

# Rochester Institute of Technology

## 1996–97 Institute Calendar

### ■ FALL QUARTER (961)

September 3	Move-In Day for New Residents
September 4	Move-In Day for Returning Students
September 4	Evening Classes Begin (5 p.m. or later)
September 5	Daytime Classes Begin
September 7	Saturday Classes Begin
September 12	Last Date to Drop/Add Courses
October 25	Last Date to Withdraw with a Grade of "W"
November 9	Last Saturday Class
November 13	Last Daytime Class
November 14	Reading Day (No Day Classes)
November 15, 16, 18, 19	Final Exams—Day Classes
November 19	Last Evening Class
November 20–December 1	Fall/Winter break

### ■ WINTER QUARTER (962)

December 2	Daytime Classes Begin
December 2	Evening Classes Begin (5 p.m. or later)
December 7	Saturday Classes Begin
December 9	Last Date to Drop/Add Courses
December 21	Last Day of Classes Before Break
January 6, 1997	Daytime Classes Resume
January 6	Evening Classes Resume (5 p.m. or later)
January 11	Saturday Classes Resume
February 7	Last Date to Withdraw with a Grade of "W"
February 21	Last Daytime Class
February 22	Last Saturday Class
February 24, 25	Final Exams—Day Classes
February 26	Reading Day (No Day Classes)
February 27, 28	Final Exams—Day Classes
February 28	Last Evening Class
March 1–9	Winter/Spring Break

### ■ SPRING QUARTER (963)

March 10	Daytime Classes Begin
March 10	Evening Classes Begin (5 p.m. or later)
March 15	Saturday Classes Begin
March 17	Last Date to Drop/Add Courses
May 2	Last Date to Withdraw with a Grade of "W"
May 16	Last Daytime Class
May 17	Last Saturday Class
May 19, 20, 21, 22	Final Exams—Day Classes
May 23	Last Evening Class
May 24	COMMENCEMENT
May 25–June 1	Spring/Summer Break

### ■ SUMMER QUARTER (964)

June 2	Daytime Classes Begin
June 2	Evening Classes Begin (5 p.m. or later)
June 7	Saturday Classes Begin
June 9	Last Date to Drop/Add for Summer Quarter Courses
July 4	HOLIDAY (No Classes)
July 5	No Saturday Class
July 25	Last Date to Withdraw with a Grade of "W"
August 11	July 4 Make-up Day (Friday Schedule Will Be Followed)
August 12	Reading Day (No Day Classes)
August 13, 14, 15	Final Exams—Day Classes
August 15	Last Evening Class
August 16	Last Saturday Class

*This material was produced, in part, through an agreement between RIT and the U.S. Department of Education.*

*RIT will admit and hire men and women; veterans; 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.*

R·I·T

Rochester Institute of Technology

**Undergraduate Bulletin**  
**1996–1997**

## About this bulletin

The academic programs, course curricula, policies and standards described in this *Undergraduate Bulletin* are in effect for students admitted to RIT during the 1996–97 academic year. The purpose of this bulletin is to provide students with a solid base of information to use in planning their undergraduate education.

Master's and doctoral degree programs, plus other post-baccalaureate offerings, are fully described in the *Graduate Studies Bulletin*, published biennially and available through the Office of Admissions.

The RIT Undergraduate Bulletin does not constitute a contract between the Institute and its students on either a collective or individual basis. It represents RIT's best academic, social and financial planning at the time of publication. Course and curriculum changes, modification of tuition, fees, dormitory, meal and other charges; plus unforeseen changes in other aspects of RIT sometimes occur after the bulletin has been printed, but before the changes can be incorporated in a later edition of the same publication. Because of this, Rochester Institute of Technology does not assume a contractual obligation with its students for the contents of this *Undergraduate Bulletin*.

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For more information concerning undergraduate study at RIT, write or phone:

**Rochester Institute of Technology**  
**Office of Admissions**  
**Bausch & Lomb Center**  
**60 Lomb Memorial Drive**  
**Rochester, N.Y. 14623-5604**  
**716-475-6631**  
**[www.rit.edu](http://www.rit.edu)**

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# An Introduction to Rochester Institute of Technology

**R**espected internationally as a world leader in career-oriented and professional education, Rochester Institute of Technology has been setting an innovative pace since 1829, when Colonel Nathaniel Rochester became the first president of the Rochester Athenaeum. In 1891, the Athenaeum merged with Mechanics Institute, which had been founded by a group of businessmen to instruct in “drawing and such other branches of studies as are most important for industrial pursuits.” In 1944, recognizing the increasingly specialized professional nature of its programs, the university adopted the name it holds today.

A private, coeducational university in upstate New York, RIT offers academic programs that combine outstanding teaching, a strong foundation in the liberal arts and sciences, modern classroom facilities and work experience gained through the university’s cooperative education program.

More than 200 different programs—including such distinctive offerings as microelectronic engineering, imaging science, computer graphics, film/video, biotechnology, physician assistant, printing management, international business management, telecommunications, and the programs of RIT’s School for American Crafts and National Technical Institute for the Deaf (NTID)—draw students from every state and more than 80 foreign countries.

Approximately 8,000 full-time undergraduate students, part-time undergraduate students and graduate students attend RIT. More than 70,000 RIT alumni, including 2,600 deaf graduates, can be found around the globe.

More than one-third of our undergraduates are transfer students from two-year colleges or other four-year institutions. About one-third are women, and adult students make up a significant proportion of the total enrollment. Our full-time undergraduate students include 1,100 deaf students, and deaf and hearing students often share the same dormitories and sometimes room together.

A nationally respected leader in professional and career-oriented education, RIT has been described as one of America’s most imitated institutions. It has been recognized by *U.S. News & World Report* as one of the nation’s leading universities and the number one comprehensive university in the East for its science and technology programs.

RIT’s cooperative education program is the fourth oldest and one of the largest in the world. We place more than 2,600 students in co-op work positions with approximately 1,400 employers every year. Each year, too, approximately 5,500 positions are listed with our Cooperative Education and Placement Office, and more than 500 companies visit RIT to conduct over 6,000 on-campus interviews.

Few universities provide RIT’s variety of career-oriented studies. Its eight colleges offer outstanding programs in business, engineering, art and design, science and mathematics, liberal arts, photography, hotel management, computer science and other areas.

As a major university, RIT offers academic opportunities that extend far beyond science and technology, including more liberal arts courses and faculty than are found at most liberal arts colleges. With a strong foundation in the humanities and social sciences, RIT students understand both technological developments and the larger philosophical and ethical issues presented by technology.

RIT’s encouragement of the appreciation of diversity is evidenced in liberal arts courses, campus events and special programs (including the annual International Banquet, Black History Month, Martin Luther King Jr. Celebration and Hispanic Heritage Week). Students are encouraged to take advantage of the many opportunities RIT provides, because the world in which they will live and work will be composed of people from many backgrounds, lifestyles and cultures.

## Colleges and Degrees

As a university, RIT is made up of separate colleges, each of which offers several academic programs. The paragraphs that follow provide an overview of each of the eight colleges and their programs.

**The College of Applied Science and Technology** (pages 15–46) offers programs in computer science; information technology; software engineering; civil engineering technology; electrical, computer and telecommunications engineering technology; mechanical engineering technology, manufacturing engineering technology; food, hotel and travel management; and packaging science. All students participate in RIT’s cooperative education program. The computer science program continues to be recognized as one of the best in the nation, and the manufacturing engineering technology program has been recognized as one of the top five in the nation in a survey sponsored by the Society of Manufacturing Engineers. Many new students enter this college as transfers from two-year schools to the college’s BS degree programs. The associate, bachelor’s and master’s degrees are awarded.

**The College of Business** (pages 47–54) offers programs in accounting, finance, information systems, international business, management, marketing and photographic marketing management. Its commitment to total quality management has been recognized with national awards. It is one of few business colleges to offer a cooperative education program. The college awards BS, MBA and MS degrees and has earned accreditation from the American Assembly of Collegiate Schools of Business (AACSB). RIT’s College of Business was ranked among the top 50 business programs in the United States by *U.S. News & World Report*’s 1996 annual guide to America’s best colleges.

## 6 Introduction

**The College of Continuing Education** (pages 55–68) awards undergraduate and graduate degrees, diplomas and certificates for courses and programs that are offered during the day, at night, on Saturdays and via distance learning in the home. Its School of Professional Studies develops unique and innovative degree programs—including applied arts and science and environmental management—for full-time students. Other college programs focus on the needs of the part-time adult student who is looking for convenience, quality and practicality.

**The College of Engineering** (pages 69–80) offers BS degree programs in electrical, computer, industrial and manufacturing, mechanical, microelectronic, and software engineering. Degree options also are offered for students interested in aerospace, environmental air quality or ergonomics specializations. A recent survey by the Semiconductor Research Corporation named RIT's microelectronic engineering program as the top program of its kind in the U.S. Starting in their third year, students in all programs participate in the cooperative education program. For those who need time to decide on a particular major, the college also offers an undeclared engineering program in the first year.

**The College of Imaging Arts and Sciences** (pages 81–100) includes the School of Art and Design, School for American Crafts, School of Photographic Arts and Sciences and School of Printing Management and Sciences. Specialized labs and darkrooms, studios, computer facilities, photo and graphic design archives, and a broad range of high-tech equipment are provided for students. Degrees include the associate, bachelor of science, master of science, bachelor of fine arts, master of science for teachers and master of fine arts. RIT is generally recognized as the top-ranked university in the nation for the study of photography.

**The College of Liberal Arts** (pages 101–110) provides a comprehensive program of liberal education that is the foundation for all RIT students' educational experience. The college also offers bachelor of science degrees in social work, criminal justice, economics, psychology, and professional and technical communication, as well as a master of science degree in school psychology. A one-year technical and liberal studies option is offered for students who are undecided about which RIT degree program to pursue.

**The College of Science** (pages 111–128) is career oriented, emphasizing the practical aspects of science and mathematics. The college offers a variety of degree programs in the sciences; mathematics and statistics; and allied health sciences, including a physician assistant program, biotechnology, polymer chemistry and other unique programs. In addition, an undeclared science option is popular with new students who want more time to decide on their major. For those who are considering a professional school of medicine, the premedical core is a set of courses required for admission to most medical, dental and veterinary schools in the U.S. The college awards associate, bachelor of science and master of science degrees, as well as the nation's only doctoral program (Ph.D.) in imaging science.

**The National Technical Institute for the Deaf** (pages 129–157) provides technical and professional programs for about 1,100 deaf students. NTID also provides extensive educational access services for deaf students who are taking courses in RIT's seven other colleges. Within NTID, students can choose from more than 30 programs, including applied accounting, applied art and computer graphics, applied computer technology, office technology, electronic publishing and printing technology, engineering technologies, ophthalmic optical finishing technology and imaging technology. They can earn a certificate, diploma or associate degree through these programs.

## Accreditation

RIT is chartered by the legislature of the State of New York and accredited by the:

New York State Education Department  
Office of Higher Education and the Professions  
Cultural Education Center, Room 5B28  
Albany, New York 12230  
518-474-5851

In addition to institutional accreditation, curricula in the colleges are accredited by appropriate professional accreditation bodies. Where applicable, specific mention of these is included in the college descriptions. Students wishing to review documents describing accreditation should contact the Office of the Associate Provost for Academic Programs.

## Research Activities

Sponsored research is a vital and integral component of RIT's research activity. Faculty and students undertake research for a variety of important reasons—to add to the body of knowledge, for professional development and to strengthen academic programs. Sponsored research, programs and projects enhance the Institute's academic programs, broaden its research resources, provide the opportunity for student participation in research, permit university/industrial partnerships and exchange of ideas, and serve the wider community in a variety of ways.

Moreover, grants and contracts provide a substantial revenue source for the university. External funding for research comes from federal and state agencies, private foundations and corporate sponsors. RIT's most active sponsors include the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Education, the Department of Defense, National Aeronautics and Space Administration (NASA), the Central Intelligence Agency (CIA), IBM, Eastman Kodak Company and the Society of Manufacturing Engineers (SME).

# Campus and Community

**H**ome to nearly one million people, the greater Rochester area is a major technical and industrial center and is well-known for its rich cultural and intellectual opportunities. Rochester is the third largest city in New York State and the home of a number of major corporations. A strong technology-based economy has made Rochester one of the 10 largest exporting cities in the U.S.

The city provides a perfect setting for students seeking a dynamic and diverse environment, with a variety of opportunities for employment, entertainment and personal growth. Large enough to include numerous restaurants, plenty of live music, movie theaters, parks, beaches and shopping areas, Rochester is also small enough to explore and enjoy. A city bus line provides convenient local transportation from campus.

Within walking distance of one another in the downtown area are the Rochester Museum and Science Center, Strasenburgh Planetarium, the Memorial Art Gallery and the International Museum of Photography. A short distance from these are the Eastman Theatre, home of the city's nationally known philharmonic orchestra, and the Strong Museum's collection of turn-of-the-century memorabilia.

The nearby mountains, Lake Ontario and the Finger Lakes provide plentiful year-round recreational opportunities.

## The Campus and Its Facilities

Conveniently located five miles from the Greater Rochester International Airport and five miles from the New York State Thruway (Interstate 90), the RIT campus is situated in a suburb only a few minutes from downtown Rochester.

The campus architecture has been described as "aesthetically flawless . . . an almost indecent collection of perfect components," including "10 million Belden iron-spot bricks." A variety of outdoor sculpture and wall tapestries, a Japanese garden and masses of spring-flowering trees soften and add interest to the landscape.

Excellent facilities and up-to-date equipment add to the quality of academic life. RIT is a leader in academic computing, and students work with state-of-the-art computer equipment regardless of their major. RIT provides computing services on VAX/VMS and VAX/ULTRIX (UNIX) systems and various microcomputers. Central computer systems can be accessed via a network connecting our library, academic facilities, 15 computer centers and microcomputer labs, and all residence halls on campus.

Wallace Library is a multimedia resource center with a collection of more than 760,000 items. Resource materials include 4,700 journal subscriptions; 410,000 microforms; 3,100 audio cassettes and recordings; 6,700 film and video titles; special collections on deafness and graphic arts; and more than 350,000 books.

Services include CD-ROM resources, interlibrary loans and computerized searching of commercial databases. An on-line catalog, Infonet, includes the library's holdings as well as access to materials in other collections. Individual carrels and small group rooms provide study spaces to more than 1,000 students.

A smaller library within Wallace Library—the Cary Library—contains more than 14,000 volumes of rare books illustrating fine printing and other materials detailing the history of printing, book design and illustration, papermaking and other aspects of the graphic arts.

During the year student art and photography is exhibited in display gallery areas. Outstanding student work is purchased and on permanent display.

RIT students also have access to a laser optics laboratory, an observatory, an animal care facility, more than 190 color and black-and-white darkrooms, computerized typesetting equipment, ceramic kilns, glass furnaces, a blacksmithing area, a student-operated restaurant, computer graphics and robotic labs, and some of the most up-to-date microelectronic and computer engineering facilities in the U.S.

## Housing and Recreational Facilities

Serving approximately 3,500 students, RIT's residence halls offer many living options to meet the diverse needs, interests and backgrounds of our students. Students may choose living arrangements according to their own lifestyles, including floor assignments by same gender, coeducational, wellness, nonsmoking, alcohol/substance free, intensified study, over 21 years of age, upper-class, ASL and mainstream (hearing and deaf students living on the same floor). Living options in Greek fraternities and sororities and special interest houses such as Art House, Community Service Clubhouse, Computer Science House, Engineering House, International House, Photo House and Unity House are also available.

RIT's Apartment Life program features one of the nation's largest university-operated apartment systems, with approximately 2,800 students residing in nearly 1,000 individual townhouse and apartment units. Apartment housing is available to students in four apartment complexes.

Our Student Life Center opened its doors in 1992, providing recreational facilities that include a gymnasium, fitness center, racquetball courts and an indoor track. Other indoor facilities include two more gyms, a swimming pool, an ice arena, wrestling rooms and a weight training room. Outdoor facilities include lighted tennis courts, an all-weather track, playing fields and a fitness trail.

# Graduation Requirements

To earn any academic credential from RIT, you must satisfy a number of requirements. Graduation requirements may vary slightly from program to program, and all students are strongly encouraged to seek out and use the academic advising resources within their colleges. In general, students should expect to satisfy the following requirements before they can graduate from RIT:

## A. Completion of academic curricula

1. Satisfactorily complete all of the courses in your academic program. General education requirements and specific course requirements for each program are identified in the following pages. This bulletin *and careful consultation with your academic adviser* provide the best resources for planning your academic program at RIT.
2. Your program curricula may include several types of courses, including cooperative education, field experience, practicums, thesis and research, and physical education. Most RIT students will need to satisfy a physical education requirement, and many academic programs require one or more quarters of cooperative education.
3. The curriculum in effect at the time of your admission into a program will normally be the one you must complete in order to graduate. Occasionally, with faculty approval, course substitutions and other minor curricular modifications may occur. Although there is no time limit within which you must complete your course requirements, the curriculum under which you are certified to graduate must be no more than seven years old.

## B. Grade point average standard

1. Successful candidates for an undergraduate degree, diploma or certificate must have a program cumulative grade point average of at least 2.0.\*
2. Graduation honors are conferred on associate and bachelor's degree recipients who achieve a 3.40 or higher program cumulative GPA.

## C. Residency and minimum earned hours

At least 45 of the credit hours used toward a degree program must be earned by successfully completing RIT courses. In addition, at least 30 of the final 45 hours of any program must be earned through RIT courses. Credit earned through transfer, credit by exam/experience, CLEP, advanced placement or audit are excluded from these residency calculations.

RIT academic programs vary as to the total number of credit hours required; however, under no circumstances will a student be allowed to graduate with a bachelor's degree with fewer than 180 cumulative earned hours (90 hours for associate degrees).

Cumulative earned hours include RIT courses, transfer credit, credit by exam/experience, CLEP and advanced placement credit.

## D. Demonstration of writing skills

Students must demonstrate, to the satisfaction of the dean of their college, that they have the writing skills needed for successful entry into their chosen careers. The criteria and standards for evaluating abilities are determined by each academic department.

## E. Full payment of all financial obligations to RIT

\*The physician assistant program requires a program cumulative grade point average of 2.8 or better.

# The Liberal Arts General Education Curriculum

The general education curriculum in the humanities and social sciences that all RIT students pursue may be best understood by examining the chart opposite. Students in associate and baccalaureate degree programs complete the entire liberal arts curriculum, or a modification of it, as a component of their particular degree programs. Academic advisers in the College of Liberal Arts and in other colleges help students interpret the liberal arts curriculum as it applies to their degree programs.

The basic curriculum consists of 14 courses (54 quarter credits) arranged in five groups:

1. English Composition
2. A core curriculum of six foundation courses in the humanities and social sciences (200- and 300-course numbers)
3. A disciplinary or interdisciplinary concentration of three advanced courses (400-course numbers)
4. Three advanced electives (400- and 500-course numbers)
5. The Liberal Arts Senior Seminar and Project

Specific required core curriculum courses are listed below (six must be selected):

**Literature:** one course required

**Fine Arts:** one required from Visual Arts, Musical Arts, Film Arts or Theatre Arts

**History:** one required from either Modern American or Modern European history

**Philosophy:** one required from Ethics, Critical Thinking or Selected Issues or one required from Science, Technology and Values

**Social Sciences:** two required from Principles of Economics I, American Politics or Political Decision Making, Introduction to Psychology, Foundations of Sociology or Cultural Anthropology

## Concentration

A concentration is a group of closely related advanced courses from which a student will choose three.

A concentration is pursued in the third, fourth or fifth year of the baccalaureate programs and can take either of the following forms:

1. **Disciplinary Concentration**—three related courses in a single discipline leading to in-depth knowledge of the methods, problems and achievements of that mode of inquiry
2. **Interdisciplinary Concentration**—three related courses from different disciplines, each one of which speaks to some aspect of a common area, subject or topic

## Senior seminar and project

The purposes of the Senior Seminar and Project are:

1. to give seniors the opportunity to prepare papers or projects that call for analysis and synthesis and for the application of their liberal arts experience to major issues that may affect their professional careers,
2. to provide seminars for all senior students on a general theme and
3. to provide an advanced experience of problem solving and value clarification.

The Senior Seminar is designed and implemented each year by a faculty committee. The seminar topic may change from one year to another.

## Academic advising

Liberal arts requirements vary within the individual degree programs on campus. Therefore, it is important that students carefully plan their liberal arts program to meet their specific degree requirements. Staff are available every day in the College of Liberal Arts' Academic Advising Office, on the second floor of the Liberal Arts Building, to provide assistance in planning and selecting appropriate liberal arts courses.

Through this office, the college also provides a course-description handbook with specific information about all liberal arts courses and academic worksheets for each degree program to help students maintain records.

English Composition
4 credits

**Core Requirements**  
6 foundation courses; 4 credits each  
(200- and 300-course numbers)

HUMANITIES REQUIREMENTS  
(4 courses)

Philosophy or Science, Technology and Values	History	Literature	Fine Arts
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SOCIAL SCIENCES REQUIREMENTS  
(Each student will choose 2 of the 4 courses)

Psychology	Economics	Political Science	Sociology/ Anthropology
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3-course concentration with prerequisites, 4 credits each  
(400-course numbers)

concentration	concentration	concentration
---------------	---------------	---------------

The concentration may be in a disciplinary or interdisciplinary area

3 electives, 4 credits each  
(400- and 500-course numbers)

elective	elective	elective
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Senior Seminar and Project 2 credits
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# The Mathematics and Science General Education Curriculum\*

The general education curriculum in mathematics and science is a component of all RIT **bachelor of science degree** programs and is completed through one of the three options described below. These options offer a balance between mathematics and science. Students should consult with their individual program chairperson or academic adviser for specific course requirements and approved sequences.

(Required minimum number of credits in parentheses)

## Plan A: Balanced (22)

1. Mathematics—One three-course sequence (10)
2. Science—One three-course sequence (9) and associated laboratories (3)

## Plan B: Emphasis on Science (20)

1. Mathematics—One two-course sequence (6)
2. Science—One two-course sequence (6) and associated laboratories (2)  
Two additional science electives (6)

## Plan C: Emphasis on Mathematics (22)

1. Mathematics—One two-course sequence (6)  
Two additional mathematics electives (8)
2. Science—One two-course sequence (6) and associated laboratories (2)

\* The RIT Mathematics and Science General Education Curriculum requirement applies to all students pursuing the bachelor of science degree. Students in bachelor of fine arts programs need not complete this requirement.

# Physical Education Requirements

RIT recognizes the need for physical fitness and recreation in today's society. To meet this demand, RIT offers an exceptional program of courses to help the student develop and maintain fitness, acquire physical skills in a variety of lifetime activities, and provide principles and elements for utilizing free time in an enjoyable and constructive manner.

The PE requirement is built on the premise that the attainment of good health and fitness are basic elements in the pursuit of excellence in many aspects of life. The learning experiences provided through the physical education curriculum are an integral part of the total educational experience at RIT.

## Baccalaureate degree

All candidates for the baccalaureate degree must successfully complete one of the following three wellness options: (1) Total Fitness; (2) Health: Mind-Body Connection; or (3) Sports Biology plus two different activity courses. This requirement is normally met during the first and second years at RIT, but may be completed at any time during succeeding academic years.

## Associate degree

All candidates for the associate degree are required to successfully complete one wellness component and one activity course. This requirement is normally met during the first year at RIT but may be completed at any time during succeeding academic quarters.

## Transferred activity

In general, physical education courses taken at other schools will be accepted in transfer at RIT. Students transferring to RIT as third-year students are required to successfully complete one wellness course and one activity course if they do not have sufficient physical education transfer credits or have not earned a baccalaureate degree at another institution. Decisions regarding college transfer of health, wellness or activity courses will be based on the course description of the college from which the student is transferring and reviewed for decision by the physical education director.

Other forms of physical education experience may be evaluated by the Center for Physical Education and accepted in lieu of PE course work, as long as the experience was completed no more than one year before matriculation.

## Permanent medical excuse

A medical excuse may exempt a student from participation in the required *activities* segment of the physical education requirement. This will be granted only by RIT's Student Health Center. One copy of the medical excuse should be filed with the Center for Physical Education and the other copy taken to the student's academic department. Medical excuses from a family physician will not be accepted. **Note:** the wellness component will still be required.

## Intercollegiate athletics

Students participating in the Institute's intercollegiate athletic programs will be granted physical education credit for the season(s) of participation. The successful completion of one wellness component is required.

## Veterans

Students who have completed six months or more of active military duty are not required to participate in the physical education program, but may voluntarily enroll in any course on a space-available basis.

## Age

Students who are 25 or older at the date of matriculation are exempt from the physical education requirements but may enroll in any courses on a space-available basis.

## Part-time status

Nonmatriculated students are exempt from the physical education requirement.

# Cooperative Education Requirements

Many academic programs at RIT require that students participate in the university's cooperative education program. Other academic programs may offer co-op as an option or have no co-op requirements. Cooperative education involves alternating quarters of classroom study and paid employment in a position related to the student's academic program. Requirements are outlined under each program listing in this bulletin.

# Academic Programs of Study

The academic programs, course curricula, policies, and standards described in this *Undergraduate Bulletin* are in effect for students admitted to RIT during the 1996–97 academic year. The purpose of this bulletin is to

provide students with a solid base of information to use in planning their undergraduate education. Enrollment in other than registered or approved programs may jeopardize a student's eligibility for certain student aid awards.

Undergraduate Programs	College	Degree and HEGIS							Eve. Option	Page
		Cert.	Dipl.	AOS	AS	AAS	BFA	BS		
Applied Accounting	NTID		5002			5002				142
Applied Art & Computer Graphics	NTID		5012			5012				136
Applied Arts & Science	Continuing Education		5699			5699		4999	Y	57
Applied Computer Technology	NTID	5101	5101			5101				138
Architectural Drafting	NTID		5304							145
Architectural Technology	NTID					5304				146
Biochemistry	Science							0414		117
Biology	Science				5604			0401		113
Biomedical Photographic Communications	Imaging Arts & Sciences					5299		1217		89
Biotechnology	Science				†			0499		114
Business Administration	Continuing Education					5001			Y	60
Accounting	Business, Continuing Education					5002		0502	Y	49
Finance	Business							0504	Y	50
Information Systems	Business							0599	Y	51
International Business	Business							0513	Y	53
Management Business	Business								0506	52
Marketing	Business, Continuing Education					5004		0509	Y	52
Photo Marketing Management	Business							0509	Y	54
Business Occupations	NTID	5005								142
Business Technology	NTID			5004						144
Ceramics & Ceramic Sculpture	Imaging Arts and Sciences					5610	1009			86
Chemistry‡	Science				5619			1905	Y	115
Civil Technology	NTID					5309				147
Communication, Technical										
Basic	Continuing Education	5008							Y	65
Advanced	Continuing Education	5008							Y	65
Communication, Professional & Technical	Liberal Arts							0601		107
Communications, Public Relations										
Graphic Communication	Continuing Education	5008							Y	65
Professional Writing	Continuing Education	5008							Y	65
Computer Science‡	Applied Science & Technology				5101			0701	Y	16
Computing, Biomedical	Science							1217		123
Craft Major, Double	Imaging Arts & Sciences						1009			86
Criminal Justice	Liberal Arts							2105		102
Deaf Studies	Continuing Education	5506							Y	66
Design										
Graphic	Imaging Arts & Sciences					5012	1009			84
Industrial	Imaging Arts & Sciences					5012	1009			84
Interior	Imaging Arts & Sciences					5012	1009			84
Diag. Medical Sonography (Ultrasound)	Science	5299				†		1299		127
Economics	Liberal Arts							2204		106
Educational Interpreting	NTID					5506				147
Electromechanical Technology	NTID					5311				150
Electronic Publishing & Printing Technology	NTID	5009	5009	5009		5009				148
Emergency Management	Continuing Education	5508								62
Engineering										
Computer Engineering‡	Engineering							0999		72
Electrical Engineering‡	Engineering							0909		73
Industrial Engineering‡	Engineering							0913		75
Mechanical Engineering‡	Engineering							0910		76
Microelectronic Engineering	Engineering							0999		78
Software Engineering	Engineering & Applied Science & Technology								0999	18, 79

Continued on next page

# 14 Academic Programs of Study

Undergraduate Programs	College	Degree and HEGIS							Eve. Option	Page
		Cert.	Dipl.	AOS	AS	AAS	BFA	BS		
Engineering Science	Engineering				5609				Y	70
Engineering Technology										
Civil Engineering Technology	Applied Science & Technology						0925			21
Computer Engineering Technology	Applied Science & Technology					5399		0925	Y	26
Electrical Engineering Technology	Applied Science & Technology							0925	Y	23
Electrical Technology	Applied Science & Technology					5310			Y	25
Electrical/Mechanical Technology	Applied Science & Technology							0925	Y	29
Manufacturing Engineering Technology	Applied Science & Technology							0925	Y	31
Mechanical Engineering Technology	Applied Science & Technology							0925	Y	32
Mechanical Technology	Applied Science & Technology					5315			Y	33
Telecommunications Engineering Technology	Applied Science & Technology							0925		27
Environmental Management	CCE/Professional Studies							0420	Y	67
Film & Video	Imaging Arts & Sciences					5008	1010	1010		90
Fine & Applied Arts & Crafts	Continuing Education		5012						Y	67
Food Management	Applied Science & Technology					5404		1307		35
Food Marketing & Distribution	Applied Science & Technology							1307		36
General Education (AA Degree)	Continuing Education					5699			Y	63
General Management	Continuing Education						5004		Y	60
Glass	Imaging Arts & Sciences					5012	1009			86
Health Systems Administration	Continuing Education	5299							Y	62
Hotel and Resort Management	Applied Science & Technology					5010		0508		37
Illustration	Imaging Arts & Sciences					5610	1002			84
Imaging Science	Science							1011		128
Imaging Technology	NTID		5007	5007		5007				154
Imaging & Photographic Technology	Imaging Arts & Sciences					5007		1011		90
Imaging Systems Management	Imaging Arts & Sciences							0599		92
Industrial Drafting	NTID		5303							151
Industrial Drafting Technology	NTID			5303		5303				151
Information Technology	Applied Science & Technology					5101		0699	Y	42
Logistics & Transportation Mgmt.	Continuing Education					5004			Y	60
Management Development	Continuing Education	5004	5004						Y	59
Manufacturing Processes	NTID		5312							153
Manufacturing Processes Technology	NTID			5312						153
Mathematics										
Applied Mathematics‡	Science					5617		1703		121
Computational Mathematics‡	Science							1703		121
Medical Illustration	Imaging Arts & Sciences						1299			85
Medical Technology	Science				†			1223		124
Metalcrafts & Jewelry	Imaging Arts & Sciences					5012	1009			86
Newspaper Operations Management	Imaging Arts & Sciences							0699		98
Nuclear Medicine Technology	Science	5299				†		1299		125
Nutrition Management	Applied Science & Technology					5404		1306		39
Office Technologies	NTID		5005			5005				144
Ophthalmic Optical Finishing Technology	NTID	5212	5212	5212		5212				139
Packaging Science	Applied Science & Technology							4999		41
Painting, Printmaking	Imaging Arts & Sciences					5610	1002			84
Personnel Administration	Continuing Education					5004			Y	60
Photographic Illustration, Professional	Imaging Arts & Sciences					5007	1011			93
Advertising Photography Option	Imaging Arts & Sciences									93
Fine Art Photography Option	Imaging Arts & Sciences									94
Photojournalism Option	Imaging Arts & Sciences									94
Physician Assistant	Science							1299		125
Physics	Science					5619		1902		122
Polymer Chemistry‡	Science							1907		118
Printing Management	Imaging Arts & Sciences					5009		0699		96
Printing & Applied Computer Science	Imaging Arts & Sciences							0699		99
Printing Systems	Imaging Arts & Sciences							0699		97
Production Management	Continuing Education					5004			Y	60
Psychology	Liberal Arts							2001		109
Quality, Basic	Continuing Education	5004							Y	59
Quality Implementation	Continuing Education	5004							Y	59
Real Estate**	Continuing Education								Y	60
Social Work	Liberal Arts							2104		104
Statistics, Applied‡	Science							1702		122
Travel & Tourism Management	Applied Science & Technology					5011		0510		38
Weaving & Textile Design	Imaging Arts & Sciences					5012	1009			86
Woodworking & Furniture Design	Imaging Arts & Sciences			5317		5012	1009			86

\* Higher Education General Information Survey

† Students in these programs may receive an AS in general science (HEGIS #5649) upon successful completion of the first two years.

‡ Dual degrees (BS/MS) option also available

\*\* Courses offered for NYS licensing

# College of Applied Science and Technology

*Wiley R. McKinzie, Dean*

The College of Applied Science and Technology (CAST) provides programs that stress the development, integration and implementation of technology in areas ranging from the manufacturing environment to a global service economy. Modern technology is a focal point in each CAST program. This technology is used to provide the productive manufacture and distribution of durable and consumable goods and the proper flow of many forms of information worldwide and to enhance customer satisfaction in the service sector.

The college includes computer science; information technology; civil engineering technology; electrical, computer and telecommunications engineering technology; mechanical engineering technology; manufacturing engineering technology; food, hotel and travel management; and packaging science. The college has programs at the associate, baccalaureate and master's degree levels. The department of military science (Army ROTC) and the department of aerospace studies, ROTC, are also part of the college.

## **Resources**

The experiential nature of all of the programs in the College of Applied Science and Technology requires excellent facilities and equipment. The Institute continually updates and adds equipment to maintain laboratories that contain state-of-the-art equipment. Engineering technology programs share facilities with the College of Engineering, with additional laboratories in CAD/CAM systems, robotics, controls, soils and telecommunications. CAD laboratories based on workstations support a number of courses. Extensive computer facilities are dedicated to academic support of undergraduate and graduate computer science and their related programs. The packaging science laboratories have some of the most advanced and sophisticated packaging testing equipment in the country.

Food product development laboratories allow students to create menu items designed to serve the growing foodservice industry. Information laboratories provide data that enables students to assess the supply and demand for food commodities throughout the world.

## **Acceptance of the associate degree**

All units within CAST strongly encourage the transfer of students from two-year colleges. Most CAST programs give students with an appropriate associate degree full junior standing, and such students are eligible to graduate from RIT in two academic years, plus the required co-op experience. Students with a less appropriate academic background may have to complete additional course work.

## **Faculty**

Faculty members in CAST have had considerable experience in their respective industrial fields and/or teaching in two-year and four-year colleges and have completed graduate programs in their various specialties. All are committed to rigor and academic excellence. While teaching is their

primary concern, they serve as active industrial consultants and researchers to maintain current knowledge in their fields. The faculty are committed to student growth and development.

## **Program planning**

Each student in CAST is considered individually when his or her program is planned. The variety of subject backgrounds from the two-year colleges necessitates an almost tailor-made pattern of courses and knowledge to assure that associate degrees retain the integrity they deserve and to guarantee, as far as possible, that previously studied material will not be repeated.

## **Advising**

The College of Applied Science and Technology provides advising services throughout a student's academic career. The faculty adviser, the co-op adviser and the departmental offices each provide a part of that advising. In the departmental offices, all students are assured of the administrative support to effectively deal with registration, records and scheduling. A faculty adviser, who is uniquely prepared to offer career counseling in the major field of study, is assigned to each student. The Office of Cooperative Education and Career Services assigns each co-op student an adviser, who assists in the placement process. With a prearranged appointment, part-time students will find advisers available during the evening. Each of these advisers will also help to identify appropriate RIT support services for specific student needs.

# Computer Science

The department of computer science offers programs leading to bachelor's and master's degrees in two fields. A bachelor of science in computer science is available, as well as a bachelor of science in software engineering through a program offered jointly with the College of Engineering. Master of science degree programs are offered in computer science as well as software development and management.

At the undergraduate level, the programs are offered to high school and two-year college graduates, as first-year and upper-division students, respectively, and to part-time students in an evening format.

The demands of industry and government require college graduates to have a mastery of both the fundamentals and the applied aspects of their profession. To meet this requirement, two applied educational experiences are woven into the program. Each student is required to complete a well-defined cooperative educational experience as well as an extensive set of "hands-on" laboratory experiences. The laboratories that support these experiences are limited to 15 students each and provide an effective means of student-faculty interaction.

Facilities dedicated exclusively to the support of undergraduate computer science (in addition to those provided by Information Services and Computing, listed in the Counseling and Academic Services section of this catalog) include:

- **Three teaching laboratories**, each with 15 SUN workstations to support formal, closed laboratory instruction, emphasized in the first two years of the curriculum;
- **Open computing laboratory** with seven SUN and 12 SGI Indy workstations to support open computing and occasional formal, closed laboratory instruction for large groups;
- **Networking and distributing systems laboratory** focusing on the study of data communications and networking strategies utilizing SUN workstations and file server as networking tools;
- **Digital logic laboratory** offering a hands-on opportunity for students to appreciate and understand the computer equipment they work with throughout the program. This lab is designed for nonengineering students;
- **CS learning laboratory**, an area in the computer science laboratory space for students and faculty to meet informally for help sessions and other discussions.

Undergraduate computer science has focused on the use of the UNIX operating system because of its applicability to software development. All of the above facilities support UNIX. Computer science students also have access to the high-end PC and Macintosh machines in the information technology labs.

All computer science and information technology facilities are connected by a high-speed Ethernet network through which students also access off-campus networks such as NYSERNET and the Internet. There are also 77 dial-in modems that allow students remote access to our computers and networks.

# Computer Science

Walter A. Wolf, Chair

The bachelor of science program, which is fully accredited by the Computer Science Accreditation Board (CSAB), attracts students who are interested in both the mathematical theory and technical applications of computer science. Most employers look for students who not only are good computer scientists, but also understand the tools and techniques of mathematics, science and industry and are able to communicate effectively. The BS program, then, is for the mathematically adept student who wishes to become a computing professional with knowledge of relevant applications areas. The program also is attractive to students transferring to RIT with an associate degree in computer science backed up by significant course work in mathematics and science.

Computer science covers a wide spectrum of the field of computing. A computer scientist can specialize in areas such as data communications and networking, software engineering, parallel computation, digital systems design and computer architecture, systems software, programming languages, computing theory, computer graphics and artificial intelligence. It is important to note that programming is a necessary tool but is only a part of the vast field of computer science.

An undergraduate computer science student is required to take a core of computer science courses that provides a solid foundation for advanced work. Building on this base, students can explore a variety of specializations in their junior and senior years, choosing one of eight concentration sequences. In addition, students have the opportunity to develop a broad appreciation of computer applications and the effects of computers on society via computer science electives, liberal arts courses and a non-computer-science concentration in a second discipline.

**Cooperative education**

All students in undergraduate computer science are required to obtain credit for one year (four quarters) of cooperative education prior to graduation. To help ensure that the goals of integrated academic and experiential education are attained, students must attend classes at RIT for at least one quarter after their final co-op block.

**Combined BS/MS degree program**

Computer science also offers a combined BS/MS program, which gives students the opportunity to receive both degrees in six years, including a year of co-op. A student accepted into this program will be able to take three graduate courses (12 credits) and apply them to both the BS and MS, reducing the total course work required for the two degrees. To be accepted into this program a student must be actively pursuing a BS degree in computer science at RIT, be eligible for co-op and have a grade point average of at least 3.3, overall and in the major.

**Evening programs**

The AS and BS programs may be taken on a part-time basis during the evening hours by those who are employed full time and desire a degree. The typical evening student requires approximately 13 quarters to complete all the course requirements for an associate-level degree and approximately 25 quarters for a BS degree (this assumes no previous course work).

Students with a strong associate degree in computer science can complete the BS degree requirements in 13 quarters.

**Computer science, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 0603-101	1
Computer Science 1, 2, 3 0603-231, 232, 233	12
Calculus I, II, III 1016-251, 252, 253	12
University Physics I, II & Lab 1017-311, 312, 375, 376 or Chemical Principles I, II & Lab 1011-211, 212, 205, 206	8-10
English Composition 0502-220	4
Liberal Arts * [1]	12-20
Physical Education Electives †	0
<i>Second Year</i>	
Computer Science 4 0603-334	4
Software Engineering 0603-361	4
Intro. to Digital Design 0603-351	3
Computer Organization 0603-352	3
Professional Communication for CS and SE 0603-341	4
University Physics III & Lab 1017-313, 377 or Organic Chemistry & Lab 1011-213, 207 or General Biology & Lab 1001-201, 202, 203, 205, 206, 207	4-12
Discrete Mathematics I, II 1016-265, 266	4
Probability & Statistics 1016-351	4
Liberal Arts * [1]	0-8
Free Elective	4
Physical Education Electives †	0
<i>Third, Fourth, Fifth Years</i>	
Introduction to Computer Science Theory 0603-380	4
Operating Systems 0603-440	4
Data Communication Systems 0603-420	4
Programming Language Concepts 0601-450	4
Computer Science Concentration [2]	8-12
Computer Science Electives [3]	12-16
Non-CS Concentration [4]	16
Liberal Arts *	26
Science Electives	8
Free Elective [5]	4
Cooperative Education (4 quarters required)	Co-op
<b>Total Quarter Credit Hours</b>	<b>193-196</b>

- [1] Students electing physics or chemistry should take 12 credits of liberal arts the first year and 8 the second. Those choosing biology should take 20 credits of liberal arts the first year and none the second year.
- [2] The computer science concentration consists of one of the following course sequences:  
 Software Engineering  
     Software Specification & Design 0603-510  
     Software Testing & Quality Assurance 0603-511  
     Software Engineering Project Laboratory 0603-555  
 Networking and Distributed Systems  
     Operating Systems Laboratory 0603-540  
     Introduction to Computer Networks 0603-541  
     Distributed Systems Laboratory 0603-542  
 Parallel Computing  
     Introduction to Parallel Computing 0603-531  
     Parallel Algorithms & Program Design 0603-532  
 Computer Graphics  
     Introduction to Computer Graphics 0603-570  
     Computer Graphics Laboratory 0603-571  
 Artificial Intelligence  
     Artificial Intelligence 0603-455  
     Expert Systems 0603-456  
 Digital Systems Design  
     Digital System Design 0306-561  
     Computer Architecture 0603-520  
     Intro. to VLSI Design 0306-630  
 Computer Science Theory  
     Formal Languages 0603-480  
     Analysis of Algorithms 0603-515  
 Systems Software  
     Computer Architecture 0603-520  
     Operating Systems Laboratory 0603-540  
     Language Processors 0603-580
- [3] Computer science courses may be taken as computer science electives except as noted in the Course Descriptions portion of this bulletin.
- [4] A non-CS concentration consists of a set of coherent courses giving the student significant expertise in an area other than computer science. Typical concentrations include mathematics, engineering technology and business.
- [5] Any course open to computer science majors may be taken as a free elective.  
 \* See page 10 for liberal arts requirements.  
 † See page 11 for policy on physical education.

**Computer science, AS degree, evening program, typical course work**

<i>COMPUTER SCIENCE</i>	<i>Quarter Credit Hours</i>
Computer Science 1, 2, 3, 4 0603-231, 232, 233, 334	16
Software Engineering 0603-361	4
Intro. to Digital Design 0603-351	3
Computer Organization 0603-352	3
<i>MATHEMATICS &amp; SCIENCE</i>	
Probability and Statistics 1016-351	12
Discrete Mathematics 1016-265, 266	8
Physics I, II, III 1017-311, 312, 313, 375, 376, 377 or Chemistry I, II, III 1011-211, 212, 213, 205, 206, 207 or Biology I, II, III 1001-201, 202, 203, 205, 206, 207	15
<i>LIBERAL ARTS</i>	
Communications 0236-220 or 0502-220	4
Introduction to Literature 0235-260 or 0504-332	4
Humanities Electives	12
Social Science Electives	8
<b>Total Quarter Credit Hours</b>	<b>90-93</b>

**Computer science, BS degree, evening program,  
typical course work**

<i>COMPUTER SCIENCE</i>	<i>Quarter Credit Hours</i>
Computer Science 1, 2, 3, 4 0603-231, 232, 233, 334	16
Software Engineering 0603-361	4
Intro. to Digital Design 0603-351	3
Computer Organization 0603-352	3
Intro. to CS Theory 0603-380	4
Programming Language Concepts 0601-450	4
Data Communications 0603-420	4
Operating Systems 0603-440	4
Computer Science Concentration	8-12
Computer Science Electives	12-16
 <i>LIBERAL ARTS</i>	
Communications 0236-220 or 0502-220	4
Introduction to Literature 0235-260 or 0504-332	4
Humanities Electives	12
Social Science Electives	8
Liberal Arts Electives *	12
Liberal Arts Concentration *	12
Senior Seminar *	2
 <i>MATHEMATICS &amp; SCIENCE</i>	
Probability and Statistics 1016-351	12
Discrete Mathematics 1016-265, 266	8
Science Electives	8
Physics I, II, III 1017-311, 312, 313, 375, 376, 377	15
or	
Chemistry I, II, III 1011-211, 212, 213, 205, 206, 207	12
or	
Biology I, II, III 1001-201, 202, 203, 205, 206, 207	12
 <i>OTHER</i>	
Professional Communication for CS & SE 0603-341	4
Free Electives	8
Non-CS Concentration	16
Co-op Work Experience (4 quarters)	Co-op
<hr/> <i>Total Quarter Credit Hours</i>	<hr/> 193-196

\* See page 10 for liberal arts requirements.

## Software Engineering

Michael J. Lutz, Coordinator

As software becomes ever more common in everything from airplanes to appliances, there has been increasing demand for engineering professionals who can develop high-quality, cost-effective software systems. In response to this demand, the departments of computer science and computer engineering at RIT have created a unique program that combines traditional computer science and engineering with specialized course work in software engineering. Graduates of this program receive a bachelor of science degree in software engineering.

Students learn principles, methods and techniques for the construction of complex and evolving software systems. The program encompasses both technical issues affecting software architecture, design and implementation, as well as process issues that address project management, planning, quality assurance and product maintenance. Students are prepared upon graduation for immediate employment and long-term professional growth in software development organizations.

An important component of the curriculum is complementary course work in related disciplines. As with other engineering fields, mathematics and natural science are fundamental. In addition, students must complete four courses in related fields of engineering. Three computer-engineering courses expose students to basic hardware design and computer architecture. A human factors course from industrial engineering introduces students to experimental and analytical techniques for evaluating human/computer interactions. Finally, a three-course sequence in an application domain helps connect software engineering principles to an area where they are applied.

## Laboratories

Students in software engineering have access to general campus-wide computing facilities, as well as the specialized laboratories supporting both computer science and computer engineering. These laboratories house state-of-the-art equipment for small-group instruction and experimentation. As the program evolves, facilities dedicated to software engineering will be created, as well.

All of these laboratories are connected to the campus-wide network, and from there to the Internet. Students can use their accounts to access Internet resources such as electronic mail, file transfer and the World Wide Web. Indeed, many departments on campus use the Internet as a means of dissemination and communication.

## Cooperative Education

All students in the software engineering program must complete five quarters of cooperative education prior to graduation. Student typically begin co-op in their third year of study, alternating academic quarters and co-op blocks. To ensure that co-op is integrated with the academic program, students must complete their final co-op block prior to their last academic quarter.

## Software engineering, BS degree, typical course sequence

First Year	Quarter Credit Hours
Freshman Seminar 3010-101	1
Computer Science 1, 2, 3 0603-231, 232, 233	12
Calculus I, II, III 1016-251, 252, 253	12
College Chemistry I 1011-208	4
University Physics I, II & Lab 1011-311, 312, 375, 376	10
English Composition 0502-220	4
Liberal Arts *	8
Physical Education Electives †	0
<b>Second Year</b>	
Engineering of Software Subsystems 3010-362	4
Computer Science 4 0603-334	4
Professional Communications 0603-341	4
Software Engineering 0603-361	4
Assembly Language Programming 0306-250	4
Introduction to Digital Systems 0306-341	4
Differential Equations 1016-306	4
Discrete Mathematics I, II 1016-365, 366	8
University Physics III & Lab 1017-313, 377	5
Liberal Arts *	8
Physical Education Electives †	0
<b>Third, Fourth, Fifth Years</b>	
Principles of Software Architecture 3010-440	4
Formal Methods of Specification & Design 3010-420	4
Software Requirements & Specification 3010-455	4
Software Engineering Project 1, 2 3010-561, 562	8
Software Engineering Electives ‡	20
Scientific Applications Programming 0603-319	4
Programming Language Concepts 0603-450	4
Computer Architecture 0306-522	4
Human Factors 0303-516	4
Probability & Statistics 1016-351	4
Application Domain Electives §	12
Free Elective	4
Liberal Arts *	18
Cooperative Education (5 quarters required)	Co-op
<b>Total Quarter Credit Hours</b>	<b>194</b>

\* See page 10 for liberal arts requirements.

† See page 11 for physical education policy.

‡ Students must choose five of the following six courses:

Principles of Concurrent Software Systems 3010-411

Principles of Distributed Software Systems 3010-442

Principles of Information Systems Design 3010-443

Software Process & Product Metrics 3010-450

Software Verification & Validation 3010-452

Software Requirements & Specification 3010-455

§ Each student must complete a three-course sequence in an application domain related to software engineering. Current domains include electrical engineering, industrial engineering, mechanical engineering, communications and networks, embedded systems and commercial applications.

# Engineering Technology

RIT is a leader in the development of baccalaureate programs in engineering technology. The bachelor of science degree in engineering technology meets the growing need of business and industry for engineering technologists at the baccalaureate level.

## Degree programs

Engineering technology at RIT offers five-year cooperative education programs leading to the bachelor of science (BS) degree in:

- civil engineering technology
- computer engineering technology
- electrical engineering technology
- mechanical engineering technology
- manufacturing engineering technology
- telecommunications engineering technology

The upper division of these programs is designed to accept graduates of associate degree programs in similar engineering technology fields and to provide continued study in the student's specialization. Each program consists of a balance of professional studies, liberal education, mathematics and on-the-job experience. Through the selection of technical electives, students can build and tailor their program based on previous knowledge and co-op experience to launch a career that best meets their needs and aspirations.

## Upper-division evening programs

The following upper-division (junior-senior) programs are offered during the evening hours for part-time students:

- electrical engineering technology
- manufacturing engineering technology
- mechanical engineering technology
- telecommunications engineering technology
- electrical/mechanical technology

These programs allow students with full-time jobs to obtain a BS degree on a part-time basis.

With the exception of the cooperative education and physical education requirements, requirements for the evening program and graduation are the same as for the full-time day program.

## Lower-division evening programs

Engineering technology offers the following lower-division evening programs:

- electrical technology
- mechanical technology
- manufacturing technology

These programs allow students with full-time jobs to obtain an AAS degree on a part-time basis.

Certificate programs are also available during the evening and award certificates to students who complete a sequence of courses in a single discipline and who do not desire to complete a degree. Further details on these certificates can be found in the RIT Part-time Studies Guide.

Additional part-time program information is provided in individual program descriptions on the following pages. Persons wishing further information on part-time evening studies should contact the appropriate department office.

### Accreditation

The following baccalaureate programs are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET): civil engineering technology, computer engineering technology, electrical engineering technology, manufacturing engineering technology, mechanical engineering technology and telecommunications engineering technology. While RIT has not sought professional accreditation for the engineering technology associate programs, they have been designed to facilitate easy transfer for students to the BS programs. Students enrolled in the engineering technology associate degree programs may transfer all of their credits to the TAC of ABET-accredited bachelor of science degree program in the appropriate field.

### Careers

The bachelor's degree graduate—an engineering technologist—is a distinct type of professional whose main concern and interest is with existing operation, maintenance and management of products and processes. As such, the graduate qualifies for positions to fulfill a role within the broad engineering requirements of business, industry and government. Graduates find increasing acceptance in positions formerly filled by engineers in such fields as sales engineering, manufacturing engineering, field service engineering, process engineering and product engineering.

The associate degree graduate—an engineering technician—works closely with engineers and technologists and is prepared for positions requiring skills in fabricating and producing equipment as well as maintaining and operating apparatus and systems.

### Cooperative education plan

An integral and significant part of each engineering technology program is on-the-job experience through RIT's cooperative education plan. This involves alternate periods of study and related industrial employment.

The co-op plan provides opportunity for students to learn and become familiar with direct application of techniques, skills and the latest developments in their fields. Students are encouraged to explore and test the wide range of opportunities available. Such things as the specific type of work, the size of the company, the location and familiarization with the industrial community and environment can and do affect an individual's decision on the direction of his or her career. Co-op can provide a suitable trial ground.

Co-op can also provide a significant income during work periods, which helps defray a major portion of one's educational expenses.

Each student is helped to find work related to specific career goals. However, as is the case in any employment situation, the major impetus must come from the individual. The typical co-op schedule for engineering technology students is shown in the chart below.

### Cooperative education plan— engineering technology

Year	Fall	Winter	Spring	Summer
1 and 2	RIT	RIT	RIT	—
3	RIT	RIT	Co-op	Co-op
4 *	RIT	Co-op	RIT	Co-op
5	Co-op	RIT	RIT	—

\* Students in computer engineering technology will co-op in the Fall Quarter and attend classes in Winter Quarter in Year 4.

## Undeclared Engineering Technology Option

James F. Scudder, Coordinator

Students interested in engineering technology but who have difficulty selecting a specific major should consider this option. It allows students to spend up to a year earning credits applicable to all programs while exploring the various options available at RIT. During the first quarter, students take basic technical skills courses in both electrical and mechanical disciplines. They also participate in an Engineering Technology Seminar in which they explore the unique characteristics of each discipline offered within the department. After the first quarter, students are expected to select a specific major or to focus on either the electrical (computer, electrical, telecommunications) or mechanical (civil, manufacturing, mechanical) disciplines. During the Spring Quarter, they are required to select a specific major. In their first two years, students take some courses at different times than students who entered a specific program. In most cases, however, students who spend a full year in the undeclared option are able to start their junior year on track with other students in the same program.

### Undeclared engineering technology, freshman year course sequence

Fall Quarter	Quarter Credit Hours
English Composition 0502-220	4
Engineering Graphics 0608-210	4
Electrical Fabrication Techniques 0618-220	2
College Algebra & Trigonometry 1016-204	4
Engineering Technology Seminar 0606-101	2
<b>Winter Quarter</b>	
<b>Electrical Students</b>	
Literature 0504-332	4
College Physics I 1017-211, 271	4
Introduction to Programming 0602-208	4
DC Circuits 0609-201	4
<b>Mechanical Students</b>	
Literature 0504-332	4
College Physics I 1018-211, 271	4
Introduction to CAD 0617-260	4
Computer Programming Elective	4
<b>Spring Quarter</b>	
<b>Electrical Students</b>	
Introduction to Statics 0610-302	4
AC Circuits 0609-202	4
Digital Fundamentals 0618-301	4
Calculus for Technologists I 1019-420	4
<b>Mechanical Students</b>	
Introduction to Statics 0610-302	4
Analytic Geometry 1016-288	4
College Physics II 1017-212, 272	4
Liberal Arts (Core) *	4
<b>Total Quarter Credit Hours</b>	<b>48</b>

\* See page 10 for liberal arts requirements.

# Civil Engineering Technology

Robert H. Easton, Chair, Civil Engineering Technology Baccalaureate Program

## Background

The civil engineering profession requires the services of many individuals with a wide range of backgrounds and interests: technicians, technologists and engineers.

The technologist translates the innovative concepts of the engineer into functioning systems and structures, using the language of codes, working drawings and specifications.

Students may choose one of five elective paths that meet their specific interests. Combined with a broad-based civil engineering technology core curriculum, this approach provides a good entry-level foundation in the industry.

Graduates have found extensive employment opportunities.

The program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET) and is operated as a cooperative education program.

## Transfer admission

The admission of transfer students at the third-year level is open to all students who have already received an appropriate associate degree, which should include:

- Technical math (2 semesters of college-level math with an introduction to calculus)
- Drafting (to include CAD)
- Technical physics (2 semesters)
- Soil mechanics
- Plane surveying
- Route surveying
- Statics (mechanics)
- Strength of materials
- Methods and materials of construction

Students lacking these courses are still admitted but are required to take the missing courses concurrently within the program or in addition to the program requirements.

Normally, an associate degree in science is acceptable from an engineering transfer program, with students taking courses they lack concurrently in the program. Typically these students graduate in the same six academic quarters as an engineering technology transfer student.

## Cooperative education plan

Work experience gained while completing alternate work and study quarters is especially valuable. A typical co-op job at an engineering consulting firm might include assisting engineers in design drafting; feasibility and preliminary report writing; and inspecting, surveying or investigating in the field. Other co-op students work in water and wastewater treatment plants, checking control panels, operating systems, pumps and other equipment. Students in the construction field typically work a wide range of duties, from craft supervision to assisting project superintendents, doing change orders, estimating, drafting and surveying.

The scope of work accomplished varies with the interests of each student and increases in complexity with each succeeding job. Construction companies, facility departments of large corporations, engineering consultants, testing agencies and all branches of government employ our students. Some students work all their co-op quarters with the same firm, while others choose from various work experiences. All are expected to use their education on the job and bring back innovative, new and unusually successful technologies to share with classmates.

**Graduates**

Bachelor of science in engineering technology degree graduates are employed by consulting engineers; construction companies and industries; and federal, state and local government agencies. They are scattered from coast to coast and from New England to Texas and several overseas areas. Their initial job titles range from assistant project manager, structural designer or junior engineer to construction inspector and environmental engineer. Several graduates have completed masters' degrees, a large number have gained registration in several states as professional engineers, and several manage their own consulting firms.

**Technical electives**

It is anticipated that a student will have at least two electives from one of the sequences shown. Other electives may be chosen from within that sequence, from another sequence, or from the other electives shown.

<b>Water Resources</b>	<i>Quarter Credit Hours</i>
Hydrology 0608-482	4
Hydraulic Structures 0608-485	4
Groundwater Hydraulics 0608-480	4

**Environmental Controls**

Design of Water Treatment Facilities 0608-510	2
Land Planning 0608-514	4
Design of Wastewater Treatment Facilities 0608-520	4
Hazardous Waste 0608-525	4

**Construction Management**

Labor Relations 0608-500	2
Cost Estimating 0608-509	4
Construction Project Management 0608-560	4
Contracts and Specifications 0608-544	2

**Structures**

Timber Design 0608-470	4
Reinforced Concrete Design 0608-496	4
Structural Steel Design 0608-497	4

**Building and Heavy Construction**

Construction Equipment 0608-460	2
Construction Practices 0608-550	4
Construction Safety 0608-505	2
Pavement Design 0608-535	4
Mechanical Equipment 0608-444	2

**Other Electives**

Data Analysis 1016-319	4
Applied Thermodynamics 0610-440	4

With departmental approval, technical electives may be selected from existing courses in other RIT colleges.

Also, independent study projects may be pursued for credit in cases where students demonstrate unusual ability and obtain sponsorship of a faculty adviser.

Students are encouraged to utilize the first-class computer facilities and to work with professors on additional applications of computer graphics. The College of Continuing Education offers evening courses, and all day college courses are open if schedules can be arranged and students have the capacity to handle additional credits.

**Civil engineering technology, BS degree, typical course sequence**

	<i>Quarter Credit Hours</i>
<i>First Year</i>	
Introduction to CET, Freshman 0608-198	1
College Algebra & Trigonometry 1016-204	4
Engineering Graphics 0608-210	4
Materials of Construction 0608-330	4
Survey of Computer Science 0602-200	4
Analytic Geometry 1016-228	4
College Physics I & Lab 1017-211, 271	4
English Composition 0502-220	4
Introduction to CAD 0617-261	4
Introduction to Statics 0610-302	4
College Physics II & Lab 1017-212, 272	4
Civil Engineering Graphics 0608-220	4
Literature 0504-332	4
Physical Education *	0
<i>Second Year</i>	
College Physics III & Lab 1017-213, 273	4
Plane Surveying 0608-320	4
Effective Technical Communication 0535-403	4
Strength of Materials 0610-303	4
Elementary Soil Mechanics 0608-360	4
Elements of Building Construction 0608-422	4
Calculus for Technologists I 1019-420	4
Route Surveying 0608-340	4
Elementary Structures 0608-380	4
Calculus for Technologists II 1019-421	4
Liberal Arts (Core) †	8
Physical Education *	0
(Or completion of an appropriate associate degree or equivalent)	
<i>Third Year</i>	
Introduction to CET, Transfer 0608-199	1
Hydraulics & Lab (or Technical Elective) 0608-420, 421	4
Effective Technical Communication 0535-403	4
Computer Techniques 0602-205	4
Solutions to Engineering Problems 1019-422	4
Applied Mechanics of Materials 0608-404	4
Computer Techniques in CET 0608-513	2
Basic Chemistry I 1011-271	3
Chemistry I Lab 1011-205	1
Liberal Arts (Core) †	4
Co-op Preparation 0606-099	0
Cooperative Education (2 quarters)	Co-op
<i>Fourth Year</i>	
Water & Wastewater Transport Systems 0608-432	2
Structural Analysis 0608-490	4
Chemistry of Water & Wastewater & Lab 1011-272, 276	4
Technical Elective	4
Liberal Arts (Core) †	4
Principles of Treatment of Water & Sewage 0608-438	4
Structural Design 0608-496 or 0608-497	4
Soil Mechanics & Foundations & Lab 0608-527, 528	4
Professional Principles & Practices 0608-546	1
Liberal Arts (Concentration) †	4
Cooperative Education (2 quarters)	Co-op
<i>Fifth Year</i>	
Transportation Engineering 0608-530	4
Elements of Building Construction 0608-422	4
Technical Elective	4
Technical Elective	2
Basic Electrical Principles 0609-414	4
Engineering Economics 0617-436	4
Principles of Dynamics in CET 0608-570	4
Liberal Arts (Concentration) †	8
Liberal Arts (Senior Seminar) †	2
Cooperative Education (1 quarter)	Co-op
<b>Total Quarter Credit Hours</b>	<b>196</b>

\* See page 11 for policy on physical education.

† See page 10 for liberal arts requirements.

# Electrical Engineering Technology

Carol Richardson, Chair

Charles L. Swain, Program Chair

This professional program is designed to meet the growing needs for engineering technologists in a rapidly changing society.

The five-year bachelor of science program in electrical engineering technology includes more than a year of cooperative work experience for full-time students. The program also accepts transfer students (see **Transfer admission**, below). The upper-division feature of the program provides a viable option for students who have completed their associate degree and desire to continue their education in technology.

The bachelor of science degree program in electrical engineering technology is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET).

A typical BS program is shown in the chart on the next page. The first two years provide basic courses in electricity, analog and digital electronics, physics, technical calculus and liberal arts. The third and fourth years of the program expand on basic courses with upper-level courses in applied differential equations, liberal arts, transformed circuits, control systems, analog and digital electronics, and mechanical engineering technology. The program is completed with a choice of technical and professional electives. Professional elective sequences are available in electric power systems, electronic communications, digital computer design and networking. Several electives also are available from other technical disciplines, and the student's academic adviser will help to determine the best choices.

Students begin their cooperative work experience in the third year of the program and are required to complete five quarters of such experience. A co-op counselor is assigned to each student.

## Transfer admission

Transfer admission is open to graduates of two-year associate degree electrical or electronic engineering technology programs. Students currently enrolled in engineering science associate degree programs also may apply and be assigned to a slightly different series of courses. Students from associate degree programs closely related to electrical technology and who have appropriate circuits and electronics course levels are also accepted, but may be required to complete some lower-level courses before starting the third year of the program.

## Professional elective sequences

### Computer Design

Digital Computer Design II 0618-539  
Digital Computer Design III 0618-540  
Digital Processing of Signals 0609-547

### Power Systems

Power Systems I 0609-550  
Power Systems II 0609-552

### Electronic Communications

Communications Systems I 0609-534  
Communications Systems II 0609-535  
Digital Processing of Signals 0609-547

### Networking

Network Engineering 0614-571  
Network Management 0614-572  
Network Planning and Design 0614-574

### Other Electives

Senior Project 0609-580  
Statistical Quality Control 0617-424  
Robots in Manufacturing 0617-485  
Value Analysis 0617-437  
Robust Design 0610-570  
Telecommunications Fundamentals 0614-271  
Voice Communications 0614-474  
Telecommunications Concepts 0614-472  
Local Area Network Administration 0614-476  
LAN/WAN Administration 0614-478

### Evening program

The upper-division portion of this program may be taken on a part-time basis during the evening hours by those who are employed full time and desire to receive a TAC of ABET-accredited baccalaureate degree. The typical evening student requires approximately 13 quarters to complete the upper-division course requirements. In the early quarters the fundamentals of mathematics, circuit theory and power concepts are emphasized to provide the background for later courses in control systems, advanced electronics and professional electives.

Technical electives that are available and appropriate for the evening program are the same as those listed for the full-time program.

**Note:** Some electives are offered only every other year. Please check with an adviser while planning your technical and professional elective content.

### Electrical technology, associate program

This part-time evening program is designed to prepare technicians for employment in the electrical and electronics fields. It also prepares graduates for continuing their studies toward a baccalaureate degree in engineering technology. The program begins with courses in mathematics, physics and basic electricity. The latter portion of the technical program covers topics in electronics, electrical power, microprocessors and design automation. Courses in composition, communication, social science and humanities round out the program.

## 24 Applied Science and Technology

### Electrical engineering technology, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
DC Circuits 0609-201	3
Electronic Fabrication Techniques 0618-220	2
DC Circuits Lab 0609-221	2
College Algebra & Trigonometry 1016-204	4
First Year Orientation 0609-207	1
Liberal Arts (Core) *	12
AC Circuits 0609-202	4
AC Circuits Lab 0609-222	2
Intro. to Programming 0602-208	3
Calculus for Technologists I, II 1019-420, 421	8
Electronics I 0609-203	4
Digital Fundamentals 0618-301	4
Physical Education †	0
<i>Second Year</i>	
College Physics I 017-211, 271	4
College Physics II 1017-212, 272	4
College Physics III 017-213, 273	4
Electronics II, III 0609-361, 362	8
Data Analysis 1016-319	4
Liberal Arts (Core) *	8
Machines & Transformers 0609-337	4
Electronics IV 0609-363	4
Microcomputers 0618-303	4
Microcontrollers 0609-439	4
Physical Education †	0
(Or completion of an appropriate associate degree or equivalent)	
<i>Third Year</i>	
Digital Systems Design I 0618-438	4
Technical Elective	4
Solutions to Engineering Programs 1019-422	4
Liberal Arts (Core) *	4
Co-op Preparation 0606-099	0
Linear Math for Engineering Technology 1019-423	4
Liberal Arts (Concentration) *	4
Principles of Electronic Design Automation 0618-320	4
Effective Technical Communications 0535-403	4
Cooperative Education (2 quarters)	Co-op
<i>Fourth Year</i>	
General Education Elective	4
Technical Electives	8
Liberal Arts (Concentration) *	4
Advanced Circuit Theory 0609-403	4
Applied Mechanics I 0610-408	4
Advanced Electronics 0609-442	4
Transmission Lines 0609-408	4
Cooperative Education (2 quarters)	Co-op
<i>Fifth Year</i>	
Control Systems 0609-404	4
Engineering Economics 0617-436	4
Senior Seminar	2
Professional Electives	8
Free Elective	4
Technical Elective	4
Liberal Arts (Concentration) *	4
Cooperative Education (1 quarter)	Co-op
<hr/>	
<b>Total Quarter Credit Hours</b>	<b>191</b>

The program shown is that which would be taken by those who start at RIT as freshmen. Each transfer student will be given a program tailored to his or her particular needs upon acceptance. Graduates will have to meet a minimum of 36 quarter credit hours of mathematics and science (including credits transferred) and include mathematics 1019-422 or equivalent.

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

### Electrical engineering technology, BS degree, typical evening course sequence, upper division only

<i>First Year</i>	<i>Quarter Credit Hours</i>
Calculus for Technologists II 1019-421 *	4
Liberal Arts (Core) †	4
Solution of Engineering Problems 1019-422 *	4
Analog Simulation Seminar 0618-425	2
Machines & Transformers 0609-337 ‡	4
Advanced Circuit Theory 0609-403	4
Principles of Electrical Design Automation 0618-320	4
<i>Second Year</i>	
Applied Mechanics 0610-408	4
or	
Technical Elective	4
Liberal Arts (Core) †	4
Advanced Electronics 0609-442	4
Effective Technical Communication 0535-403	4
or	
General Education	4
Control Systems I 0609-404	4
Linear Math for Technologists 1019-423	4
<i>Third Year</i>	
Transmission Lines 0609-408	4
General Education Elective	4
Digital Systems Design I 0618-438	4
Data Analysis 1016-319	4
Technical Elective	4
Intro to Programming 0602-208	4
or	
Technical Elective	4
<i>Fourth Year</i>	
Liberal Arts (Concentration) †	4
Engineering Economics 0617-436	4
Liberal Arts (Concentration) †	4
Professional Elective	8
Technical Elective	4
<i>Fifth Year</i>	
Liberal Arts (Concentration) †	4
Senior Seminar †	2
<hr/>	
<b>Total Quarter Credit Hours</b>	<b>102</b>

\* This sequence is based on students who have had the equivalent of 1019-420 as a part of their associate degree. If a student has not had this course, the recommended sequence for the first year for these courses is: Fall, 1019-420; Winter, 1019-421; Spring, 1019-422.

† See page 10 for liberal arts requirements.

‡ Lower-division course

**Electrical technology, AAS degree,  
typical evening sequence**

	<i>Quarter Credit Hours</i>
<i>First Year</i>	
College Algebra & Trigonometry 1016-204 *	4
Liberal Arts (Core) *	4
DC Circuits 0609-201	3
DC Circuits Lab 0609-221	2
Calculus for Technologists I 1019-420 *	4
AC Circuits 0609-202	3
AC Circuits Lab 0609-222	2
<i>Second Year</i>	
Physics I & Lab 1017-211, 271	4
Electronics I 0609-203	4
Physics II & Lab 1017-212, 272	4
Liberal Arts Core *	8
Physics III & Lab † 1017-213, 273	4
<i>Third Year</i>	
Intro. to Programming 0602-208	4
Effective Technical Communication 0535-403	4
Electronics II 0609-361	4
Calculus for Technologists II † 1019-421	4
Electronics III 0609-362	4
Program Elective	4
<i>Fourth Year</i>	
Digital Fundamentals 0618-301	4
Microcomputers 0618-303	4
Liberal Arts Core *	4
Liberal Arts Core *	4
Program Electives	8
<hr/> <i>Total Quarter Credit Hours</i>	<hr/> 96

\* See page 10 for liberal arts requirements.

† Students who plan to obtain an AAS degree as their terminal degree may substitute a technical elective here. They should contact their academic adviser for appropriate technical electives.

**Program Electives**

*Quarter Credit Hours*

**Computer Technology**

Program Design & Validation 0602-210	4
Abstractions in Programming 0602-212	4
Microcontrollers 0609-439	4

**Electrical Technology**

Machines & Transformers 0609-337	4
Electronics IV 0609-363	4
Microcontrollers 0609-439	4

**Telecommunications Technology**

Program Design & Validation 0602-210	4
Electronics IV 0609-363	4
Telecommunications Fundamentals 0614-271	4

# Computer Engineering Technology

Carol Richardson, Chair

George Zion, Program Chair

There is an increasing need for graduates possessing both computer programming skills and a sound knowledge of computer (digital) electronic hardware. This is true for both technicians with an AAS degree and for technologists with the bachelor of science degree.

Based on a foundation in physics and applied mathematics, the computer engineering technology program is designed to develop hardware and software skills necessary for the design and development of systems involving computers. The upper division of the program includes a required co-op work/study component, giving the student valid work experience before graduation.

Computer-aided design plays a significant role in the curriculum. Students learn to work in a design automation environment on computer workstations running state-of-the-art design software. The skills developed both in system operation and design creativity enhance preparation for both co-op and permanent job opportunities.

Electives are available in the upper division and may be taken from computer science or electrical engineering technology courses. Other courses are available on approval by an adviser.

The program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET).

## Transfer admission

Transfer admission is open to graduates of closely allied associate degree programs. Transfer students from such programs may normally expect to complete the requirements for the BS degree in three years, which includes six academic quarters and five quarters of cooperative work experience. Because no single program of study can effectively integrate all AAS transfer students into the curriculum, each qualified transfer student is evaluated on a course-by-course basis and is given a specific program of study that best meets his or her career goals, provides a meaningful cooperative work experience and permits the student to fulfill the degree requirements in a reasonable period of time.

## Technical electives

Because of the diversified technical content of the computer engineering technology curriculum, students have the option to take their technical electives in the areas of electrical engineering technology, telecommunications technology, computer science and/or information technology. Below is a partial list of available electives for computer engineering technology students.

- Electric Machines & Transformers 0609-337
- Transmission Lines 0609-408
- Local Area Network Administration 0614-476
- Artificial Intelligence 0602-420
- Windows Programming 0602-570
- Programming Language Concepts 0601-450
- Computer Architecture 0603-520
- Computer Graphics 0603-570
- Transmission Systems 0614-473
- Network Management 0614-572

## Computer engineering technology, BS degree, typical course sequence

	Quarter	Credit Hours
<i>First Year</i>		
Freshman Seminar	0618-101	1
Electronic Fabrication Devices	0618-220	2
Digital Fundamentals	0618-301	4
DC Circuits	0609-201	3
DC Circuits Lab	0609-221	2
AC Circuits	0609-202	3
AC Circuits Lab	0609-222	2
Electronics I	0609-203	4
Introduction to Programming	0602-208	4
College Algebra & Trigonometry	1016-204	4
Calculus for Technologists I, II	1019-420, 421	8
Liberal Arts *		12
<i>Second Year</i>		
Microcomputers	0618-303	4
Electronics II & III	0609-361, 362	8
Microcontrollers	0609-439	4
Program Design & Validation	0602-210	4
Abstractions in Programming	0602-212	4
College Physics I, II, III	1017-211, 212, 213	9
College Physics I, II, III Lab	1017-271, 272, 273	3
Effective Technical Communication	0535-403	4
Liberal Arts *		8
<i>Third Year</i>		
Principles of Electronic Design Automation	0618-320	4
Digital Systems Design I	0618-438	4
Computer Science for Transfer Students	0603-263	4
Software Engineering	0603-361	4
Solutions of Engineering Problems	1019-422	4
Linear Math for Technologists	1019-423	4
Liberal Arts *		4
Co-op Preparation	0606-099	0
Cooperative Education (2 quarters)		Co-op
<i>Fourth Year</i>		
Digital Systems Design II	0618-539	4
Advanced Electronics	0609-442	4
Advanced Circuit Theory	0609-403	4
Networking Technologies	0614-477	4
Operating Systems	0603-440	4
Engineering Economics	0617-436	4
Liberal Arts *		8
Cooperative Education (2 quarters)		Co-op
<i>Fifth Year</i>		
Digital Systems Design III	0618-540	4
Topics in Computer Engineering Technology	0618-571	4
Intro. to Semiconductor Device Physics	1017-300	4
Technical Electives		8
General Education Elective		4
Math/Science Elective		4
Senior Seminar (liberal arts)		2
Cooperative Education (2 quarters)		Co-op
<b>Total Quarter Credit Hours</b>		<b>188</b>

Note: One Physical Education Wellness and two different Physical Education Activity courses need to be taken any time during the five years.

\* See page 10 for liberal arts requirements.

**Computer engineering technology, BS degree,  
typical evening course sequence/upper division only**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Digital Systems Design I 0618-438	4
Principles of Electronic Design Automation 0618-320	4
Analog Simulation Seminar 0618-425 *	2
Computer Science for Transfer Students 0603-263	5
Networking Technologies 0614-477	4
Solutions of Engineering Problems 1019-422	4
Liberal Arts *	4
<i>Second Year</i>	
Digital Systems Design II 0618-539	4
Advanced Electronics 0609-442	4
Advanced Circuit Theory 0609-403	4
Operating Systems 0603-440	4
Engineering Economics 0617-436	4
Liberal Arts *	4
<i>Third Year</i>	
Digital Systems Design III 0618-540	4
Software Engineering 0603-361	4
Linear Math for Technologists 1019-423	4
Liberal Arts *	8
General Education Elective	4
<i>Fourth Year</i>	
Topics in Computer Engineering Technology 0618-571 †	4
Technical Electives	8
Intro. to Semiconductor Device Physics 1017-300 †	4
Math/Science Elective	4
Senior Seminar (liberal arts)	2
<b>Total Quarter Credit Hours</b>	<b>97</b>

\* Required only if missing computer simulation in D.C. & A.C. Circuits..

† Courses not offered regularly in evenings—check with your academic adviser for scheduling information.

# Telecommunications Engineering Technology

Carol Richardson, Chair

Mark Indelicato, Program Chair

This program is designed to meet the ever increasing need of the telecommunications industry for state-of-the-art principles, applications, equipment and regulatory policies. Telephone companies, equipment manufacturers and telecommunications users all need a cadre of those capable of utilizing equipment to its fullest, both from a technical and from a management perspective. The five-year BS program in telecommunications engineering technology includes over a year of cooperative work experience for full-time students.

Two options are available to fulfill the needs of specific employers. The technical option is designed for the person whose interests lie in the applications of equipment, while the management option is designed for the individual who wants to move into the management of telecommunications resources. The two options differ at the junior and senior levels by six courses, allowing students to choose after they have been introduced to the fundamentals of telecommunications, electronics, mathematics, science and the liberal arts.

The technical option emphasizes the applications and equipment used on specific job sites. Technical electives are available in telecommunications and other areas of electrical and computer engineering technology.

The management option emphasizes resource management of an overall telecommunications installation. Business courses in accounting, finance, marketing and organizational behavior are included.

Students begin their cooperative work experience in the third year of the program and are required to complete five quarters of co-op. A cooperative education counselor is available for each program.

The program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET).

## Transfer admission

Transfer admission is open to graduates of two-year associate degree programs on a course-by-course evaluation. Students from closely related programs, such as telecommunications technology or electrical/electronics technology, can normally expect to graduate in three years, which includes seven academic quarters and four quarters of cooperative employment. Graduates of less closely related programs are also welcome to apply but may expect to take longer to complete the program.

## Technical electives

Microcontrollers 0609-439  
 Digital Systems Design I, II, III 0618-438, 539, 540  
 Principles of Electronic Design Automation 0618-320  
 Advanced Circuit Theory 0609-403  
 Advanced Electronics 0609-442  
 Control Systems 0609-404  
 Digital Processing of Signals 0609-547  
 Local Area Network Administration 0609-476  
 Communication Systems I 0609-534  
 LAN/WAN Administration 0609-478

## Evening program

The upper division of this program may be taken evenings. A special schedule is available through the department office.

Also, courses have been identified that can be taken for the equivalent of the lower division of this program. Please contact the department for an appointment with an adviser to discuss this option.

**Telecommunications engineering technology, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
DC Circuits 0609-201	3
DC Circuits Laboratory 0609-221	2
Electronic Fabrication Techniques 0618-220	2
College Algebra & Trigonometry 1016-204	4
First Year Orientation—Telecommunications 0614-209	1
Liberal Arts (Core) *	12
AC Circuits 0609-202	3
AC Circuits Laboratory 0609-222	2
Telecommunications Fundamentals 0614-271	4
Calculus for Technologists I, II 1019-420, 421	8
Electronics I 0609-203	4
Digital Fundamentals 0618-301	4
Physical Education †	0
<i>Second Year</i>	
College Physics I & Lab 1017-211, 271	4
College Physics II & Lab 1017-212, 272	4
College Physics III & Lab 1017-213, 273	4
Electronics II, III, IV 0609-361, 362, 363	12
Data Analysis 1016-319	4
Introduction to Programming 0602-208	4
Program Design & Validation 0602-210	4
Liberal Arts (Core) *	12
Physical Education †	0
(Or completion of an appropriate associate degree or equivalent)	

**Technical option, upper division**

<i>Third Year</i>	
Telecommunications Concepts 0614-472	4
Microcomputers 0618-303	4
Solutions to Engineering Problems 1019-422	4
Co-op Preparation 0606-099	0
Linear Math 1019-423	4
Voice Communications 0614-474	4
Technical Electives	8
Effective Technical Communications 0535-403	4
Cooperative Education (2 quarters)	Co-op
<i>Fourth Year</i>	
Networking Technologies 0614-477	4
Liberal Arts (Concentration) *	4
Transmission Systems 0614-473	4
Applied Database Management 0602-483	4
Technical Elective	4
Math/Science Elective	4
Switching Technologies 0614-475	4
Telecommunications Policy 0614-480	4
Cooperative Education (2 quarters)	Co-op
<i>Fifth Year</i>	
Network Engineering 0614-571	4
Network Management 0614-572	4
Liberal Arts (Concentration) *	8
Senior Seminar	2
Technical Electives	8
Engineering Economics 0617-436	4
Network Planning & Design 0614-574	4
Cooperative Education (1 quarter)	Co-op
<b>Total Quarter Credit Hours</b>	<b>195</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

**Management option, upper division**

<i>Third Year</i>	
Telecommunications Concepts 0614-472	4
Financial Accounting 0101-301	4
General Education Elective	4
Data Analysis 1016-319	4
Co-op Preparation Course 0606-099	0
Math/Science Elective	4
Voice Communications 0614-474	4
Managerial Accounting 0101-302	4
Effective Technical Communication 0535-403	4
<i>Fourth Year</i>	
Networking Technologies 0614-477	4
Applied Database Management 0602-483	4
Transmission Systems 0614-473	4
Principles of Economics I 0511-301	4
Principles of Marketing 0105-463	4
Organizational Behavior 0102-430	4
Switching Technologies 0614-475	4
Telecommunications Policy 0614-480	4
<i>Fifth Year</i>	
Network Engineering 0614-571	4
Network Management 0614-572	4
Technical Elective	4
Liberal Arts (Concentration) *	12
Senior Seminar	2
Corporate Finance 0102-441	4
Network Planning & Design 0614-574	4
<b>Total Quarter Credit Hours</b>	<b>98</b>

\* See page 10 for liberal arts requirements.

**Telecommunications engineering technology—management option, BS degree, typical evening course sequence, upper division**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Telecommunications Fundamentals 0614-271 †	4
Calculus for Technologists I 1019-420 †	4
Calculus for Technologists II 1019-421 †	4
Telecommunications Concepts 0614-472	4
Solutions of Engineering Problems 1019-422	4
Voice Communications 0614-474	4
<i>Second Year</i>	
Networking Technologies 0614-477	4
Financial Accounting 0201-201	4
Effective Technical Communications 0535-403	4
Managerial Accounting 0201-203	4
Principles of Economics I 0237-221	4
Technical Elective	4
<i>Third Year</i>	
Transmission Systems 0614-473	4
Principles of Marketing 0105-463	4
Network Engineering 0614-571	4
Data Analysis 1016-319 †	4
Liberal Arts (Core) *	4
Switching Technologies 0614-475	4
<i>Fourth Year</i>	
Intro. to Telecommunications Policy 0614-480	4
Liberal Arts (Concentration) *	4
Organizational Behavior 0102-430	4
Network Management 0614-572	4
Corporate Finance 0104-441	4
Network Planning & Design 0614-574	4
<i>Fifth Year</i>	
Math/Science Elective	4
Liberal Arts (Concentration) *	8
Applied Database Management 0602-483	4
Senior Seminar *	2
<b>Total Quarter Credit Hours</b>	<b>114</b>

\* See page 10 for Liberal Arts requirements.

† Lower-division course

**Telecommunications engineering technology—  
technical option, BS degree, typical evening course  
sequence, upper division**

	<i>Quarter Credit Hours</i>
<i>First Year</i>	
Telecommunications Fundamentals 0614-271 †	4
Calculus for Technologists I 1019-420 †	4
Calculus for Technologists II 1019-421 †	4
Telecommunications Concepts 0614-472	4
Solutions of Engineering Problems 1019-422	4
Voice Communications 0614-474	4
<i>Second Year</i>	
Networking Technologies 0614-477	4
Liberal Arts (Core) *	4
Effective Technical Communication 0535-403	4
Technical Elective	4
Linear Math for Technology 1019-423	4
Liberal Arts (Core) *	4
<i>Third Year</i>	
Transmission Systems 0614-473	4
Applied Database Management 0602-483	4
Network Engineering 0614-571	4
Data Analysis 1016-319	4
Switching Technologies 0614-475	4
Math/Science Elective	4
<i>Fourth Year</i>	
Intro. to Telecommunications Policy 0614-480	4
Liberal Arts (Concentration) *	8
Network Management 0614-572	4
Engineering Economics 0617-436	4
Network Planning & Design 0614-574	4
<i>Fifth Year</i>	
Technical Electives	12
Liberal Arts (Concentration) *	4
Senior Seminar *	2
<b>Total Quarter Credit Hours</b>	<b>106-114</b>

\* See page 10 for liberal arts requirements.

† Lower-division course

# Manufacturing and Mechanical Engineering Technology

Guy Johnson, Chair

The manufacturing and mechanical engineering technology department offers an AAS program in mechanical technology, a BS program in electrical/mechanical technology and TAC of ABET-accredited BS programs in manufacturing engineering technology and mechanical engineering technology.

Laboratories available to students include those for CAD, robotics, computer-aided manufacturing, thermodynamics, fluids, plastics and heat transfer, materials processing, materials testing, metrology, assembly automation and electronics manufacturing.

## Electrical/Mechanical Technology

Guy Johnson, Chair

James F. Scudder, Program Chair

### Baccalaureate program

With both the increased complexity of product design and the merger of mechanical and electrical aspects of design, there is a growing need for professionals who have a strong foundation in electrical, mechanical and manufacturing disciplines. Graduates from the electrical/mechanical technology program are able to effectively bridge the gap between coworkers with more specialized backgrounds.

### Objectives of the program

This part-time, upper-division evening program is designed primarily for the adult student who needs to expand his or her knowledge of basic engineering technology principles. The program is designed with the maximum amount of flexibility to allow students with various backgrounds and interests to obtain appropriate technical degrees and to qualify for professional positions.

### Curriculum

The program's requirements are based on an entire baccalaureate degree. Approximately half of the courses are in mathematics, physics, chemistry, communications and liberal arts. In addition to these general studies requirements, the core of the program consists of 67 credits of specified technical courses. These courses cover the disciplines of electricity, electronics, microprocessors, computer programming, mechanics, materials, thermal science, engineering graphics, manufacturing processes and economic analysis. Once a student completes the core, he or she may select a group of three courses in a particular discipline. The student may use this concentration to tailor the degree to meet specific employment objectives. The remaining 24 credits must be appropriate technical, mathematics or science courses. This portion of the curriculum accommodates the diverse backgrounds of students entering the program.

**Transfer admission**

Admission is open to students who possess associate degrees in engineering technology or engineering science. Students with baccalaureate degrees in nontechnical fields may also take this program, but need additional technical course work to meet the overall degree requirements. The minimum expected preparation for admission includes mathematics through introductory calculus, college physics, English composition and computer programming. Transfer credit is evaluated on a course-by-course basis, i.e., each course taken as part of a previous degree is compared to a specific program requirement. Any course that does not match a specific requirement is applied to either the general education or technical elective requirement. Transfer credit is not awarded for courses that could increase the number of elective credits beyond the program maximums.

**Additional requirements**

The following courses are required in addition to those in the accompanying "typical sequence" listing. If a student has not completed equivalent courses, he or she will need to take these:

College Algebra and Trigonometry  
 College Physics I, II  
 Engineering Graphics  
 Manufacturing Processes  
 Pneumatics and Hydraulics  
 Computer Programming (BASIC, FORTRAN or C)  
 English Composition  
 Three courses in humanities and/or social science  
 24 credits in technical electives

**Sample technical concentrations**

After completing the core, a student selects, with adviser approval, a concentration sequence of three upper-division technical courses. This may be one of the following, or it may be tailored to meet the student's specific needs.

**Electrical Systems (select 3 courses)**

Power Systems I  
 Electrical and Optical Devices  
 Advanced Circuit Theory  
 Advanced Electronics  
 Control Systems

**Mechanical Design**

Dynamics of Machinery  
 Machine Design I  
 Machine Design II

**Manufacturing Management**

Robust Design  
 Productions and Operations Management II  
 Special Topics in Computer-Integrated Manufacturing

**Electrical/mechanical technology, BS degree, upper-division evening program, typical course sequence**

	<i>Quarter Credit Hours</i>
<i>First Year</i>	
Calculus for Technologists I 1019-420	4
Calculus for Technologists II 1019-421	4
Metallurgy & Materials Testing 0610-211, 304	4
Electrical Principles for Design I 0609-411 †	4
Solutions to Engineering Problems 1019-422	4
Electrical Principles for Design II 0609-412 †	4
Pneumatics & Hydraulics 0610-305 †	4
<i>Second Year</i>	
Applied Mechanics I 0610-408 †	4
Machines & Transformers 0609-337	4
Computers in MET 0610-432	2
Liberal Arts (Core) *	8
Applied Mechanics II 0610-410	4
Applied Microprocessors 0609-413 †	4
<i>Third Year</i>	
Telecommunications Fundamentals 0614-271	4
Engineering Economics 0617-436	4
MET Lab I 0610-407	2
Effective Technical Communications 0535-403	4
Fundamentals of Chemistry 1011-271	3
Chemistry Lab 1011-205	1
Intro. to Chemistry of Materials 1011-273	3
Chemistry Lab 1011-277	1
<i>Fourth Year</i>	
Controls for Industrial Automation 0617-470	3
Liberal Arts (Concentration) *	8
Data Analysis 1016-319	4
Materials Technology 0610-416	4
MET Lab II 0610-409	2
<i>Fifth Year</i>	
Technical Concentration	12
Liberal Arts (Concentration) *	4
Senior Seminar 0520-501 †	2
Production & Operations Management I 0617-440	3
Thermodynamics and Heat Transfer 0610-441	4
<b>Total Quarter Credit Hours (including transfer credit)</b>	<b>192</b>

\* See page 10 for liberal arts requirements.

† These courses present materials normally covered in associate degree programs, depending on the specific major. Students should consult an adviser to determine which of these courses should be taken and which lower-division courses should also be taken.

# Manufacturing Engineering Technology

Guy Johnson, Chair  
Louis Gennaro, Program Chair

Leaders in the manufacturing engineering profession estimate that the present shortage of qualified manufacturing engineers and technologists is between 50,000 and 100,000 people—and the need is increasing. They also estimate that between 20,000 and 30,000 new jobs are created in manufacturing engineering every year. The two principal factors generating this demand are industrial productivity and technological innovations. The rate of increase of productivity in American industry is lagging behind most industrial nations.

Realizing that competitive positions in world and domestic markets are tied to the productivity of manufacturing units, there is considerable effort by industrial organizations to improve productivity. This nationwide effort is causing organizational and planning changes in many corporations, which now recognize the manufacturing unit as the key to profits; for example, many corporations have placed manufacturing engineers in charge of new product design functions in an effort to ensure product *manufacturability*.

Efforts to improve productivity have led to the rapid introduction of new processes, equipment and increased levels of automation. This has created a demand for personnel well-versed in the new manufacturing technologies: computer-aided design, computer numerical control, microprocessor controls, robotics, computer-aided manufacturing, flexible manufacturing systems, assembly automation, computer-integrated manufacturing and electronics manufacturing.

The manufacturing engineering technology program is designed to meet industry demands. The program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET) and is operated on the cooperative education plan.

## Program objectives

The primary objective of the manufacturing engineering technology program is to prepare individuals for professional employment in the manufacturing field. This program is designed to provide the skills necessary for applying both today's and tomorrow's manufacturing technologies. These skills are enhanced by a full co-op program in manufacturing industries. Throughout the academic program, a large measure of hands-on laboratory experiences related to manufacturing technology is provided.

## Curriculum

The curriculum has been designed with the aid and consultation of professionals in the field. The program's major emphasis is on computer-integrated manufacturing. Subjects covered include traditional and nontraditional manufacturing processes, fundamentals of electronics and microprocessors, computer-aided design, computer numerical control, robotics, group technology, computer-aided process planning, materials requirements planning, surface-mount electronics design and assembly, flexible manufacturing systems, quality control, engineering economics, value analysis and plastics.

## Transfer admission

Transfer students from two-year colleges should have an AAS degree or equivalent in one of the following majors: manufacturing technology, mechanical technology, management engineering technology, engineering science, electrical technology, computer technology, quality control technology, design and drafting technology or electromechanical technology. Students with other backgrounds may have to take additional courses to meet the entrance requirements.

## Evening program

The upper division of this program may be taken on a part-time basis during the evening by those who are employed full time and desire to receive a TAC of ABET-accredited baccalaureate degree.

The typical evening student requires approximately 13 quarters to complete the upper-division course requirements. In the early quarters, the fundamentals of mathematics, electronics and processes are emphasized to provide the background for later courses in computer-integrated manufacturing and technical electives. Students also may elect certain courses from other programs.

**Note:** Some technical electives are offered only every other year. Please check with an adviser when planning your program technical elective content.

**Manufacturing engineering technology, BS degree, typical course sequence**

First Year	Quarter	Credit Hours
Freshman Seminar	0617-101	1
College Algebra & Trigonometry	1016-204	4
Literature	0504-332	4
Introduction to Engineering Graphics	0608-210	4
Manufacturing Process I	0617-220	4
Analytical Geometry	1016-228	4
College Physics I & Lab	1017-211, 271	4
Introduction to CAD or CAD-A	0617-260 or 261	4
Introduction to Materials Technology	0610-211	3
Materials Testing	0610-304	1
Calculus for Technologists I	1019-420	4
College Physics II & Lab	1017-212, 272	4
Mechanical Design Drawing	0610-220	4
Introduction to Statics	0610-302	4
Physical Education †		0
<b>Second Year</b>		
Calculus for Technologists II	1019-421	4
Strength of Materials	0610-303	4
Technical Elective—Metrology	0610-212	2
English Composition	0502-220	4
Solutions to Engineering Problems	1019-422	4
Basic Chemistry I	1011-271	3
Basic Chemistry Lab	1011-205	1
Statistics	1016-309	4
Computer Techniques—C++ Programming	0602-208	4
Liberal Arts (Core) *		8
Technical Electives		8
<b>Third Year</b>		
Technical Elective—3rd Year Seminar		3
Effective Technical Communications	0535-403	4
Computer-Aided Design	0617-460	4
Introduction to Electronics Manufacturing	0617-455	3
Nontraditional Manufacturing Processes	0617-502	3
Computer Numerical Control	0617-471	4
Computers in Manufacturing	0617-410	4
Electrical Principles for Design	0609-411	4
Liberal Arts (Core) *		4
Cooperative Education (2 quarters)		Co-op
<b>Fourth Year</b>		
Controls for Automation	0617-470	3
Integrated Electronics Design	0609-445	3
Production & Operations Management I	0617-440	4
Engineering Economics	0617-436	4
Robots in Manufacturing	0617-485	4
Production & Operations Management II	0617-441	4
Electronics Manufacturing with SMT	0617-456	3
Liberal Arts Senior Seminar *		2
Liberal Arts (Concentration) *		8
Cooperative Education (2 quarters)		Co-op
<b>Fifth Year</b>		
Cooperative Education (1 quarter)		Co-op
Computer-Aided Manufacturing	0617-475	4
Liberal Arts (Core) *		4
Technical Elective		4
Liberal Arts (Concentration) *		4
Tool Engineering	0617-472	3
Process Design	0617-510	4
Technical Electives		4
<b>Total Quarter Credit Hours</b>		<b>190</b>

\* See page 10 for liberal arts requirements.

† See page 11 for physical education policy.

**Manufacturing engineering technology, BS degree, upper-division evening program, typical course sequence**

First Year	Quarter	Credit Hours
Nontraditional Manufacturing Processes	0617-502	4
Calculus for Technologists II	1019-421	4
Effective Technical Communications	0535-403	4
Solutions of Engineering Problems	1019-422	4
Computer-Aided Design	0617-460	4
Statistics	1016-309	4
<b>Second Year</b>		
Liberal Arts (Core) *		8
Computer Numerical Control	0617-471	4
Electrical Principles for Design I	0609-411	4
Computers in Manufacturing	0617-410	4
<b>Third Year</b>		
Basic Chemistry I	1011-271	3
Chemistry I Lab	1011-205	1
Controls for Mfg. Automation	0617-470	3
Production & Operations Management	0617-440	4
Production & Operations Management II	0617-441	4
Engineering Economics	0617-436	4
<b>Fourth Year</b>		
Robots in Manufacturing	0617-485	4
General Studies Elective		4
Liberal Arts (Core) *		4
Computer-Aided Manufacturing	0617-475	4
<b>Fifth Year</b>		
Liberal Arts (Concentration) *		8
Tool Engineering	0617-472	3
Liberal Arts (Concentration) *		4
Liberal Arts (Senior Seminar) *		2
Process Design	0617-510	4
<b>Total Quarter Credit Hours</b>		<b>100</b>

\* See page 10 for liberal arts requirements.

## Mechanical Engineering Technology

Guy Johnson, Chair

Robert Merrill, Program Chair

**Baccalaureate program**

Mechanical engineering technology involves understanding how products and machinery work and how to design, make or use them. From water wheels and steam engines to high-performance automobiles, air-conditioned environments and jet aircraft, mechanical engineering technology has changed society for the better.

As a mechanical engineering technology student, you will study the foundations of mechanics, materials and energy. You will learn technical skills such as drafting and CAD and how to make parts and use computers. You will learn to apply these principles and skills to the various fields of mechanical engineering technology—such as product and machine design, power generation, utilities and manufacturing—through assigned design projects.

The program is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET) and is operated on the cooperative education plan.

**Program objectives**

The program objectives are to prepare graduates to hold professional positions in machine design; manufacturing; test engineering; field service engineering; technical sales; thermal analysis; product design; utilities operations; heating, ventilating and air conditioning; and plant operations. The program emphasizes the development of a design methodology, and this is reinforced through the use of project-oriented assignments.

**Curriculum**

In the early quarters, students develop their skills in the fundamentals of mechanics, mathematics, materials technology and computer-aided design. In later quarters, courses focus both on mechanical design and applied thermofluid engineering. Individuals may specialize by taking technical electives in such areas as product design, air conditioning, thermal power, plastics processing and manufacturing.

A substantial amount of laboratory work is required, including the preparation of quality reports. Use of the computer is emphasized throughout the curriculum.

#### Transfer admission

Transfer students enter this program at the third-year level, having received an appropriate associate degree in mechanical technology, design-drafting technology, air conditioning technology, engineering science or an acceptable equivalent. It is expected that these associate degree programs will have provided the student with background in the following:

Mathematics through Introductory Calculus  
Physics  
Mechanical Drafting  
Computer Drafting  
Manufacturing Processes  
Statics and Elementary Strength of Materials  
Computer Use  
Metallurgy  
Electric Circuits

#### Elective concentrations in mechanical engineering technology

In the last three quarters of students' programs, they may elect to take a concentration in one of the following areas: product design; heat, power and HVAC; or plastics processing.

Custom sequences can be developed with departmental approval.

#### Evening program

The upper division of this program may be taken on a part-time basis during evening hours by those who are employed full time and desire to receive a TAC of ABET-accredited baccalaureate degree.

The typical evening student requires approximately 13 quarters to complete the upper-division course requirements.

Students also may elect certain courses from the manufacturing engineering technology and electrical engineering technology programs with department approvals.

**Note:** Some electives are offered only every other year. Please check with an adviser when planning your program technical electives.

#### Mechanical technology, associate program

This part-time evening program is designed to prepare technicians for employment in the mechanical design and manufacturing fields. Since it is identical to the lower division of the day school BS degree program, with the exception of Freshman and Sophomore Seminar, it prepares graduates for continuing their studies toward a baccalaureate degree in engineering technology. The program begins with courses in mathematics, physics, mechanical drafting, computer-aided design (CAD) and manufacturing processes. The advanced portion of the technical program covers topics in mechanics, hydraulics, materials and machine design. Courses in composition, communication, social science and humanities round out the program.

#### Mechanical engineering technology, BS degree, typical course sequence

	Quarter	Credit Hours
<i>First Year</i>		
Freshman Seminar	0610-101	1
College Algebra & Trigonometry	1016-204	4
English Composition	0502-220	4
Intro. to Graphics	0608-210	4
Manufacturing Processes I	0617-220	4
Analytic Geometry	1016-228	4
College Physics I & Lab	1017-211, 271	4
Mechanical Design Drawing	0610-220	4
Introduction to Materials Technology	0610-211	3
Materials Testing	0610-304	1
College Physics II & Lab	1017-212, 272	4
Introduction to CAD	0617-260	4
Introduction to Statics	0610-302	4
Liberal Arts (Core) *		4
Physical Education †		0
<i>Second Year</i>		
College Physics III & Lab	1017-213, 273	4
Metrology	0610-212	2
Strength of Materials	0610-303	4
Report Writing	0236-315	2
Literature	0504-332	4
Electrical Principles for Design I	0610-411	4
Principles of Mechanical Design I	0610-315	4
Liberal Arts (Core) *		4
Sophomore Seminar	0610-102	1
Technical Electives ‡		8
Pneumatic & Hydraulic Systems	0610-305	4
Computational Methods	0610-330	4
Calculus for Technologists I	1019-420	4
Physical Education †		0
Or completion of an appropriate associate degree or equivalent		
<i>Third Year</i>		
Calculus for Technologists II	1019-421	4
Computers in MET	0610-432	2
Applied Mechanics of Materials	0610-404	4
Basic Chemistry I	1011-271	3
Chemistry I Lab	1011-205	1
Effective Technical Communication	0535-403	4
Co-op Preparation	0606-099	0
Solutions of Engineering Problems	1019-422	4
Applied Dynamics	0610-405	4
MET Lab I	0610-407	2
Basic Chemistry II & Lab	011-273, 277	4
Liberal Arts (Core) *		4
Cooperative Education (2 quarters)		Co-op
<i>Fourth Year</i>		
Materials Technology	0610-416	4
MET Laboratory II	0610-409	2
Applied Thermodynamics	0610-440	4
Data Analysis	1016-319	4
Liberal Arts (Core) *		4
Applied Fluid Mechanics	0610-460	4
Machine Design I	0610-506	4
Technical Elective ‡		4
Liberal Arts (Concentration) *		4
Cooperative Education (2 quarters)		Co-op
<i>Fifth Year</i>		
Thermofluid Lab	0610-465	3
Electrical Elective		4
Technical Elective ‡		8
Liberal Arts (Concentration) *		8
General Education Elective		4
Liberal Arts (Senior Seminar) *		2
Cooperative Education (1 quarter)		Co-op
<b>Total Quarter Credit Hours</b>		<b>197</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Technical electives must be approved by student's adviser.

**Mechanical engineering technology, BS degree, upper-division evening program, typical course sequence**

First Year	Quarter Credit Hours
Liberal Arts (Core) *	8
Effective Technical Communication 0535-403	4
Calculus for Technologists II 1019-421	4
Applied Mechanics of Materials 0610-404	4
Solutions of Engineering Problems 1019-422	4
<b>Second Year</b>	
Applied Dynamics 0610-405	4
MET Lab I 0610-407	2
Computers in MET 0610-432	2
Basic Chemistry I & Lab 1011-271, 205	4
Basic Chemistry II & Lab 1011-273, 277	3
Applied Thermodynamics 0610-508	4
Liberal Arts (Concentration) *	4
<b>Third Year</b>	
Electrical Elective	4
Liberal Arts (Concentration) *	8
Applied Fluid Mechanics 0610-460	4
Data Analysis 016-319	4
Materials Technology 0610-416	4
MET Lab II 0610-409	2
Senior Seminar *	2
<b>Fourth Year</b>	
Machine Design I 0610-506	4
Liberal Arts (Concentration) *	4
Technical Elective †	12
Thermofluid Laboratory 0610-465	3
<b>Fifth Year</b>	
General Education Elective	4
<b>Total Quarter Credit Hours</b>	<b>99</b>

\* See page 10 for liberal arts requirements.

† Technical electives must be approved by student's adviser.

**Mechanical technology, AAS degree, evening program typical course sequence**

First Year	Quarter Credit Hours
College Algebra & Trigonometry 1016-204	4
Communications 0236-220	4
Manufacturing Processes I 0617-220	4
Introduction to Engineering Graphics 0608-210	4
Mechanical Design Drawing 0610-220	4
Analytic Geometry 1016-228	4
<b>Second Year</b>	
Introduction to CAD 0617-260	4
Physics I & Lab 1017-211, 271	4
Physics II & Lab 1017-212, 272	4
Report Writing 0236-315	2
Metrology 0610-212	2
Physics III & Lab 1017-213, 273	4
Literature 0504-332	4
<b>Third Year</b>	
Introduction to Statics 0610-302	4
Calculus for Technologists I 1019-420	4
Strength of Materials 0610-303	4
Liberal Arts (Core) *	4
Introduction to Materials Technology 0610-211	3
Materials Testing 0610-304	1
Pneumatic & Hydraulic Systems 0610-305	4
<b>Fourth Year</b>	
Computational Methods 0610-330	4
Principles of Mechanical Design I 0610-315	4
Technical Elective †	4
Liberal Arts (Core) *	4
Electrical Principles for Design I 0609-411	4
Technical Elective †	4
<b>Total Quarter Credit Hours</b>	<b>96</b>

\* See page 10 for liberal arts requirements.

† Technical electives must be approved by student's adviser.

# Food, Hotel and Travel Management

Francis Domoy, Ph.D., Chair

Food, hotel and travel management offers five programs: hotel and resort management, travel management, food management, nutrition management, and food marketing and distribution.

The programs prepare students for a wide variety of career choices that include, but are not limited to, food management; hotel/resort management; health care; corporate travel management; and food marketing, sales and distribution. A career in the hospitality industries has become highly specialized in today's business world, and RIT graduates are in demand.

The five programs provide a broadly based view of service management, hospitality, travel and client care through a common core of courses. This approach promotes an understanding of the interrelationships among the food, lodging and travel service industries, based on the underlying concept of quality service management, and allows students to retain the flexibility to switch majors or jobs if their career goals change.

These diverse and specialized fields require a common set of abilities: creative problem solving, technical knowledge, communication skills and leadership. The first priority is to equip students with these skills and qualities.

Now in their 105th year, RIT's food, hotel and travel management programs are among the nation's leading hospitality-travel management programs and have been recognized by *Forbes*, *Travel Weekly*, *Nation's Restaurant News* and *Corporate Travel* magazines. Programs are accredited by the Council on Hotel, Restaurant and Institution Education and by the American Dietetics Association. Over the past five years students from 38 countries have become alumni of the programs.

The curriculum is integrated, encompassing a broad base of competencies defined in partnership with faculty, students and industry. Students take courses that contribute to building a strong concept of the total industry by studying accounting, marketing, finance, economics, computer science, business management, behavioral science, service management, nutrition, food preparation, food and beverage service principles, hotel operations, travel and other topics.

The goal is to offer students a rigorous, challenging and interdisciplinary program of study in order to develop their talents. It provides them with the opportunity to develop their full potential in a managerial environment. Small classes promote a dynamic learning interaction among faculty, students and industry professionals.

Freshman students not sure of a career field can apply for an undeclared major within the school. Prior to fall enrollment of the sophomore year, a student must decide upon a major. This option allows the student to experience courses in all fields within the hospitality industry before selecting a specific major.

**Vision statement**

Food, hotel and travel management will be a leader in hospitality, nutrition and service management education by creating an environment of both individualized and team-oriented learning, fusing the human values of hospitality, applying future technologies and innovation, and highlighting cultural diversity in a highly integrated global service economy.

## Objectives

It is each program's mission to prepare students to excel in their chosen profession by developing:

1. Theoretical and technical knowledge essential to successful attainment of professional, executive-level management
2. The ability to apply knowledge and original thinking to solving management problems
3. The skills and techniques of leadership and teamwork
4. An awareness of and desire for a lifetime of learning
5. An intellectual spirit for constructive thought and action in building a good life and effective citizenship

## Cooperative education

Food, hotel and travel management programs require each student to combine 1,600 hours of practical co-op experience with classroom theory in order to graduate.

Cooperative education (co-op) is one of the many ways students are introduced to hands-on learning and employment in the hospitality and travel industries. Co-op is usually taken in the summer following the freshman and sophomore years and during any quarter in the junior and senior years, except the final quarter of senior year, when students are required to be in residence on campus. Co-op is planned, monitored and evaluated by the student, the co-op counselor, the faculty adviser and the employing firm.

Many students find that their career goals take shape and become refined as they progress through co-op experiences. In general, co-op provides students with the opportunity to apply the theory of classroom instruction to an actual work setting.

## Faculty

Faculty members have outstanding academic credentials and industry experience. They serve in professional and trade associations at the national level, are frequent guest speakers, and consult in the fields of their expertise: travel, marketing, hospitality operations, nutrition and health care, to name a few.

## Advisory board

National industry leaders compose the National Advisory Board, contributing professional and technical expertise to undergraduate programs and strengthening the development of their future.

## Two-year transfer program for foodservice management, hotel and resort management, and travel management

Students who have earned an appropriate associate degree or its equivalent before enrolling at RIT may normally expect to complete the requirements for the BS degree in two years, including six academic quarters and cooperative education.

Transfer students must complete a minimum of 85–90 quarter credit hours with an earned minimum grade point average of 2.3 and two quarters of approved cooperative education assignments.

Transfer students with less than two years of college or from other educational backgrounds can also be accommodated. The amount of transfer credit is determined by evaluating the individual's transcript.

In every instance it is the policy of the college to recognize as fully as possible the past academic accomplishments of each student.

## Two-year transfer program for nutrition management

RIT makes every effort to facilitate transfer credit. Due to specific areas of study required by the American Dietetic Association and RIT, the amount of transferable credit and estimated time to complete work for the BS degree must be determined by evaluation of each individual's transcript.

## Facilities

State-of-the-art equipment and laboratories are available to enhance the educational experience of all students. Henry's, a full-service, licensed restaurant, provides an excellent training environment for students, who manage special luncheons and dinners with the help of computerized beverage and point-of-sale systems. The food lab is commercially equipped for developing, testing and evaluating new food products and evaluating equipment.

Information management is a critical element within food, hospitality and travel industries. Food, hotel and travel is fortunate to have for instruction the American Airlines SABRE computerized reservation and accounting systems in the live mode. Two computer laboratories and the training studio allow students to prepare for the technology they will encounter on the job. Database, spreadsheet and numerous other software applications are used in conjunction with classroom activities. PRONET, a real-time, worldwide agricultural commodities network, and other market information networks also are available for use.

Approximately 40–50 healthcare, corporate and community-based facilities are used for practicum experience for nutrition management students.

## Food Management

The foodservice industry employs more people than any other industry in the nation and will continue to do so as the public demands more services. Foodservice offers an array of work places located far and wide: restaurants from full service to cafeteria; fast-food and special chain operations; hotel fine dining and catering; clubs; contract services for manufacturing; business firms; recreation and sports centers; education, health and life institutions; retail stores; governmental agencies; and food vending.

Students in foodservice management experience a sampling of these foodservice sectors during cooperative education. By graduation students will have accumulated more hours of work experience than in any other four-year hospitality management program in the country. It is because of this depth of exposure that RIT students are in demand by food and beverage operations.

The program prepares students for management through lab experience in Henry's, its full-service, beverage-licensed restaurant. In addition, students develop competencies in problem solving and decision making through individual and team-based class projects, computerized exercises and industry-related activities.

Students learn essential principles and procedures for quality in food production and presentation, sanitation, nutrition, menu planning and merchandising, purchasing, product development, cost control and service management. The program requires several management topic courses, including accounting, computer science, statistics, leadership management, technology in service systems and assessment of service quality. These professional and business courses are balanced by a strong component of liberal arts and science.

The first student chapter chartered by a state restaurant association is available to foodservice management students. The New York State Restaurant Association's goal is to foster interchange of ideas between industry and students and professional growth in organizational and social skills. Juniors are encouraged to attend the annual National Restaurant Association show in Chicago.

### Food management, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Contemporary Nutrition 0620-213	4
Service Management Careers in Hospitality Ind. 0619-220	2
Principles of Food Production 0621-225	4
Sanitation & Safety 0621-314	2
Purchasing & Inventory Control 0621-324	2
Orientation to Computers in Hospitality 0622-221	2
FHTM Elective	4
Financial Accounting 0101-301	4
Managerial Accounting 0101-302	4
Algebra for Management Sciences 1016-225	4
Liberal Arts (Core) *	16
Physical Education (3 quarters) †	0
Cooperative Education 0621-499	Co-op
<i>Second Year</i>	
Menu Planning & Merchandising 0621-321	2
Restaurant Operations 0621-331	6
Financial Management Hospitality Industry 0622-355	4
FHTM Electives	8
Intro. Statistics Methods I & Lab 1016-301, 311	4
Intro. Statistics Methods II & Lab 1016-302, 312	4
Intro. Statistics Methods III & Lab 1016-303, 313	4
Science Electives with Lab	8
Liberal Arts (Core) *	12
Cooperative Education 0621-499	Co-op
<i>Third Year</i>	
Assessment of Service Quality 0619-410	4
Technology in Service Systems 0619-426	4
Food & Labor Cost Control 0621-424	4
FHTM Electives	16
Principles of Economics I 0511-301	4
Principles of Marketing 0105-363	4
Liberal Arts (Concentration) *	12
Cooperative Education 0621-499	Co-op
<i>Fourth Year</i>	
Leadership Management in Service Cultures 0619-470	4
Senior Project 0619-490	4
Product Development 0621-416	6
Free Elective	4
Liberal Arts (Senior Seminar) *	2
Liberal Arts (Upper-division electives) *	12
Cooperative Education 0621-499	Co-op
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

## Food Marketing and Distribution

This program prepares graduates for industry positions in food marketing, sales, and distribution and logistics. Graduates are uniquely qualified for positions in an array of food marketing and distribution industries worldwide. In particular, they understand a variety of issues—foodservice operations and food marketing, logistics, distribution and packaging.

Many of the normal food management course requirements remain in this option. Other curriculum topics include commodity analysis; food marketing, processing, packaging, distribution; national and global logistics; and quality assurance.

Specific course content is defined in the Course Descriptions portion of this bulletin. An outline of required courses is provided in the chart below.

### Food marketing and distribution, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Principles of Packaging 0607-201	4
Service Management Careers in Hospitality Ind. 0619-220	2
Principles of Food Production 0621-225	4
Sanitation & Safety 0621-314	2
Purchasing & Inventory Control 0621-324	2
Orientation to Computers in Hospitality 0622-221	2
Distribution Systems 0623-206	4
Financial Accounting 0101-301	4
Managerial Accounting 0101-302	4
Algebra for Management Science 1016-225	4
Liberal Arts (Core) *	16
Physical Education (3 quarters) †	0
Cooperative Education 0621-499	Co-op
<i>Second Year</i>	
Commodity Market Analysis 0621-310	4
Restaurant Operations 0621-331	6
Financial Management for Hospitality Industry 0622-355	4
Intro Statistics Methods I & Lab 1016-301, 311	4
Intro Statistics Methods II & Lab 1016-302, 312	4
Intro Statistics Methods III & Lab 1016-303, 313	4
Science Electives with Lab	8
Principles of Economics I 0511-301	4
Liberal Arts (Core) *	12
Cooperative Education 0621-499	Co-op
<i>Third Year</i>	
Packaging for Distribution or Marketing 0607-432 or 433	4
Assessment of Service Quality 0619-410	4
Technology in Service Systems 0619-426	4
Food Service Marketing 0621-315	4
Product Development 0621-416	6
FHTM Electives	14
Liberal Arts (Concentration) *	12
Cooperative Education 0621-499	Co-op
<i>Fourth Year</i>	
Leadership Management in Service Cultures 0619-470	4
Senior Project 0619-490	4
Food Processing/Quality Assurance 0621-410	4
FHTM Elective	4
Free Elective	4
Liberal Arts (Upper-division elective) *	12
Liberal Arts (Senior Seminar) *	2
Cooperative Education 0621-499	Co-op
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# Hotel and Resort Management

This is a professionally oriented curriculum for students interested in careers involving the management and operation of hotel, resort, leisure time and related enterprises. A composite of discipline areas allows students to understand the physical characteristics of the properties and to gain the business expertise necessary to manage and market them.

The program builds student skills with a balanced academic program of the basic principles of hotel and restaurant operations, tourism, resort development and management, business and financial management, and liberal arts, together with paid work experience (co-op) for four quarters, hands-on class projects, laboratories and school activities. Specialized courses include statistics, hotel engineering and maintenance, financial management for hotels, hotel marketing and sales, personnel and executive development, and negotiation and conflict management. Industry professionals regularly offer their expertise in all of the program courses.

Students develop communication skills through participation in the student chapters of organizations and are encouraged to attend the annual International Hotel/Motel and Restaurant shows in New York City and Chicago.

## Hotel and resort management, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Service Management Careers in Hospitality Ind. 0619-220	2
Hotel Operations 0621-200	4
Hospitality Industry Real Estate 0622-205	4
Hotel Marketing & Sales 0622-210	4
Orientation to Computers in Hospitality 0622-221	2
Algebra for Management Science 1016-225	4
Financial Accounting 0101-301	4
Managerial Accounting 0101-302	4
Principles of Economics I 0511-301	4
Liberal Arts (Core) *	16
Physical Education (3 quarters) †	0
Cooperative Education 0621-499	Co-op

### *Second Year*

Resort Development & Management 0622-310	4
Financial Management for Hospitality Industry 0622-355	4
Minor Program Courses—Food or Travel (choose one)	
Food—Principles of Food 0621-225	4
Sanitation & Safety 0621-314	2
Purchasing & Inventory Control 0621-324	2
Travel—Distribution Systems 0623-206	4
Intro. to SABRE 0632-210	4
Intro. Statistics Methods I & Lab 1016-301, 311	4
Intro. Statistics Methods II & Lab 1016-302, 312	4
Intro. Statistics Methods III & Lab 1016-303, 313	4
Science Elective with Lab	8
Liberal Arts (Core) *	12
Cooperative Education 0621-499	Co-op

### *Third Year*

Principles of Marketing 0105-363	4
Assessment Service Quality 0619-410	4
Minor Program Courses—Food or Travel (choose one)	
Food—Restaurant Operations 0621-331	6
Food & Labor Cost Control 0621-424	4
Travel—Meeting Management 0623-410	4
Corporate Travel Planning 0623-420	4
Negotiations & Conflict 0623-522	2
Liberal Arts (Concentration & upper-division electives) *	16
FHTM Electives	12
Free Elective	4
Cooperative Education 0621-499	Co-op

### *Fourth Year*

Technology in Service Systems 0619-426	4
Leadership Management in Service Cultures 0619-470	4
Senior Project 0619-490	4
FHTM Electives	12
Liberal Arts (Upper-division electives) *	8
Liberal Arts (Senior Seminar) *	2
Cooperative Education 0621-499	Co-op

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*Total Quarter Credit Hours* 180

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

## Travel Management

The growth of modern travel has created many technical challenges for the movement of individuals and groups in a global corporate environment and, with that, the need to consult highly qualified experts to plan, arrange and coordinate travel. Today, more than ever before, travelers are faced with many alternatives for transportation, accommodations and other travel services and rely increasingly on the travel professional to guide them wisely and honestly. Travel agencies and corporate travel consultants have an important impact on the hospitality-travel economies, including foodservice, lodging and leisure, travel and transportation, meetings and technology industries.

Travel management combines a study of specialized courses in travel management with a sound general education that includes courses in accounting, management principles, marketing, business law, foreign languages and computer science. The program is structured to provide students with a balance of hands-on experience and management theory. This is necessary to further their understanding of why the travel industry operates as it does in its business environment. This career orientation provides both the four-year and transfer student with a balance of theoretical classroom instruction and experiential opportunities that are furnished by cooperative education.

Equipped with this program, students in travel management prepare for careers in corporate travel, consulting and professional meeting management. Employment opportunities are also excellent with hotels, resorts, retail travel agencies, major corporations and other businesses.

### American Airlines SABRE Systems

Available to food, hotel and travel management students in live mode are the automated reservation and accounting systems designed by American Airlines to allow corporate travel planners and meeting managers to serve the client faster while handling the complex details of their business more efficiently. The reservation system, SABRE, enables travel professionals to give their clients immediate confirmation for flights operated by airlines worldwide.

Students work at SABRE reservation sets, with video screens and keyboards, which are linked directly to American's worldwide travel information system. This provides access to accommodations at hotels—domestic and international—major car rental firms and wholesale tour operators who design tours to such destinations as Hawaii, the Caribbean, Mexico, Canada and the U.S. mainland.

SABRE provides the student with a view of a worldwide market distribution system. The system also performs fare quotations; currency conversions; and, with the aid of the Telenet printers, prepares a printed ticket, a comprehensive invoice and a passenger itinerary.

Students are also versed in the use of communication technologies that allow them to conduct research via the Internet.

### Travel management, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Service Management Careers in Hospitality 0619-220	2
Orientation to Computers in Hospitality 0622-221	2
Distribution Systems 0623-206	4
Introduction to AA SABRE 0623-210	4
Algebra for Management Science 1016-225	4
Financial Accounting 0101-301	4
Managerial Accounting 0101-302	4
Liberal Arts (Core) *	24
Physical Education (3 quarters) †	0
Cooperative Education 0621-499	Co-op
<i>Second Year</i>	
Resort Development & Management 0622-310	4
Financial Management Hospitality Industry 0622-355	4
Travel Reservation Procedures 0623-312	2
Salesmanship Techniques in Travel 0623-314	2
FHTM Electives	8
Intro. Statistics Methods I & Lab 1016-301, 311	4
Intro. Statistics Methods II & Lab 1016-302, 312	4
Intro. Statistics Methods III & Lab 1016-303, 313	4
Science Elective with Lab	8
Principles of Economics I 0511-301	4
Liberal Arts (Core) *	4
Cooperative Education 0621-499	Co-op
<i>Third Year</i>	
Principles of Marketing 0105-363	4
Assessment of Service Quality 0619-410	4
Technology in Service Systems 0619-426	4
Corporate Travel Marketing & Sales 0623-413	4
Corporate Travel Planning 0623-420	4
FHTM Electives	18
Liberal Arts (Concentration) *	12
Cooperative Education 0621-499	Co-op
<i>Fourth Year</i>	
Leadership Management in Service Cultures 0619-470	4
Senior Project 0619-490	4
Meeting Management 0623-410	4
Free Elective	4
FHTM Electives	4
Liberal Arts (Senior Seminar) *	2
Liberal Arts (Upper-division elective) *	12
Cooperative Education 0621-499	Co-op
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# Nutrition Management

People are increasingly interested in nutrition requirements for good health and long life. They are concerned about balanced menus away from home and about the availability of special diet menus for those with serious ailments. Physical fitness centers seek educated advice about meal planning.

Dietitians are involved with people of all ages, cultures and economic means. They enjoy people and learn to understand them as individuals, thereby helping to solve their nutritional needs. Dietitians are health professionals who apply the science and art of human nutrition.

The nutrition management program offers a challenging curriculum that prepares students for diverse career opportunities. From their base of knowledge about nutrition, registered dietitians practice in many settings. Possible career paths may be developed in private practice; community nutrition and public health, wellness and fitness programs for sports; education and corporations; clinical dietetics or food management in hospitals and long-term care facilities; research for clinical, educational or food manufacturing operations; nutrition education; restaurant consulting; and writing.

## Nutrition management program options

All nutrition management students are enrolled in the didactic program in nutrition management during the first two years. Upon completion of the necessary preprofessional (first and second year) courses, students may apply for admission into the coordinated program in nutrition management. Applications for this program must be submitted by February 15 to be considered for admission into the professional phase the following September.

### Didactic program option

The didactic program leads to a BS degree that meets the education requirements of the American Dietetic Association (ADA). Four-year students must complete three quarters of approved cooperative work experience. To become credentialed as a registered dietitian (RD), students also need to complete an ADA-approved or accredited, supervised practice and pass the National Registration Examination for Dietitians.

### Coordinated program option

This option combines the undergraduate curriculum and planned supervised practice to meet the academic and performance requirements established by the American Dietetic Association for eligibility as a registered dietitian (RD).

This option is planned to integrate formal teaching and more than 900 hours of planned, supervised practice in hospitals, long-term care facilities, school and corporate food services, and community health agencies. Academic and supervised practice phases are taught together to reinforce each other. Learning experience involves team teaching by RIT faculty and industry instructors, each contributing his or her expertise in the profession.

Co-op is required of students in the coordinated program. In addition, the supervised practice hours in the junior and senior years establish their eligibility to take the National Registration Examination for Dietitians upon graduation.

Completion of this option leads to a bachelor of science degree plus eligibility to take the national examination.

## Nutrition management, BS degree, typical course sequence

First Year	Quarter	Credit Hours
Service Management Careers in Hospitality Ind.	0619-220	2
Contemporary Nutrition	0620-213	4
Principles of Food Production	0621-225	4
Orientation to Computers in Hospitality	0622-221	2
Survey of General Chemistry & Lab	1011-201, 205	4
Survey of Organic Chemistry & Lab	1011-202, 207	4
Biochemistry I	1011-203	4
Algebra for Management Science	1016-225	4
Financial Accounting	0101-301	4
Liberal Arts (Core) *		12
Principles of Economics I	0511-301	4
Physical Education (3 quarters) †		0

Second Year	Quarter	Credit Hours
Menu Planning & Merchandising	0621-321	2
Sanitation & Safety	0621-314	2
Purchasing & Inventory Control	0621-324	2
Microbiology	1004-210	4
Human Biology I & Lab	1004-211, 231	4
Human Biology II & Lab	1004-212, 232	4
Biochemistry II	1011-204	4
Intro. Statistics Methods I & Lab	1016-301, 311	4
Liberal Arts (Core) *		16
Liberal Arts (Concentration) *		4
Principles of Marketing	0105-363	4
Physical Education (3 quarters) †		0
Cooperative Education	0621-499	Co-op

### Didactic program option

Third Year	Quarter	Credit Hours
Assessment of Service Quality	0619-410	4
Technology in Service Systems	0619-426	4
Product Development	0621-416	6
Food & Labor Cost Control	0621-424	4
Design & Layout of Food Operations	0621-512	2
Nutrition in Life Cycle	0621-554	5
Liberal Arts (Concentration) *		8
Cooperative Education (2 quarters)	0621-499	Co-op

Fourth Year	Quarter	Credit Hours
Principles & Methods Diet. Education	0602-519	4
Leadership Management in Service Culture	0619-470	4
Senior Project	0619-490	4
Advanced Nutrition/Diet Therapy I	0620-525	5
Advanced Nutrition/Diet Therapy II	0620-526	4
Community Nutrition	0620-550	8
Free Electives		8
Liberal Arts (Upper-division elective) *		12
Liberal Arts (Senior Seminar) *		2

**Total Quarter Credit Hours** 182

### Coordinated program option

Third Year	Quarter	Credit Hours
Principles & Methods of Dietetic Education	0602-519	4
Assessment of Service Quality	0619-410	4
Technology in Service Systems	0619-426	4
Dietetic Environment	0620-402	4
Design & Layout of Food Operations	0620-512	2
Food Systems Management II	0620-551	8
Nutrition in Life Cycle	0620-554	5
Product Development	0621-416	6
Food & Labor Cost Control	0621-424	4
Liberal Arts (Concentration) *		8

Fourth Year	Quarter	Credit Hours
Leadership Management in Service Cultures	0619-470	4
Community Nutrition	0620-550	8
Clinical Dietetics I	0620-560	4
Clinical Dietetics II	0620-561	4
Clinical Dietetics III	0620-562	4
Clinical Dietetics IV	0620-563	8
Liberal Arts (Upper-division elective) *		12
Liberal Arts (Senior Seminar) *		2

**Total Quarter Credit Hours** 193

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# Information Technology

Edith A. Lawson, Chair

We are in the Information Age, but the supply of technically competent professionals is not currently meeting the demand. In addition, strong computing skills for all individuals are increasingly important. Individuals are devoting more time to familiarizing themselves with the wide variety of computing hardware and software available in today's marketplace. As a result, they spend less time working in application areas and more time developing computing environments—a frustrating experience for both the individual and the corporation.

To effectively address this situation, a new professional has emerged—the information technologist, whose primary responsibility is to “fit” the right computing needs to the environments within an enterprise. The objective of the information technology baccalaureate program is to provide the foundations for a well-educated professional in this field.

Students study a wide variety of computing areas, from elementary programming to data communications to electronic imaging. Through courses in communication, technology transfer and needs assessment, the student acquires the interpersonal communication skills necessary to confer with less technical professionals in order to assess and facilitate their needs. A cooperative education requirement enhances the academic requirements with real-world experiences.

## Program overview

The program of study in information technology consists of a core of computing courses, followed by advanced study in a concentration area chosen by the student. The concentration is intended to educate the student in the area in which he or she intends to work. For example, a student who wants to work in the graphic arts industry might take a sequence of courses from the College of Imaging Arts and Sciences, whereas a student interested in manufacturing could take a sequence of courses in computer integrated manufacturing. A number of concentration areas have been identified, but individually constructed concentrations are also possible.

All of the components in this program, including cooperative education, are uniquely designed to produce an individual of value to industry in the Information Age.

## Cooperative education

The BS in information technology requires that students complete three quarters of cooperative education prior to graduation. Students may schedule cooperative education after completion of second-year academic requirements.

A typical schedule might include cooperative education in the Summer Quarter following the second year and in Spring and Summer quarters of the third year.

## Part-time study

There are two degrees available on a part-time basis in the information technology department—the AAS and the BS in information technology.

Courses in these programs are available both during the day and in the evening to accommodate those who work, regardless of their work schedules. The typical evening student requires approximately 12 quarters to complete all the course requirements for an associate-level degree and approximately 23 quarters for a BS degree (this assumes no previous course work). Students with a strong associate degree may be able to complete the BS degree requirements in 12 quarters.

## Information technology, BS degree, full time, typical course sequence

	Quarter Credit Hours
<i>First Year</i>	
Freshman Seminar 0602-201	1
Computing Tools & Env. 0602-202	4
Algebra 1016-204	4
Software Scripting 0602-203	4
Calculus I, II 1019-420, 421	8
Electronic Imaging 0602-320	4
General Education Electives	12
Liberal Arts *	12
<i>Second Year</i>	
Programming with Components 0602-204	4
Intro. to Programming 0602-208	4
Computer Concepts & Software Systems 0602-410	4
Statistics 1016-309	4
Program Design & Validation 0602-210	4
Data Communications 0602-411	4
Database Management 0602-483	4
Liberal Arts *	20
<i>Third Year</i>	
Inter-Networking Lab 0602-412	4
Human Factors 0602-425	4
Interface Design 0602-310	4
Technology Transfer 0602-350	4
Liberal Arts *	8
Science Electives	8
Cooperative Education	Co-op
<i>Fourth Year</i>	
AI Expert Systems 0602-420	4
Senior Seminar 0602-595	1
Needs Assessment 0602-455	4
Concentration Courses †	12
Professional Electives	16
Liberal Arts *	14
Cooperative Education (3 quarters required after year 2)	Co-op
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† Concentrations are available in telecommunications, training and human performance, interactive media design, microcomputer application development and system integration, or an individual concentration may be designed with the guidance of an adviser.

## Information technology, AAS degree

	Quarter Credit Hours
<i>INFORMATION TECHNOLOGY</i>	
Software Tools 0602-202	4
Software Scripting 0602-203	4
Introduction to Programming 0602-208	4
Program Design & Validation 0602-210	4
Interface Design 0602-310	4
Electronic Imaging 0602-320	4
Technology Transfer 0602-350	4
Computer Concepts 0602-410	4
Data Communication 0602-411	4
Human Factors 0602-425	4
Applied Database Management 0602-483	4
<i>MATHEMATICS and SCIENCE</i>	
Algebra & Trigonometry 1016-204	4
Calculus for Technologists I 1019-420	4
Calculus for Technologists II 1019-421	4
Science Elective	4
Science Elective	4
<i>LIBERAL ARTS *</i>	
Communications 0602-411	4
Literature 0602-425	4
Social Science Electives 0510/0511/0513/0514/0515	8
Fine Arts 0505	4
History 0507	4
Philosophy 0508/0509	4
<b>Total Quarter Credit Hours</b>	<b>92</b>

\* See page 10 for liberal arts requirements.

# Packaging Science

Daniel L. Goodwin, Ph.D., Chair

The interdisciplinary packaging science program, leading to the bachelor of science degree, provides educational opportunities for men and women seeking careers in the multifaceted packaging industry. Graduates are prepared for initial employment in such areas as package engineering, development, sales, purchasing, structural design, production, research and marketing.

The program was developed as a result of a close and long-established relationship between the packaging industry and RIT. The multibillion-dollar industry exhibits dynamic growth and provides employment for many thousands of men and women with wide-ranging skills and expertise.

Packaging is increasingly related to total marketing concepts; it has even greater dependence on new developments in materials and processes. Therefore, the industry requires management personnel with creativity and strong backgrounds in business, engineering and science.

## Program characteristics

The program is:

1. **Career oriented**—graduates are ready to enter directly into a position of responsibility.
2. **Interdisciplinary**—students become familiar with the many facets of packaging through courses in several RIT colleges.
3. **Flexible**—offering three options (management, technical and printing) with ample opportunity for electives according to interest.
4. **Representative of industry needs**—content developed with the assistance of an industry advisory board, consultants from the industry and educational specialists.
5. **Adaptable to a modified cooperative plan**—scheduled at the student's convenience, following development of appropriate skills.

## Transfer admission

Transferring into the program with advanced standing is particularly advantageous, since RIT has had many years of experience in assimilating graduates of two-year colleges into its programs and moving them directly into a chosen career field. Some candidates now in four-year colleges will find in the packaging science program a career opportunity with outstanding potential. Courses for associate degree holders (AA, AS, AAS) are arranged to meet program requirements and to correct deficiencies resulting from work taken at other institutions not offering the courses required for graduation. With a selective choice of electives, graduates of two-year colleges find it possible to complete the packaging science curriculum in two additional years at RIT.

## Principal field of study

The principal field of study is defined to be all courses in the packaging science department, as well as the required courses in the College of Science (for the technical option), colleges of Business and Science (management option), and colleges of Science and Imaging Arts and Sciences (printing option). Matriculated students not maintaining a 2.0 cumulative grade point average in their principal field of study are subject to academic probation or suspension, according to Institute policy.

**Packaging science—management option, BS degree,  
typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
New Student Seminar 0607-200	1
Principles of Packaging 0607-201	4
Engineering Design Graphics 0607-301	3
Packaging Materials I 0607-311	4
Computer Applications 0607-341	4
College Physics & Lab 1017-211, 271	4
Algebra for Management Science 1016-225	4
Calculus for Management Science 1016-226	4
Principles of Economics I, II 0511-301, 302	8
Liberal Arts (Foundation) *	12
Physical Education †	0
<i>Second Year</i>	
Packaging Materials II 0607-312	4
Methods of Evaluation 0607-313	3
Rigid Containers 0607-321	4
Flexible Containers 0607-322	4
Survey of General Chemistry & Lab 1011-201, 221	4
Survey of Organic Chemistry & Lab 1011-202, 222	4
Foundations of Scientific Thinking 1017-341	2
Data Analysis 1016-319	4
Introduction to Printing 2081-254	3
Financial Accounting 0101-301	4
Liberal Arts (Foundation) *	16
Physical Education †	0
Cooperative Education 0607-499	Co-op
<i>Third Year</i>	
Career Seminar 0607-401	1
Technical Communication 0607-420	4
Packaging Production Systems 0607-431	4
Packaging for Distribution 0607-432	4
Packaging for Marketing 0607-433	4
Shock & Vibration 0607-485	4
Organizational Behavior 0102-430	4
Principles of Marketing 0105-363	4
Effective Speaking 0502-501	4
Liberal Arts (Concentration) *	12
Free Elective	3
Cooperative Education 0607-499	Co-op
<i>Fourth Year</i>	
Packaging Regulations 0607-462	3
Professional (Packaging) Electives	12
Liberal Arts (Electives & Senior Seminar) *	14
Management Electives	8
Free Electives	7
<b>Total Quarter Credit Hours</b>	<b>192</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

**Packaging science—technical option, BS degree,  
typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
New Student Seminar 0607-200	1
Principles of Packaging 0607-201	4
Engineering Design Graphics 0607-301	3
Packaging Materials I 0607-311	4
Modern Algebra 1016-204	4
Introduction to Calculus 1016-214, 215	6
College Chemistry 1011-208, 273	8
Effective Speaking 0502-501	4
Liberal Arts (Foundation) *	16
Physical Education †	0
<i>Second Year</i>	
Packaging Materials II 0607-312	4
Methods of Evaluation 0607-313	3
Rigid Containers 0607-321	4
Flexible Containers 0607-322	4
Computer Applications 0607-341	4
Data Analysis 1016-319	4
Introduction to Organic Chemistry/Lab 1011-213/227	4
Introduction to Polymer Technology 1014-301	2
Liberal Arts (Foundation) *	12
Free Electives	8
Physical Education †	0
Cooperative Education 0607-499	Co-op
<i>Third Year</i>	
Career Seminar 0607-401	1
Technical Communication 0607-420	4
Packaging Production Systems 0607-431	4
Packaging for Distribution 0607-432	4
Packaging for Marketing 0607-433	4
Shock and Vibration 0607-485	4
College Physics 1017-211, 212, 213	9
College Physics Lab 1017-271, 272, 273	3
Foundations of Scientific Thinking 1017-341	2
Introduction to Printing 2081-254	3
Liberal Arts (Concentration) *	12
Cooperative Education 0607-499	Co-op
<i>Fourth Year</i>	
Packaging Regulations 0607-462	3
Professional (Packaging) Electives	12
Principles of Marketing 0105-363	4
Organizational Behavior 0102-430	4
Liberal Arts (Electives & Senior Seminar) *	14
Free Electives	6
<b>Total Quarter Credit Hours</b>	<b>192</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

**Packaging science—printing option, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
New Student Seminar 0607-200	1
Principles of Packaging 0607-201	4
Engineering Design Graphics 0607-301	3
Packaging Materials I 0607-311	4
Packaging Materials II 0607-312	4
Algebra for Management Science 1016-225	4
Calculus for Management Science 1016-226	4
Data Analysis 1016-319	4
College Physics & Lab 1017-211, 271	4
Foundations of Scientific Thinking 1017-341	2
Liberal Arts (Foundation) *	16
Physical Education †	0
<i>Second Year</i>	
Methods of Evaluation 0607-313	3
Rigid Containers 0607-321	4
Flexible Containers 0607-322	4
Computer Applications 0607-341	4
Technical Communication 0607-420	4
Survey of General Chemistry & Lab 1011-201, 221	4
Survey of Organic Chemistry & Lab 1011-202, 222	4
Introduction to Printing 2081-254	3
Principles of Copy Preparation 2081-256	3
Gravure Process 2081-386	3
Properties of Paper 2081-378	3
Liberal Arts (Foundation) *	12
Physical Education †	0
Cooperative Education 0607-499	Co-op
<i>Third Year</i>	
Career Seminar 0607-401	1
Packaging Production Systems 0607-431	4
Packaging for Distribution 0607-432	4
Packaging for Marketing 0607-433	4
Packaging Regulations 0607-462	3
Principles of Shock & Vibration 0607-485	4
Lithographic Process 2081-367	3
Flexographic Process 2081-364	3
Organizational Behavior 0105-430	4
Principles of Economics I, II 0511-301, 302	8
Liberal Arts (Concentration) *	12
Cooperative Education 0607-499	Co-op
<i>Fourth Year</i>	
Professional (Packaging) Electives	12
Effective Speaking 0502-501	4
Image Capture & Conversion 2081-401	3
Liberal Arts (Electives & Senior Seminar) *	14
Free Electives	8
<b>Total Quarter Credit Hours</b>	<b>192</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

**Department of Military Science—  
Army Reserve Officers' Training  
Corps (ROTC)**

MAJ William Weber, Professor of Military Science

RIT offers full-time students from all degree fields the opportunity to enroll in the Army ROTC program. Participation in the program includes classroom instruction and leadership plus physical and tactical training.

Those who join the Reserve Officers' Training Corps become cadets in a dynamic and challenging program. Army cadets participate in the fall student orientation, demonstrations of military training throughout the academic year, special events geared toward fostering community relations, and fund raising for worthy charities. Army ROTC extracurricular activities include color guard, pistol/rifle team, rappelling, Ranger Challenge Competition and numerous field events throughout the year. Annual social events include a formal Dining-In in the Winter Quarter and a Spring Quarter Military Ball.

The department of military science and Army ROTC offer an educational experience unavailable from any other source. Students receive hands-on training with Army weapons and equipment. Additionally, they gain practical on-campus leadership experience and may choose further leadership development at Army posts statewide and overseas, in preparation for leading the men and women of today's Army.

The program is divided into two parts: the basic course (freshman and sophomore years) and the advanced course (junior and senior years).

**Scholarship opportunities**

Our program offers students the opportunity to compete for two- and three-year scholarships during the freshman and sophomore years. These scholarships pay \$12,000, \$8,000 or \$5,000 per year toward tuition, depending on the award level; \$450 per year for books; and an approximate \$1,400 yearly cash stipend. They are based on academic achievement and leadership potential. Both enrolled cadets and nonenrolled students may apply for a scholarship. Enrolled and nonenrolled sophomores can attend summer basic camp, where they may compete for additional scholarship opportunities.

### Financial benefits

A subsistence allowance of \$150 per month is provided, tax free, directly to each contracted ROTC cadet throughout the school year. This, plus pay for Advanced Camp attendance, amounts to more than \$3,000 for the last two years of college.

RIT provides room scholarships and tuition supplement to cadets who are recipients of four-year or three-year advance ROTC scholarships. To receive RIT's room scholarship and tuition supplement, students must file a Free Application for Federal Student Aid form by March 1. Contact the Financial Aid Office for further information.

### Basic course

During the basic course, nonscholarship students have absolutely no military service obligation. The flexible curriculum develops self-confidence and leadership abilities and tests responsibility. Freshmen and sophomores participate approximately six hours per week. A student may sample ROTC at any time within his or her first two years. Cadets enrolled in military science study basic military organization, tactics and history and take a master student course on college preparation. Completion of the basic course qualifies a cadet for enrollment in the advanced course, scholarships, airborne training, air assault training and many other opportunities to gain valuable on-the-job experiences.

### Summer camp program

A two-year program is offered to all qualified students with two academic years remaining who did not previously participate in the Basic Course. Students in this program attend the six-week Basic Summer Camp between their sophomore and junior years. Upon successful completion of the camp, the student may be enrolled in the Advanced Course for the last two years. It should be noted that two-year scholarships are available on a competitive basis during the Basic Summer Camp. Interested students should begin processing applications for this program early in the Winter Quarter of their sophomore year.

### Veterans

Students with prior military service and members of the Army National Guard and Army Reserve are eligible for entry into the Advanced Course once they have completed one year of college.

### Advanced course

The Advanced Course is conducted during the last two years (three years if you co-op) and includes attendance at the ROTC Advanced Camp, normally between your junior and senior years. Military science department classes during the Advanced Course serve as a prelude to subsequent instruction at specific Army Service Schools. Advanced Course ROTC cadets perform in leadership positions with a cadet company and may participate in and/or lead various training activities.

The program includes an annual trip to Fort Drum, N.Y. Usually scheduled during September, this exercise is conducted in preparation for the Advanced Camp at Fort Bragg, N.C., which trains and evaluates thousands of cadets annually from all schools on the eastern seaboard. The six-week Advanced Camp gives each participant an opportunity to plan, organize and lead his or her peers through a vigorous and challenging training program. Attendees are paid travel expenses and a salary for this intellectually and physically rewarding experience.

After Advanced Camp, selected cadets have the opportunity to participate in the Cadet Troop Leader Training Program for an additional two or three weeks in active Army units in leadership positions throughout the U.S. and overseas.

Airborne (parachute) and air assault (helicopter) training also are available on a competitive basis to cadets in the upper division of ROTC. RIT cadets may earn their badges as parachutists or air assaultists and become fully qualified to be assigned duties in these activities after commissioning.

### Professional military education

In addition to the military science curriculum and the Fort Bragg Advanced Camp, each cadet must complete a course in the following fields of study:

1. Written communication
2. Military history
3. Human behavior
4. Computer literacy
5. Math reasoning

### Graduate school opportunities

Commissioned officers may have an opportunity to pursue graduate work in their chosen discipline. Normally the cost of a graduate degree or attendance at a professional school is at the individual's expense. Certain specialties may be paid for by the U.S. Army.

### Technological enrichment program

Students who plan to pursue graduate studies in high-technology areas can compete for a full graduate school scholarship through the Army in their senior year.

### For additional information

To learn more about broadening your career options through Army ROTC, visit or call the department of military science on the third floor of the George Eastman Building (475-2881 or -2882).

### Department of military science four-year program, typical course sequence

<i>First Year, MS I</i>	<i>Quarter Credit Hours</i>
Introduction to Military Science 0640-201 *	2
Applied Military Dynamics 0640-202 *	2
Military Heritage 0640-203 *	2
<i>Second Year, MS II</i>	
Military Geography 0640-301 †	2
Psychology & Leadership 0640-302 †	2
The Military & American Society 0640-303 †	2
<i>Third Year, MS III</i>	
Military Tactics 0640-401 †	3
Military Communications 0640-402 †	3
Military Operations 0640-403 †	3
<i>Fourth Year, MS IV</i>	
Combined Arms Operations 0640-501 †	3
Military Administration & Logistic Management 0640-502 †	3
Military Ethics 0640-503 †	3
<b>Total Quarter Credit Hours</b>	<b>30</b>

\* Completion meets physical education requirements.

† A Leadership Lab, which is conducted on a weekly basis for one hour, is an integral part of each course offered throughout the year. Class 1, Lab 1 = Credit 2, or Class 2, Lab 1 = Credit 3.

**Department of military science two-year program,  
basic camp/adv. placement/summer compression,  
typical course sequence**

<i>Third Year, MS III</i>	<i>Quarter Credit Hours</i>
Military Tactics 0640-401 †	3
Military Communications 0640-402 †	3
Military Operations 0640-403 †	3
<i>Fourth Year, MS IV</i>	
Combined Arms Operations 0640-501 †	3
Military Administration & Logistic Management 0640-502 †	3
Military Ethics 0640-503 †	3
<b>Total Quarter Credit Hours</b>	<b>18</b>

† A Leadership Lab, which is conducted on a weekly basis for one hour, is an integral part of each course offered throughout the year. Class 1, Lab 1 = Credit 2, or Class 2, Lab 1 = Credit 3.

## Department of Aerospace Studies— Air Force Reserve Officer Training Corps (AFROTC)

Lt. Col. Joseph J. Pow, Professor of Aerospace Studies

### Background

Air Force Reserve Officer Training Corps (AFROTC) opened at RIT in September 1985. Since 1947 AFROTC has afforded graduating college students an appointment as commissioned officers in the United States Air Force. There are three methods to obtain a commission: through the Air Force Academy, the Air Force Officer Training School and our Air Force ROTC program. Participation in ROTC allows college students a firsthand view of the Air Force while attending the college of their choice. Activities are extremely varied and enriching, encompassing classroom instruction, leadership experiences, visits to Air Force bases, summer field training, physical fitness and more.

### Characteristics

The department of aerospace studies at RIT has designed an approach to its curriculum totally compatible with the normal four-year curriculum in some RIT colleges and with the five-year cooperative education program in a larger number of colleges within the Institute. RIT and the department of aerospace studies believe the program will develop very well-rounded individuals fully prepared to enter into their chosen career fields and become future leaders in our society.

### Four-year program

This program has three distinct parts: the General Military Course (GMC), the Professional Officer Course (POC) and the Summer Field Training.

Cadets normally enter the four-year program directly from high school. The GMC is taken by freshmen and sophomores. Cadets entering this curriculum incur no military commitment. Air Doctrine, Air Force Mission Structure, Organization, the Nature of Conflict, Air Power Development, National Security, the Evolution of Air Power and more are studied. Successful completion of the GMC requirements and the four-week field training exercise qualifies a student to apply for entry into the POC.

The POC is the advanced Aerospace Studies curriculum and is conducted during the junior and senior years at RIT. The curriculum prepares cadets for entry into the Air Force as commissioned second lieutenants. Fundamentals of leadership and management, ethics, staffing, planning, coordinating, the need for national security, policy direction and implementation, and actual leadership case studies are examined.

Additionally, in both the GMC and POC curricula, several instructional blocks on written and oral communication skills are taught. Every cadet must complete a Summer Field Training encampment, normally between the sophomore and junior years. In the four-year program, the summer exercise is four weeks long. The curriculum and activities at summer field training educate and evaluate a student's leadership potential and qualify the cadet for entry into the POC. The training program includes leadership evaluation exercises, orientation, survival training, officer training, confidence courses, aircraft and aircrew orientation, physical training and more.

Leadership and management experience is gained in the Air Force ROTC curriculum through a series of Leadership Laboratories, conducted in the Fall, Winter and Spring quarters throughout the four- and five-year college curricula. The lab is managed by the cadet corps staff with a detachment officer overseeing all activities. Practical command and staff leadership experience, drill and ceremonies, customs and courtesies and career decision making are all part of the Leadership Laboratory.

The four-year program is very comprehensive. Spirited and well-rounded Air Force officers are the result.

### Two-year program

This program allows students to join the cadet corps with as little as two years remaining at college. The General Military Course (GMC) material and leadership laboratories are obviously not taught, but instead cadets receive all GMC curriculum and laboratory experience in a six-week summer field training exercise, usually conducted between their sophomore and junior years. Successful completion of the summer camp qualifies cadets for entry into the Professional Officer Course (see "Four-year program"). Cadets then complete their remaining AFROTC requirements as members of the Professional Officer Corps.

### Other programs

Several other programs and activities are afforded to cadets in both the two- and four-year Air Force ROTC programs. They are offered to highly competitive cadets to further develop the officer "whole person" concept. These programs include airborne training with the U.S. Army, Advanced Training Program (an on-the-job training program at selected air bases), base visitations and Arnold Air Society.

### Physical education graduation requirements

Physical education activity requirements can be satisfied by completion of the department of aerospace studies leadership laboratories. Students must be enrolled in Air Force ROTC (the two- or four-year program) to enroll in the leadership laboratories.

### Qualifications and selection procedure

To become a member of the Air Force ROTC requires many different and varied qualifications. Some are very simply met; others are more complex, involving Air Force Officer Qualifying Testing, physicals, interviews and selection boards. Please contact the Air Force ROTC office for complete details and learn how you may qualify. The phone number is 716-475-5196.

### Scholarships

Air Force ROTC offers a variety of scholarships to qualified students in many academic disciplines. Four-year, three-year, and two-year scholarships are available in technical, non-technical, pilot, navigator and missile career fields. The needs of the Air Force dictate which scholarships will be offered on a yearly basis. Competition is very keen. High-school students must complete their applications for a four-year scholarship very early in the senior year. Any student awarded a scholarship is entitled to numerous benefits. Most scholarships pay the majority of tuition and textbook expenses. Also, contract cadets receive a nontaxable allowance of \$150 per month during the school year.

### Air Force ROTC specialized programs

The AFROTC also has several specialized career programs, pre-health being the most widely known. In addition a number of graduate study programs are available. Certain specialties may be paid in full; the requirements are extremely varied, and contact with the AFROTC detachment at RIT is imperative.

### Financial assistance

Every scholarship cadet and all POC cadets receive a \$150 monthly allowance. RIT offers room scholarships and tuition supplement to cadets who are recipients of four-year and three-year, Type I and Type II ROTC scholarships through the College Scholarship Program. In order to receive RIT's room scholarship and tuition supplement, students must file a Free Application for Federal Student Aid form by March 1. Contact the Financial Aid Office for further information. In addition, during field training, transportation and room and board are paid, and a salary of \$16 per day is provided. Other student loan programs are available to cadets from both the Air Force and RIT.

### Commissioning

The commissioning of cadets as second lieutenants takes place close to graduation day ceremonies. Prior to commissioning, each cadet must perform the following:

1. Complete all degree requirements
2. Complete the aerospace studies curriculum
3. Complete the applicable summer training
4. Complete one quarter of English composition (scholarship recipients only)
5. Complete one quarter of college mathematics
6. Complete one year of a foreign language (scholarship recipients only). Two years of a foreign language in high school fulfills this requirement.

### For more AFROTC information

Call the department at 716-475-5196 or visit us on campus, 3211 Eastman Building.

### Department of aerospace studies—AFROTC, typical course sequence \*

<i>First Year</i>	<i>Quarter</i>	<i>Credit Hours</i>
Air Force Today I, II, III	0650-210, 211, 212	3
Leadership Lab I	0650-201, 202, 203	3
<i>Second Year</i>		
History of Air Power I, II, III	0519-201, 202, 203	4
Leadership Lab II	0650-301, 302, 303	3
<i>Third Year</i>		
Air Force Leadership & Mgmt. I, II	0102-310, 311	10
Leadership Lab III	0650-401, 402, 403	3
<i>Fourth Year</i>		
National Security Forces I, II	0513-401, 402	9
Leadership Lab IV	0650-404, 405, 406	3
<i>Fifth Year</i>		
Leadership Lab V	0650-501, 502, 503	3
<i>Total Quarter Credit Hours</i>		<b>41</b>

#### \* NOTE:

1. This is a typical flow. Certain degree programs may desire the Air Force junior- and senior-level courses to be taken in any one of the following combinations: years 3 and 5, years 4 and 5, or as printed in years 3 and 4.
2. While students are enrolled at RIT but not taking Air Force junior- or senior-level courses, they must be enrolled in a Leadership Lab.
3. Although the number of credit hours seem less than required, the contact hours actually meet or exceed those required by AFROTC/Hdqtrs.

# College of Business

*William A. Nowlin, Interim Dean*

In an era of increasing global competitiveness and an emphasis on quality management, the environment that graduates of the College of Business will enter is both complex and rapidly changing. A well-educated and prepared manager must have a broad foundation of knowledge not only in business but also in the social sciences, humanities and science in order to be professionally competitive. In addition, specialization is necessary if one hopes to make immediate contributions to an organization following graduation. RIT's College of Business is committed to providing real-world programs combining teamwork and technology to ensure graduates successful careers.

## Plan of education

To achieve the educational aims described above, the college has prepared a program that has four components: the liberal arts, the business core, the major and the cooperative work experience.

The liberal arts/science component of the business student's program represents 50 percent of the total program. The liberal arts component includes courses in humanities, math, science and social science. The student is also expected to display proficiency in both oral and written forms of communication and to choose a humanities or social science concentration. The capstone course of the liberal arts program is a senior seminar in which a subject is explored in depth.

Integrated throughout the business core are themes of global competitiveness, quality management, customer satisfaction, ethics, diversity and problem solving. Courses in economics, mathematics, data analysis, computers and organizational behavior provide the fundamental knowledge and interpersonal analytical skills necessary for the pursuit of advanced study in a major. They also provide the foundation to consider career alternatives.

In the third component, the major, students concentrate their study in a specific business career field.

Majors offered by the college are as follows:

### Accounting

Public accounting option  
Management accounting option

### Finance

### Information systems

### International business

(Dual major, offered daytime only)

### Management

### Marketing

### Photographic marketing management

(Major offered daytime only)

### Undeclared business option (first two years)

Students can also choose an additional business focus area by completing three to five courses in any of the seven majors listed. College of Business advisers are available to assist students in choosing these courses.

By building on the liberal arts and business core components, the major will provide mastery of marketable skills.

The final component, cooperative work experience, offers the chance to apply and question what has been learned in the classroom. These hands-on, paid work opportunities occur in the last two years so that a student will have prerequisite academic preparation to contribute to the workplace.

The exciting and challenging programs in the college provide a unique level of competence as well as a foundation for continuous intellectual and career growth.

## Typical cooperative education plan—College of Business \*

Year	Fall	Winter	Spring	Summer
1	RIT	RIT	RIT	—
2	RIT	RIT	RIT	—
3	RIT	RIT	RIT	Co-op
4	Co-op	RIT	RIT	—

\* Co-op quarters may vary depending on major.

## Cooperative education

Cooperative education is an integral part of the program. Students obtain practical work experience in an area related to their chosen field of interest. This work experience is part of the student's career exploration and provides not only practical experience that can be related to course work but also an opportunity to observe and perform work directly related to the student's major. This experience should help the student develop a greater insight into his or her chosen field and provide a record of practical experience that may increase the student's opportunities for placement and more rapid career advancement upon graduation.

All College of Business students are required to complete two successful cooperative work experiences. These "work blocks" take place during the junior or senior year. While RIT and the College of Business cannot guarantee anyone cooperative employment, RIT's Office of Cooperative Education and Placement is available to assist students in their job search efforts.

**Advising**

The College of Business is committed to providing advising services throughout a student's academic program. In its Student Services Office, all students are assured administrative support to effectively deal with registration, records and scheduling. In addition, the administrative staff is prepared to provide students with information about other support areas within RIT such as career and personal counseling. Students are also assigned an individual faculty adviser in their major area of study once the major is declared. Faculty advisers are an integral part of the student's advising network and are available for questions about courses and scheduling, as well as for cooperative education assessment and placement advising.

**Transfer programs**

The College of Business has, for many years, integrated transfer students into its baccalaureate degree programs. All transfer students, upon entry, are offered a course that introduces them to the concepts of Total Quality Management. Students who have earned an associate degree in a business program prior to enrollment at RIT may normally expect to complete the requirements for the BS degree in two years, which includes six academic quarters and two required quarters of cooperative work experience.

In every instance, it is the policy of the college to recognize as fully as possible the past academic accomplishments of each student.

**Part-time studies**

The college offers evening classes for students who wish to pursue a baccalaureate degree in accounting, marketing, finance, information systems and management.

RIT's College of Continuing Education offers lower-division business courses for those students who are just beginning their college studies and who are interested in pursuing an associate degree. Upon successful completion of the associate degree, students may transfer to the College of Business.

Students who wish to pursue part-time studies during the day have the option of selecting one of the following baccalaureate degree programs: accounting, finance, information systems, international business, marketing, management and photographic marketing management.

**Resources**

The College of Business is housed in the Max Lowenthal Building. In addition to modern classrooms, facilities include time-sharing terminals on line with RIT's extensive computer systems and excellent software support. The college has a state-of-the-art IBM personal computer lab that serves as an instructional lab and as a lab for student use.

Business students especially benefit from RIT's library and its extensive collection of business texts, periodicals and references.

**Accreditation**

RIT is accredited by the nationally recognized Middle States Association of Colleges and Schools and by the American Assembly of Collegiate Schools of Business (AACSB), a professional accreditation held by approximately 315 of the 1,400 undergraduate business programs in the United States.

**Professional affiliations**

The public accounting curriculum of the College of Business is registered with the New York State Education Department, and graduates meet the educational requirements for candidacy for the Certified Public Accountant (CPA) examination.

The college's Center for Production and Inventory Management is affiliated with the American Production and Inventory Control Society (APICS) and operates an international information service for APICS.

Membership in professional organizations contributes to the quality of the college's programs.

**Graduate programs**

The College of Business offers a master's degree program in business administration and a master of science program in finance and international business as well as a joint MS in manufacturing management and leadership with the College of Engineering. Most programs are available on a full- or part-time basis. The programs are professional in nature and prepare the student in all aspects of business management as well as offering a concentration in a field of specialization. Undergraduate business students may want to consider the 4:1 program, which allows completion of both a BS and MBA or a BS and MS in five years. Details are contained in the Graduate Bulletin, available from the Admissions Office.

RIT's College of Business was ranked among the top 50 business programs in the United States by *U.S. News & World Report's* 1996 annual guide to America's best colleges.

## The Core Curriculum

All students in the College of Business are required to take the business core courses described below (and later displayed in the sample four-year program charts). These courses provide the skills specific to functional competencies in accounting, finance, and marketing and serve as a foundation for advanced study in a specific area of interest.

### Business core courses \*

Effective Communications  
Quality Concepts  
Quality Applications I, II  
Algebra for Management Science  
Calculus for Management Science  
Business Computer Applications  
Economics I (Macro)  
Economics II (Micro)  
Financial Accounting  
Managerial Accounting  
Legal Environment of Business  
Data Analysis  
Management Science  
Survey of International Business  
Principles of Marketing  
Organizational Behavior  
Corporate Finance  
Operations Management  
Business, Government and Society  
Strategy and Policy

\* Core varies by major. See program outlines on following pages.

### Additional requirements

2 laboratory science courses  
7 lower-division liberal arts courses  
3 upper-division liberal arts electives  
3 upper-division liberal arts concentration courses  
Senior Seminar  
2 quarters cooperative education

## Accounting

The accounting major provides fundamental theory and practice in the required accounting core. Beyond this core, students choose an option that best fits their career interests.

Students wishing to become certified public accountants must choose the public accounting option and complete each course prescribed in this program. The program is registered by the New York State Board for Public Accountancy, which means that the prescribed course work satisfies the state's CPA examination educational requirements. Candidates must have earned at least a "C" grade point average in their accounting courses to be admitted to the CPA exam.

The management accounting option allows more flexibility in choice of courses. This flexibility permits students to tailor their program to meet the diverse opportunities for accounting graduates in industrial, commercial and municipal organizations. Of particular interest for both students and employers in the current environment is the opportunity to take advanced courses in computer and information sciences. Completion of studies in this program prepares students to sit for the Certified Management Accountant examination, administered by the Institute of Management Accountants. Students should consult with an adviser before choosing electives in this option.

## Accounting, BS degree, typical course sequence (CPA option)

First Year	Quarter Credit Hours
Freshman Seminar 0102-011	0
Effective Communications 0102-225	2
Quality Concepts 0102-231	2
Quality Applications I 0102-232	2
Principles of Economics I & II 0511-301, 401	8
Calculus for Management Science 1016-226	4
Data Analysis I 1016-319	4
Legal Environment of Business 0101-319	4
Liberal Arts (lower-level core) *	16
Laboratory Science	8
Physical Education †	0
<b>Second Year</b>	
Quality Applications II 0102-233	2
Data Analysis II 1016-320	4
Data Analysis II Lab 1016-380	2
Financial Accounting 0101-301	4
Business Law 0101-320	4
Business Computer Applications 0106-320	4
Survey of International Business 0102-360	4
Principles of Marketing 0105-363	4
Management Science 0106-334	4
Liberal Arts (lower-division core) *	12
Liberal Arts (upper-division concentration & elective) *	8
Completion of College Writing Competency Requirement	
<b>Third Year</b>	
Organizational Behavior 0102-430	4
Financial Reporting & Analysis I, II 0101-408, 409	8
Cost and Managerial Accounting 0101-431	4
Tax Accounting I, II 0101-522, 523	8
Corporate Finance 0104-441	4
Managing Corporate Assets & Liabilities 0104-452	4
Operations Management 0106-401	4
Quality Concepts for Transfers 0102-235	2
Liberal Arts (upper-division concentration or elective) *	12
Cooperative Education (2 quarters required; must complete within third and fourth years)	
<b>Fourth Year</b>	
Strategy & Policy 0102-551	4
Auditing 0101-530	4
Accounting for Complex Organizations 0101-539	2
Analytical Skills in Accounting 0101-541	2
Financial Accounting & Reporting Issues 0101-550	4
Not-for-Profit & Government Accounting 0101-560	2
Free Elective	2
Liberal Arts/Science Elective	4
Liberal Arts (upper-division concentration or elective) *	4
Liberal Arts (Senior Seminar) *	2
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

**Accounting Core**

Financial Reporting and Analysis I, II

Cost and Managerial Accounting

Business Law

Accounting for Complex Organizations

Analytical Skills in Accounting

Financial Accounting and Reporting Issues

Managing Corporate Assets and Liabilities

*Management Accounting Option*

Taxes for Decision Making

Advanced Cost Accounting

Free Electives, 12 credits

Liberal Arts/Science Elective, 4 credits

*Public Accounting Option*

Tax Accounting I, II

Auditing

Not-for-Profit and Government Accounting

Free Electives, 2 credits

Liberal Arts/Science Elective, 4 credits

# Finance

The finance major will prepare students for financial management positions in financial, commercial, industrial and governmental organizations. Students are taught the principles of financial decision making and given an understanding of the economic, legal and financial environment in which they must operate.

Finance major graduates could pursue management positions in commercial, industrial or governmental organizations. The finance student interested in security analysis will usually find positions in asset and securities management with financial institutions such as banks, brokerage houses, insurance companies or real estate firms.

**Finance, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 0102-011	0
Effective Communications 0102-225	2
Quality Concepts 0102-231	2
Quality Applications I 0102-232	2
Principles of Economics I & II 0511-301, 401	8
Calculus for Management Science 1016-226	4
Data Analysis I 1016-319	4
Legal Environment of Business 0101-319	4
Liberal Arts (lower-level core) *	16
Laboratory Science	8
Physical Education †	0
<i>Second Year</i>	
Quality Applications II 0102-233	2
Data Analysis II 1016-320	4
Data Analysis II Lab 1016-380	2
Financial & Managerial Accounting 0101-301, 302	8
Business Computer Applications 0106-320	4
Survey of International Business 0102-360	4
Principles of Marketing 0105-363	4
Liberal Arts (lower-division core) *	12
Liberal Arts (upper-division concentration or elective) *	8
Completion of College Writing Competency Requirement	
<i>Third Year</i>	
Organizational Behavior 0102-430	4
Corporate Finance 0104-441	4
Managing Corporate Assets & Liabilities 0104-452	4
Intermediate Investments 0104-453	4
Finance Electives	8
Operations Management 0106-401	4
Quality Concepts for Transfers 0102-235	2
Liberal Arts (upper-division concentration or elective) *	8
Free Electives	12
Cooperative Education (2 quarters required; must complete within third and fourth years)	
<i>Fourth Year</i>	
Strategy & Policy 0102-551	4
Finance Electives	8
Free Electives	8
Liberal Arts/Science Elective	4
Liberal Arts (upper-division concentration or elective) *	8
Liberal Arts (Senior Seminar) *	2
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

**Finance Electives** (minimum 3 of 4 must be 0104 courses)

International Finance 0104-504
Advanced Corporate Financial Planning & Analysis 0104-505
Management of Financial Institutions 0104-510
Seminar in Finance 0104-554
Financial Reporting & Analysis I 0101-408
Cost and Managerial Accounting 0101-431

# Information Systems

The information systems major will prepare students for careers involving the development and management of computer information systems. The curriculum provides students with a thorough understanding of data processing fundamentals, including the ability to write properly documented programs. Students are introduced to the tools available for the analysis, design and implementation of computer-based and manual information systems. As a result, they are able to design practical, cost-effective systems that will satisfy an organization's needs. Major career directions for graduates of this program include applications programming, systems analysis and information systems management.

**Information systems, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 0102-011	0
Effective Communications 0102-225	2
Quality Concepts 0102-231	2
Quality Applications I 0102-232	2
Principles of Economics I & II 0511-301, 401	8
Business Computer Applications 0106-320	4
Algebra, Calculus for Management Science 1016-225, 226	8
Fundamentals of Information Systems 0106-325	4
Intro. to Programming 0602-208	4
Liberal Arts (lower-level core) *	12
Laboratory Science	8
Physical Education †	0
<i>Second Year</i>	
Quality Applications II 0102-233	2
Business Applications Using COBOL 0602-300	4
IS Theory & Practice 0106-335	4
Financial Accounting 0101-301	4
Information Technology Hardware & Software 0106-355	4
Survey of International Business 0102-360	4
Analysis & Logical Design I 0106-363	4
Data Analysis I 1016-319	4
Data Analysis I Lab 1016-379	2
Liberal Arts (lower-division core) *	16
Completion of College Writing Competency Requirement	
<i>Third Year</i>	
Programming Elective (0602-210 or 0602-303 recommended)	4
Networking Technologies 0106-375	4
Organizational Behavior 0102-430	4
Principles of Marketing 0105-363	4
Corporate Finance 0104-441	4
Operations Management 0106-401	4
Quality Concepts for Transfers 0102-235	2
Liberal Arts (upper-division concentration or elective) *	12
Free Electives	8
Cooperative Education (2 quarters required; must complete within third and fourth years)	
<i>Fourth Year</i>	
Analysis & Logical Design II 0106-464	4
Applied Database Management 0602-483	4
Project Management & Practice 0106-553	4
Business, Government & Society 0102-507	4
Strategy & Policy 0102-551	4
Liberal Arts (upper-division concentration or elective) *	12
Liberal Arts (Senior Seminar) *	2
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# Management

The management major is an ideal choice for students with a variety of interests and career choices in industrial, commercial, service and nonprofit enterprises. Management majors gain an understanding of the dynamics of work organizations, especially as they relate to the concepts, theories, analytical tools and skills that enhance workplace interactions. Students examine issues of motivation, leadership, job design, group dynamics and organization structure in an effort to create more effective learning organizations.

Management majors have a wide choice of careers in the functional areas of the profit and nonprofit sectors in both line and staff roles. In addition, they acquire skills in supervision, liaison support and the foundations of management consulting. Many management majors are budding entrepreneurs with plans to start their own businesses.

Management majors are able to concentrate in the areas of human resource management, entrepreneurship and small business management and in managing for quality and performance. In addition, concentrations in any of the business areas are encouraged.

## Management, BS degree, typical course sequence

First Year	Quarter	Credit Hours
Freshman Seminar 0102-011		0
Effective Communications 0102-225		2
Quality Concepts 0102-231		2
Quality Applications I 0102-232		2
Principles of Economics I & II 0511-301, 401		8
Algebra, Calculus for Management Science 1016-225, 226		8
Data Analysis I 1016-319		4
Data Analysis I Lab 1016-379		2
Liberal Arts (lower-division core) *		16
Laboratory Science		8
Physical Education †		0
<b>Second Year</b>		
Quality Applications II 0102-233		2
Financial & Managerial Accounting 0101-301, 302		8
Business Computer Applications 0106-320		4
Survey of International Business 0102-360		4
Principles of Marketing 0105-363		4
Management Science 0106-334		4
Liberal Arts (lower-division core) *		12
Liberal Arts (upper-division concentration or elective) *		8
Physical Education †		0
Completion of College Writing Competency Requirement		
<b>Third Year</b>		
Organizational Behavior 0102-430		4
Human Resources Management 0102-455		4
Operations Management 0106-401		4
Corporate Finance 0104-441		4
Management & Leadership 0102-460		4
Seminar in Total Quality Management 0102-520		4
Quality Concepts for Transfers 0102-235		2
Management Electives		8
Free Electives		12
Cooperative Education (2 quarters required; must complete within third and fourth years)		
<b>Fourth Year</b>		
Free Electives		8
Liberal Arts/Science Elective		4
Business, Government & Society 0102-507		4
Strategy & Policy 0102-551		4
Liberal Arts (upper-division concentration or elective) *		16
Liberal Arts (Senior Seminar) *		2
<b>Total Quarter Credit Hours</b>		<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# Marketing

The marketing major prepares students for entry-level marketing management positions. As marketing majors, students acquire knowledge of markets, marketing and consumer behavior through a combination of academic education and cooperative field education. The combination provides an understanding of problems related to a number of marketing areas: e.g., product management, professional selling, advertising, sales management, retailing, marketing research and product planning.

For the student interested in a business career with an objective to explore, experience and experiment, the marketing major is an ideal option. With a marketing background, the student will find a wide variety of employment opportunities that center on customer satisfaction and customer understanding and analysis, the major focus of any business. To develop this focus, the marketing curriculum provides an understanding of business in general and specific marketing operations with emphasis on customer motivation, quality management and business problem solving.

## Marketing, BS degree, typical course sequence

First Year	Quarter	Credit Hours
Freshman Seminar 0102-011		0
Effective Communications 0102-225		2
Quality Concepts 0102-231		2
Quality Applications I 0102-232		2
Principles of Economics I & II 0511-301, 401		8
Algebra, Calculus for Management Science 1016-225, 226		8
Data Analysis I 1016-319		4
Data Analysis I Lab 1016-379		2
Liberal Arts (lower-division core) *		16
Laboratory Science		8
Physical Education †		0
<b>Second Year</b>		
Quality Applications II 0102-233		2
Financial & Managerial Accounting 0101-301, 302		8
Business Computer Applications 0106-320		4
Survey of International Business 0102-360		4
Principles of Marketing 0105-363		4
Management Science 0106-334		4
Liberal Arts (lower-division core) *		12
Liberal Arts (upper-division concentration or elective) *		8
Free Elective		4
Completion of College Writing Competency Requirement		
<b>Third Year</b>		
Organizational Behavior 0102-430		4
Buyer Behavior & Satisfaction 0105-505		4
Operations Management 0106-401		4
Corporate Finance 0104-441		4
Professional Selling 0105-559		4
Quality Concepts for Transfers 0102-235		2
Marketing Electives		8
Liberal Arts (upper-division concentration or elective) *		16
Liberal Arts/Science Elective		4
Cooperative Education (2 quarters required; must complete within third and fourth years)		
<b>Fourth Year</b>		
Business, Government & Society 0102-507		4
Strategy & Policy 0102-551		4
Marketing Research 0105-551		4
Marketing Management Problems 0105-550		4
Free Electives		12
Liberal Arts (Senior Seminar) *		2
<b>Total Quarter Credit Hours</b>		<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# International Business

The international business major is offered by the College of Business in cooperation with the College of Liberal Arts. Designed to meet the growing interest of American business in global markets, the international business major has a dual major in finance, marketing, management, accounting or information systems.

Students in international business develop the business and liberal arts foundations necessary to understand business, political and cultural diversity. Proficiency in a foreign language is an integral part of the program. Students are required to complete a college-level I-VI sequence of one chosen language. Students with proficiency at the college level may start the sequence where appropriate. In most cases, three of the six courses will be used to fulfill part of the upper-level liberal arts requirement. In some cases, program credits will exceed the minimum required amount. The cooperative education requirement for the international business student may be satisfied through foreign work experience, international experience within a domestic corporation or study abroad.

Upon graduation, international business students are prepared to step into entry-level positions in several aspects of international trade. They can assume positions such as assistant international product managers, assistant export-import managers, international financial analysts, sales representatives or regional analysts.

## International business, BS degree, typical course sequence\*

First Year	Quarter Credit Hours
Freshman Seminar 0102-011	0
Effective Communications 0102-225	2
Quality Concepts 0102-231	2
Quality Applications I 0102-232	2
Principles of Economics I & II 0511-301, 401	8
Algebra, Calculus for Management Science 1016-225, 226	8
Data Analysis I 1016-319	4
Data Analysis I Lab 1016-379	2
Liberal Arts (lower-division core) *	8
Laboratory Science Language Levels I, II, III †	8
Physical Education ‡	12
	0
<b>Second Year</b>	
Quality Applications II 0102-233	2
Financial & Managerial Accounting 0101-301, 302	8
Business Computer Applications 0106-320	4
Survey of International Business 0102-360	4
Management Science 0106-334	4
Legal Environment of Business 0101-319	4
Liberal Arts (lower-division core) *	12
Language Levels IV, V, VI	12
Completion of College Writing Competency Requirement	
<b>Third Year</b>	
Organizational Behavior 0102-430	4
Principles of Marketing 0105-363	4
Operations Management 0106-401	4
Corporate Finance 0104-441	4
Quality Concepts for Transfers 0102-235	2
International Business Co-Major	8
Functional Business Area	8
Liberal Arts (lower-division core) *	8
Liberal Arts (upper-division concentration or elective) *	4
Cooperative Education (2 quarters required; must fall within third and fourth years)	
<b>Fourth Year</b>	
Strategy & Policy 0102-551	4
International Business Co-Major	8
Functional Business Area	8
Liberal Arts (upper-division concentration or elective) *	8
Liberal Arts (Senior Seminar) *	2
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† Language credit may be used as liberal arts upper-division credit.

‡ See page 11 for policy on physical education.

## International business co-major

(Choose 4)

International Marketing  
 International Finance  
 International Management  
 International Accounting  
 Multinational Business Operations and Strategy  
 International Seminar

## Functional Business Area

Four required courses in one of the following areas:  
 Marketing, Management, Finance, Accounting or  
 Information Systems

## Language Courses through Level VI

Foreign language courses offered by College of Liberal Arts

# Photographic Marketing Management

The photographic marketing management major is a joint degree program offered by the College of Business and the School of Photographic Arts and Sciences. This program is designed to provide students with a thorough knowledge of the photographic process and a solid background in business administration and marketing management. The combination of course work in these two disciplines prepares students for management careers in the photographic industry.

Opportunities for positions include those in customer service aspects of photofinishing and professional color laboratories and management positions with photographic manufacturers and retailers.

## Photographic marketing management, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 0102-011	0
Effective Communications 0102-225	2
Quality Concepts 0102-231	2
Quality Applications I 0102-232	2
Principles of Economics I & II 0511-301, 401	8
Algebra, Calculus for Management Science 1016-225, 226	8
Data Analysis I 1016-319	4
Data Analysis Lab I 1016-379	2
Liberal Arts (lower-division core) *	16
Laboratory Science	8
Physical Education †	0
<i>Second Year</i>	
Quality Applications II 0102-233	2
Financial & Managerial Accounting 0101-301, 302	8
Business Computer Applications 0106-320	4
Survey of International Business 0102-360	4
Principles of Marketing 0105-363	4
Management Science 0106-334	4
Basic Photography Lab I-III 2068-441, 442, 443	12
Liberal Arts (lower-division core) *	12
Completion of College Writing Competency Requirement	
<i>Third Year</i>	
Materials & Processes of Photography 2076-211, 212, 213	9
Organizational Behavior 0102-430	4
Buyer Behavior & Satisfaction 0105-505	4
Professional Selling 0105-559	4
Operations Management 0106-401	4
Corporate Finance 0104-441	4
Quality Concepts for Transfers 0102-235	2
Liberal Arts (upper-division concentration or elective) *	20
Special Topics 2068-551	3
Cooperative Education (2 quarters required; must fall within third and fourth years)	
<i>Fourth Year</i>	
Business, Government & Society 0102-507	4
Strategy & Policy 0102-551	4
Marketing Research 0105-551	4
Marketing Management Problems 0105-550	4
Marketing/Management Elective	4
Liberal Arts (upper-division concentration or elective) *	4
Liberal Arts (Senior Seminar) *	2
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# College of Continuing Education

*Dr. Raymond Santirocco, Interim Dean*

**T**raditional college programs and schedules are not always the answer. For the adult student juggling work, family and social obligations; for the young adult seeking to upgrade basic skills for college or the job market; for the employee who wants to learn new skills in noncredit workshops and seminars; for the traditional college student who wants a nontraditional degree, the College of Continuing Education may be the answer. Students can earn degrees, diplomas and certificates through a number of CCE programs in a variety of ways.

CCE courses and programs are offered during the day, at night, on Saturdays, through Weekend College and even via distance learning courses that students can take at home.

CCE is on the forefront of developing new degree programs such as environmental management. Its precollegiate programs help underserved and other young adults decide what they want to study and what they want to do, as well as master the skills necessary to do them. CCE also offers diverse noncredit courses in areas ranging from Total Quality Management and computing to printing and the graphic arts.

The CCE **academic division** offers numerous options in areas such as management, fine and applied arts, technical communication, business administration, health systems administration, emergency management and public relations.

The popular applied arts and science degree is now available through distance learning technologies to students who cannot attend classes at RIT. For more information, call 716-475-5027.

The **School of Professional Studies (SPS)** develops and delivers innovative and interdisciplinary bachelor's degrees for new and emerging careers. The SPS bachelor of science in environmental management provides in-depth knowledge of solid waste management science and technology, plus training in related disciplines, including politics and policy, economics, budgeting and finance, environmental regulatory law, public relations and communications. It is the first program of its kind and has attracted the attention of students and employers both locally and across the country. For more information, call 716-475-7213.

CCE's **division of human resources** brings together two graduate programs covering the spectrum of human resource development, instructional design and development, and performance technology. The career and human resource development program offers a master of science degree for the fields of human resource development and human resource management. The instructional technology program offers a master of science degree for instructional design and training development. Both programs are rooted in the behavioral sciences and train students in techniques that will improve the work-related performance of organizations and individuals. They are open to full and part-time students. The accelerated summer executive leader programs enable experienced professionals to complete a degree with minimum

residence requirements. Call 716-475-5069 for additional information about CHRD; 716-475-2893 for information about instructional technology.

The **health systems administration department** has a unique **master of science in health systems administration**, which complements the undergraduate **certificate program**. The master's program is available in an executive distance learning format. Students do most of the work at home without interrupting their careers. The master's program meets the needs of professionals wishing to expand their knowledge of quantitative and qualitative methods and issues pertinent to the health-care environment. Interested individuals should contact William W. Walence, Ph.D., at 716-475-7359 or on the Internet at [WWWCAD@RIT.EDU](mailto:WWWCAD@RIT.EDU), or Kelly Outermins in the Office of Graduate Studies, 716-475-6768 or [KBOGSD@RIT.EDU](mailto:KBOGSD@RIT.EDU).

CCE is dedicated to providing educational opportunity and access. Its university program is a provisional freshman-year program designed to enable students to build the necessary qualifications for admission to an RIT degree program.

CCE's **division of training and professional development** serves business, industry and government with noncredit seminars and training programs, delivered either at RIT or the customer's site. Using resources from RIT's academic departments, TPD also will create customized **credit-bearing** programs for corporate customers using CCE's diplomas and degrees in applied art and science as the academic vehicle. The topics most popular with corporate customers are manufacturing, TQM, engineering technology, computers and information systems, communication and digital imaging and printing. For further information on noncredit training and customized credit offerings, call 1-800-724-2536.

CCE's **open enrollment policy** allows a student to take any course or pursue any part-time degree for which he or she has sufficient background. Many courses have prerequisites that students are expected to have met before enrolling. Prerequisites are listed in the course descriptions. Academic advisers are available throughout the year to answer questions regarding course or program choices.

Students who wish to enroll in a CCE math or communication course are asked to take diagnostic tests that will assist in their placement in appropriate courses. Distance learning students may be tested off-campus. Call 716-475-2234 to arrange to take either on- or off-campus diagnostic exams. Students in Communication 220 (0236-220) are required to take an exit examination. Those who do not pass may work out a program with their instructors for mastering needed skills and may retake the exit test later. When they pass the test, students receive the grade they earned in the course.

In support of and in compliance with RIT's policy of assuring competency in written communication, all students matriculated in a CCE BS degree program must satisfy CCE's communication competency requirement. Information about this requirement and the various methods for satisfying it is available at the CCE office; it may also be obtained from a CCE adviser or from the communication chair, 716-475-4936.

Students matriculated in CCE bachelor's degree programs are normally expected to complete their degrees within seven years.

Specially trained financial aid counselors can provide students with information about some of the grants and loans available for part-time students. In addition to federal, state and private programs, RIT has special financial aid funds for part-time students that can cut tuition costs by as much as 50 percent. Many companies have employer education benefits that will pay for some or all tuition costs; active U.S. Army Reserve and National Guard members are eligible for benefits that pay up to 90 percent of tuition. Call 716-475-2958 for more information on financial aid.

For more information on any of the programs offered by CCE, call 716-475-2234.

### Academic advising

The CCE Office of Student Services provides academic advising regarding educational and career goals. This service is available at no charge to all undergraduate students who are matriculated in CCE degree, diploma and certificate programs and to all students who are enrolled in CCE courses. In addition, CCE is the designated service college for the RIT nonmatriculated student body.

Advisers are experienced and trained across academic disciplines. An adviser will help match educational and career goals with an appropriate program of study. The advising process ensures that the courses will lead to a certificate, diploma or degree in the quickest, most direct manner. Call 716-475-2078 to schedule an advising session. The office is in room 2200 of the Eastman Building.

### Transfer credit

Degree programs in CCE are structured to permit transfer of credit from other accredited institutions. When a student matriculates into a specific program, a complete evaluation is made of prior academic work. The student will know immediately how much transfer credit is awarded and what courses will be needed to earn a specific degree.

Transfer credit may also be awarded for courses included in the New York State Education Department Publication *Guide to Educational Programs in Non-Collegiate Organizations*. Call 716-475-2218 for more information.

### Faculty

Most credit and noncredit courses in the College of Continuing Education are conducted by instructors who teach what they do professionally. Our faculty are selected for their professional competence, academic background and teaching ability.

### Course scheduling options

In addition to our weekly evening and Saturday schedules, we also offer courses in distance learning and Weekend College formats.

**Distance learning** offers quality programming that students can take at home. Courses combine videotape lectures sent to the student or aired on cable and public broadcast television with textbook readings, audio and computer conferencing, assignments, exams and a limited number of class meetings. Students have access to instructors by mail, computer, telephone or individual appointment. These electronic delivery systems allow students to learn at times and places

convenient to them. For more information, call 716-475-5089; for advising, call 716-475-2078.

**Weekend College** courses meet on Saturdays (leaving the rest of your weekend free), usually every other weekend, and a full course may be completed in five weekends. Students enjoy the schedule and the seminar-like environment. Through Weekend College, you can earn credits toward a degree or complete a certificate or diploma program. For more information, call Joyce Clayton at 716-475-5511.

## Academic Division

Lynda Rummel, Associate Dean and Director  
Nancy Kunkler, Barbara Warth, Academic Program Assistants

The **academic division** of CCE provides credit-bearing courses and programs specifically designed with the adult, part-time student in mind. Each program of study is designed to meet the interests of students and Rochester's expanding business, artistic and industrial complex.

The academic division also houses the **School of Professional Studies**, through which new full-time bachelor's degrees and programs for premajors are developed and launched. The school currently offers a BS program in environmental management and the university program.

The academic division offers the following academic programs and courses:

- A wide variety of courses and course combinations of special interest, including some of the general education courses (liberal arts, science, mathematics, computer literacy and communication) required in all RIT undergraduate degree programs.
- Concentrations or certificates in:
  - Small business management
  - International business
  - Customer and consumer service
  - Environmental management with options in solid waste management science, technology and implementation
  - Business and career communication
  - Quality management—basic quality and quality implementation
  - Health systems administration
  - Emergency management
  - Management development
  - Technical communication—basic and advanced
  - Public relations communications—professional writing and graphic communication
  - Deaf studies
- Diplomas in:
  - Management development, with concentrations in seven areas
  - Fine and applied arts, with crafts and design options
- Associate degrees in:
  - AAS degrees in accounting, business administration, marketing, personnel administration, production/industrial management, and logistics and transportation;
  - AA degree in general education (with career options)
- Diploma, AAS, and BS degrees in applied arts and science (individualized multidisciplinary study)
- Bachelor of science degree in environmental management (through the School of Professional Studies)
- MS in health systems administration

## Applied Arts and Science Degrees

Lynda Rummel, Chairperson

The College of Continuing Education offers students the opportunity to tailor individualized programs of technical and professional study through its applied arts and science program. In this program, students work closely with advisers and the program review committee to co-design unique, multidisciplinary plans of study that combine several areas of expertise. The college also will work with employers to design multidisciplinary programs that are specially suited to their employees' needs.

The applied arts and science program is particularly appropriate for individuals who have prior college-level learning, are interested in changing majors, or who want to prepare themselves for a career environment that requires skills and expertise in several areas of knowledge. There are three levels:

### Diploma

36 credits; 1 area of concentration

### Associate of applied science (AAS) degree

52 core credits in general education plus 38 credits in 1-2 areas of concentration

### Bachelor of science (BS) degree

90 core credits in general education plus 90 credits in 2-4 areas of concentration

The AAS and BS degree are available to full-time students. Although the program for full-time students is very flexible, it does include physical education requirements and more limited set of math and science course options. (Full-time students should contact Joan DiFabio, full-time program coordinator, at 716-475-2845 for further information.)

## Individualized Concentrations

The associate and bachelor's degrees allow you to study several different professional and technical areas, selected specifically to meet your unique career and personal goals. The diploma focuses on one concentration. For your professional concentrations, you can draw on a wealth of educational resources from across RIT colleges and departments, including quality management, information technology, engineering technologies, sciences, computing, photography, printing, business and management, liberal arts, physical and social sciences, mathematics, fine arts, technical communication and public relations. Concentrations in health systems administration, management, applied computing, telecommunications, emergency management and solid waste management technology are now available through distance delivery.

No two applied arts and science programs will be exactly alike because each takes into account the student's previous learning and brings together a special combination of courses that are right for his or her career and professional development. For example, one individualized program might lead to a bachelor's degree with concentrations in information technology, graphic arts and management, while another could lead to a bachelor's degree that combines fields of technical communication and health systems administration.

As their career plans evolve and the demands of their technical and professional fields change, students meet regularly with advisers to review and update plans of study.

## Course requirements, AAS and BS degrees in applied arts and science

	Math/Computer/Science	Qtr. Cr.	Liberal Arts	Qtr. Cr.	Concentration(s) * 1 or 2	Qtr. Cr.
Phase 1 & 2—AAS 90 Hrs. Total	<b>Math</b> Technical Mathematics 0240-201, 202 or Math for Business 0208-201, 202 or Math Thought/Processes and Modern Math Methods 0240-205 0240-206	8	Communication † 0236-220 Literature 0504-332 Communication Elective Humanities Electives Behavioral Science Electives	4 4 4 8 8	To be developed by student with adviser	38
	<b>Computer</b> Intro to Computers/Prog. or Intro to Computer Science or Information Resources and Network Tools 0203-323	4				
	<b>Science</b> College Physics/Lab 1017-211 212, 213 or 271, 272, 273 or Contemporary Science 0246-221, 222, 223, 224, 289 (3 of 5 courses)	12				
Phase 3 & 4—BS 180 Hrs. Total	<b>Math/Science</b> Math or Science Electives ‡	8	<b>Liberal Arts</b> General Education Liberal Arts Concentration Liberal Arts Electives § Senior Seminar	4 12 16 2	<b>Concentration(s) *</b> 2 or 3 To be developed by student with adviser	48

\* A concentration = 20 (or more) quarter hours in one subject area (e.g., applied computing, communication, business).

† The communication courses require pretest; call 716-475-2234 for information. Students completing BS degree must also pass a communications competency test.

‡ Cannot be in the same area as professional concentration.

§ Students choosing a liberal arts area for a professional concentration must choose their "liberal arts concentration" and "liberal arts electives" in other disciplines or interdisciplinary areas in the College of Liberal Arts.

**Common features**

Every applied arts and science degree has certain features in common:

1. An approved program of study developed with an individual adviser and the degree committee
2. General education courses in mathematics, computer literacy, science and liberal arts (52 credits for the AAS; 90 for the BS)
3. One or more professional concentrations that provide each student with the opportunity to develop an interdisciplinary program tailored to specific career and personal objectives
4. Students must achieve a program GPA of at least 2.0 in order to be certified.

**Recognition for prior college-level learning**

Each program begins by taking account of what the student already knows and has accomplished. For example, college credits earned at RIT or other accredited institutions may be reviewed to see how they might be applied to the program of study; professional certifications and experiences will be evaluated for the possibility of receiving credit; and credits may be earned (by examination, portfolio reviews or other documentation) for college-level learning that was gained on the job or through other educational experiences. For information, contact Bette Anne Winston, coordinator, at 716-475-2218.

**Business and Management Studies**

Daniel Smialek, Chairperson

Approximately 50 credit-bearing courses in business and management subjects are available through CCE. Courses leading to an AAS degree and transferable to appropriate baccalaureate degree programs in RIT's College of Business and other schools are available in business administration, accounting, marketing, personnel administration, production management, and traffic and transportation.

For those interested in a short-term concentration in one of these fields, CCE also offers a management development program leading to a management certificate and management diploma, a small business management program and a program in customer and consumer service. Courses also may be taken individually.

General requirements for an AAS degree, diploma or certificate in business or management are:

- Completing the necessary quarter credits
- Following the program outline when selecting courses
- Achieving a program GPA of at least 2.0 in order to be certified

**Small Business Management**

Daniel Smialek, Chairperson

The certificate of achievement program in small business management is designed for enterprising individuals who want to launch a new venture or improve an existing small business. It is especially appropriate for entrepreneurs, members of family-owned businesses and key employees in companies with sales under \$2 million.

The three courses in the program are tightly integrated, to provide a solid foundation in managing, marketing and financing small businesses. The faculty include academically qualified entrepreneurs who have managed their own small companies. Courses may count as business electives in degree programs, may serve as foundation courses for the management diploma and may be taken out of sequence. Students must achieve a program GPA of at least 2.0 in order to be certified.

Like most courses in CCE, small business management courses may be taken on an audit basis (noncredit, without exams) at a reduced rate. For more information, call Daniel Smialek at 716-475-5023.

<b>Courses</b>	<i>Quarter Credit Hours</i>
New Venture Development, 0205-221	4
Small Business Management & Finance, 0205-222	4
Small Business Marketing & Planning, 0205-223	4
<b>Certificate Total</b>	<b>12</b>

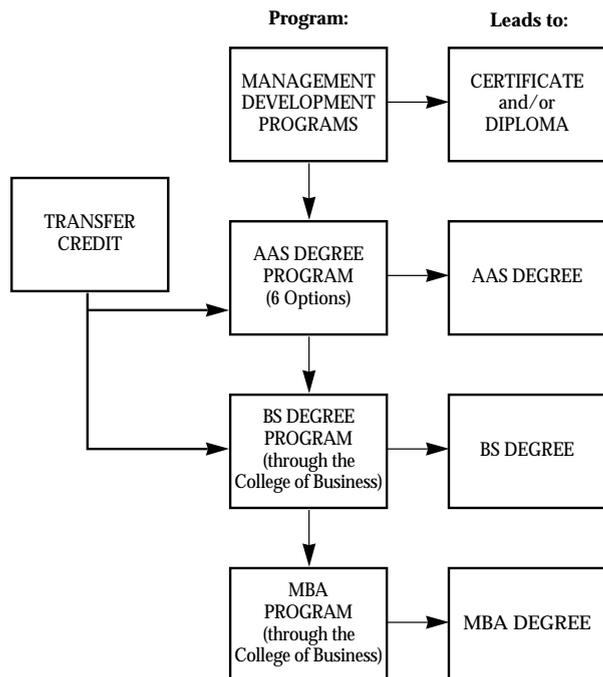
**Customer and Consumer Service**

Daniel Smialek, Chairperson

In today's competitive and growing service economy, the key to success is customer satisfaction, which comes from delivering quality products and services that are strongly shaped by thorough attention to customer needs.

The customer and consumer service certificate of achievement program focuses on customer satisfaction as the sustainable competitive advantage for both manufacturing and service industries (e.g., health care, communications, banking and finance, transportation, retailing). Special attention is paid to developing an orientation toward customer satisfaction throughout organizations and to the relationship between customer satisfaction and customer service. This program is designed for:

- managers and potential managers who want to implement customer satisfaction principles and practices throughout their organizations
- current and future managers, supervisors and personnel in sales, customer service, customer relations, quality management and human resource management



The program consists of 16 credits—10 in required core courses and an additional six selected from an array of specialized electives. Individual courses and/or the certificate may be applied to appropriate undergraduate degree programs. Students must achieve a program GPA of at least 2.0 in order to be certified. The program also may be acquired as a post-baccalaureate credential. For more details, call 716-475-5023.

<b>Core courses</b>	<i>Quarter Credit Hours</i>
The New Service Economy 0237-227	2
Introduction to Quality 0220-230	4
Customer Service Technology 0205-306	4

<b>Electives (select any 6 credits)</b>	
Marketing Practices for the Service Economy 0207-362	2
Recruiting, Training & Supervising Service Industry Personnel 0209-225	2
Leadership Skills for Quality 0220-330	4
Interpersonal Communication for Customer Service 0236-340	4
<b>Certificate Total</b>	<b>16</b>

## Quality Management

Daniel Smialek, Chairperson

Poor quality in manufacturing and service can cost companies as much as 20 percent of revenue in rework, scrap, brand switching and loss of goodwill. Organizations have begun to understand that prevention saves more time and money than discovery of flaws after the fact.

CCE's management-oriented certificate programs focus on quality as a priority. Developed in cooperation with industry, the courses can help you develop a Total Quality Management environment to combine the theory and practice of statistical quality control with leadership, teamwork and problem-solving concepts and skills.

The certificate in basic quality teaches the "nuts and bolts" of a quality organization and prepares you to introduce quality concepts to your organization. The certificate in quality implementation teaches you how to put quality principles to work for you. Together, the certificate package can prepare you to work as a quality trainer, facilitator, team leader or manager at various levels of an organization. Students must achieve a program GPA of at least 2.0 in order to be certified. For more information, contact Daniel Smialek at 716-475-5023.

<b>Certificate in basic quality</b>	<i>Quarter Credit Hours</i>
Introduction to Quality 0220-230	4
Basic SQC Techniques 0220-231	4
Leadership Skills for Quality 0220-330	4
<b>Certificate Total</b>	<b>12</b>

<b>Certificate in quality implementation</b>	
Statistics for Total Quality 0220-340	4
Costing for Quality 0220-410	4
Implementing Total Quality 0220-430	4
<b>Certificate Total</b>	<b>12</b>

## The Management Development Program

Daniel Smialek, Chairperson

The management development program has two components: the management certificate and the management diploma. By successfully completing The Management Process (0205-200, 201, 202), a 12-credit course in practical supervision, management and communication skills, students may earn the management certificate. To receive a management diploma, students must complete 16 additional credits in one of seven business/management concentrations.

The program is structured to provide a broad foundation in applied general management and focused study in a specialized field. It is specifically designed for new supervisors, emerging managers, those seeking supervisory and management positions, and for new and re-entering students. *Both parts of the program are also appropriate for individuals with degrees in the liberal arts, sciences or technologies who wish to acquire new professional skills and expand their career opportunities.*

Students may take one or both parts of the program, and both may be completed in one academic year. Credits earned in the program can be applied to various degree programs. Management certificate and diploma courses are typically offered as part of our Weekend College and our regular schedule. Students must achieve a program GPA of at least 2.0 in order to be certified. For further information, call Daniel Smialek at 716-475-5023.

### Management Certificate

Daniel Smialek, Chairperson

The management certificate is earned by successfully completing CCE's unique three-quarter, 12-credit course, The Management Process. The course focuses on:

- practical applications of management theory
- management problems, solutions and ideas
- personal development as an effective manager

The Management Process offers a comprehensive, integrated study of supervisory management. Topics covered include effective motivation, decision making, team building, conflict resolution, problem solving, time and stress management, communication techniques and strategies, planning, organizing, staffing, performance appraisal and leadership.

In this program students associate with others who have similar career aspirations, job responsibilities and challenging problems on the job. Through case studies, role plays, simulations and other instructional methods, students learn effective supervisory and management practices. Instruction is usually guided by a team of management specialists, rather than by a single instructor. Students must achieve a program GPA of at least 2.0 in order to be certified. For further information, call Daniel Smialek at 716-475-5023.

<b>Management Certificate</b>	<i>Quarter Credit Hours</i>
Management Process I 0205-200	4
Management Process II 0205-201	4
Management Process III 0205-202	4
<b>Certificate Total</b>	<b>12</b>

## Management Diploma

Daniel Smialek, Chairperson

In the management diploma program, students concentrate their studies in one of seven specific areas of business and management (such as accounting or marketing) that may be immediately relevant on the job.

A management diploma is earned by completing 16 quarter credits in addition to, typically, a management certificate. However, one of the following options may be substituted for the management certificate:

- the small business management certificate
- three core courses and one elective course from the customer and consumer service certificate program
- three foundation courses (Organization and Management 0205-203; Communication, 0236-204 or 205 or 220; and one additional business elective)
- or approved equivalents

Courses applied toward a management diploma also may be counted as professional courses in appropriate degree programs. Students must achieve a program GPA of at least 2.0 in order to be certified. For further information, call Daniel Smialek at 716-475-5023.

<b>Accounting</b>	<i>Quarter Credit Hours</i>
Management Process 0205-200, 201, 202 or approved alternative	12
Financial Accounting 0201-201	4
Managerial Accounting 0201-203	4
Intermediate Accounting I 0201-308	4
Intermediate Accounting II 0201-309	4
<i>Diploma Total</i>	<i>28</i>

<b>General management</b>	<i>Quarter Credit Hours</i>
Management Process 0205-200, 201, 202 or approved alternative	12
Financial Accounting 0201-201	4
Managerial Accounting 0201-203	4
Information Resources & Network Tools 0203-323	4
Marketing 0207-361 or Business Elective	4
<i>Diploma Total</i>	<i>28</i>

<b>Marketing</b>	<i>Quarter Credit Hours</i>
Management Process 0205-200, 201, 202 or approved alternative	12
Marketing 0207-361	4
Effective Selling 0207-210	4
Advertising Principles 0207-213	4
Business Elective	4
<i>Diploma Total</i>	<i>28</i>

<b>Personnel administration</b>	<i>Quarter Credit Hours</i>
Management Process 0205-200, 201, 202 or approved alternative	12
Personnel Administration 0209-229	4
Interviewing Techniques 0209-224	4
Business Law I 0202-301	4
Business Elective	4
<i>Diploma Total</i>	<i>28</i>

<b>Production/industrial management</b>	<i>Quarter Credit Hours</i>
Management Process 0205-200, 201, 202 or approved alternative	12
Production Management 0210-209	4
Fundamentals of Industrial Engineering 0210-305	4
Industrial Engineering Economy 0210-306	4
Information Resources & Network Tools 0203-323	4
<i>Diploma Total</i>	<i>28</i>

<b>Logistics and transportation management</b>	<i>Quarter Credit Hours</i>
Management Process 0205-200, 201, 202 or approved alternative	12
Intro. to Logistics & Transportation 0212-234	4
Traffic & Transportation Law, Rates, Accounting & Control 0212-239	4
International Logistics & Transportation 0212-241	4
Marketing 0207-361	4
<i>Diploma Total</i>	<i>28</i>

<b>Real estate management</b>	<i>Quarter Credit Hours</i>
Management Process 0205-200, 201, 202 or approved alternative	12
Basic Real Estate Principles,* 0213-201	4
Advanced Real Estate Principles,* 0213-202	4
Real Estate Investment & Finance, 0213-203	4
Business Elective	4
<i>Diploma Total</i>	<i>28</i>

\* These courses provide an excellent foundation for a real estate career and are approved by the New York State Division of Licenses as preparation for the salesperson's and broker's license examinations in real estate.

## Business and Management AAS Degree Programs

Daniel Smialek, Chairperson

Programs leading to an AAS degree in business administration are available in accounting and business administration. These programs are fully transferable to baccalaureate degree programs in RIT's College of Business.

Programs leading to an AAS degree in management are offered in marketing, personnel administration, production management, logistics and transportation. Management programs are also transferable to a BS degree program in RIT's College of Business.

All business and management degree programs include a core group of business courses in organization and management, accounting, data processing and business law. Approximately half of the credits in degree programs are earned through these professional courses, which may count in management diploma programs, as well as in AAS degrees. In addition, all business and management degree programs include a broad spectrum of courses in communication, behavioral/social sciences, humanities, math and science. Students must achieve a program GPA of at least 2.0 in order to be certified.

For more information, call Daniel Smialek at 716-475-5023.

<b>Professional concentration requirements, business and management AAS programs</b>	<i>Quarter Credit Hours</i>
<b>Accounting</b>	
Intermediate Accounting I 0201-308	4
Intermediate Accounting II 0201-309	4
Business Law I 0202-301	4
Business Law II 0202-302	4
History or Fine Arts Elective	4
<i>Concentration Total</i>	<i>20</i>

<b>Business administration</b>	<i>Quarter Credit Hours</i>	
History or Fine Arts Elective		4
Legal Environment of Business 0202-310		4
3 Business Electives		12
<i>Concentration Total</i>		20
<b>Marketing</b>	<i>Quarter Credit Hours</i>	
Effective Selling 0207-210		4
Advertising Principles 0207-213		4
Business Law I 0202-301		4
2 Business Electives		8
<i>Concentration Total</i>		20
<b>Personnel administration</b>	<i>Quarter Credit Hours</i>	
Personnel Administration 0209-229		4
Interviewing Techniques 0209-224		4
Business Law I 0202-301		4
2 Business Electives		8
<i>Concentration Total</i>		20
<b>Production/industrial management</b>	<i>Quarter Credit Hours</i>	
Production Management 0210-209		4
Fundamentals of Industrial Engineering 0210-305		4
Industrial Engineering Economy 0210-306		4
Business Law I 0202-301		4
Elective		4
<i>Concentration Total</i>		20
<b>Logistics and transportation management</b>	<i>Quarter Credit Hours</i>	
Intro. to Logistics & Transportation 0212-234		4
Traffic & Transportation Law, Rates, Accounting & Control 0212-239		4
International Logistics & Transportation 0212-241		4
Business Law I 0202-301		4
Elective		4
<i>Concentration Total</i>		20

## International Business

Linda Tolan, Chairperson

Rochester-area export sales in 1993 totaled approximately \$11 billion, and 59 percent of the local firms responding to a Chamber of Commerce survey increased exports in 1993. Companies in the upstate New York area are actively pursuing opportunities in the expanding global marketplace. Any firm that does business internationally needs knowledgeable employees throughout the company—those involved both directly and indirectly in international projects—who know and understand the issues, challenges and processes of international business. CCE's international business certificate of achievement can help prepare employees to be a part of this exciting field and is an excellent complement to a wide variety of career fields.

Developed in association with the International Business Council of the Greater Rochester Metro Chamber of Commerce and other prominent international business leaders from upstate New York, the courses in this program focus on the knowledge and skills required for transacting business and trade across international borders. They are taught by faculty who are not only academically qualified, but who also work on a daily basis in the international business community. They bring a wealth of direct international business experience to the classroom. Designed to provide a keen understanding of the values, structures and systems of the international marketplace, the certificate or courses can enhance your credentials in a wide range of positions.

The flexible curriculum allows students to customize the requirements to their needs and interests. General courses provide fundamental information on business practices, cultural differences and international economic factors. The specialty courses allow students to focus on specific content areas and geographic regions. Credit may be applied to professional concentrations in the applied arts and sciences degree or taken individually for professional development. Students must achieve a program GPA of 2.0 or higher in order to be certified. For further information, contact Linda Tolan at 716-475-5078.

## Core Requirements, All Business and Management AAS Programs

Below are the core requirements for all business and management degree programs. Professional program requirements are added to these core requirements.

	Professional Courses	Qtr. Cr.	General Education	Qtr. Cr.	Math, Statistics & Science	Qtr. Cr.
Required Courses 9/2 Credits	Financial Accounting 0201-201	4	Communication * 0236-220		Science Electives †	8
	Managerial Accounting 0201-203	4	and		Math for Business 0208-201, 202	8
	Organization & Mgmt. (1) 0205-203	4	Literature 0504-332	8	Statistics 0208-351, 352	8
	Information Resources & Network Tools 0203-323	4	or			
	Principles of Marketing 0207-361	4	Dyn. Comm. * 0236-214	8		
	Management Science 0205-353	4	Comm. 0236-220	8		
	Professional Concentration Courses (see above)	20	Economics 0511-301, 302	8		
			Psychology 0514-210	4		
			Sociology 0515-210	4		
	Total	44	Total	24	Total	24

In sequentially numbered courses, the lower-number course is prerequisite.

(1) The Management Process (0205-200, 201, 202) may be substituted for the following:

	Qtr. Cr.
Dynamic Communication 0236-214	4
Organization & Management 0205-203	4
1 business elective	4

\* These communication courses require pretest; call 716-475-2234 for information. Students who take 0236-214 should also take 0236-220. Students who take 0236-220 should also take 0504-332.

† Science electives may include any of the following:

Contemporary Science/Biology 0246-221
Contemporary Science/Chemistry 0246-222
Contemporary Science/Physics 0246-223
Contemporary Science/Oceanus 0246-224
Contemporary Science/Mechanical Universe 0246-289
College Physics 1017-211, 212, 213

General courses (select one; 4 cr. hrs. req.)	Credit Hours
Doing Business in International Markets 0218-410	4
Communicating Across Cultures 0218-430	4

Specialty courses (select two; 8 cr. hrs. req.)	Credit Hours
International Trade: Importing & Exporting 0218-452	4
International Advertising & Public Relations 0218-454	4
Doing Business in Mexico & Latin America 0218-412	4
Doing Business in Japan & the Pacific Rim 0218-413	4

Select one additional 4-credit general or specialty course from above list.	Credit Hours
	4
<b>Certificate Total</b>	<b>16</b>

### Health Systems Administration

William Walence, Chairperson

The health care industry has been transformed in recent years by advances in technology, new modalities of care, changes in financing and organization, greater demand for accountability and a general expansion as the population ages. These developments have led to increasing demand for administrators at all levels.

CCE's concentration of courses in health systems administration is designed to equip students with the skills necessary to obtain entry-level positions in health administration. Such students are typically those with a clinical background in nursing or an allied profession desiring to change their professional emphasis. However, certain courses also may be of interest to administrators desiring to upgrade their skills in special areas.

The sequence of six courses consists of three survey courses (a systems overview, administration in the health care setting, and finance and budgeting), followed by three specialized courses (legal aspects of health care, quality assurance, and program planning and development). These courses are offered in the distance learning format.

### Health systems administration certificate

This is an upper-level concentration generally requiring previous course work or experience and permission of the chair for enrollment. Students may earn the certificate and/or apply the courses to the professional concentration requirements for the degree in applied arts and science. The program has been developed with the assistance of Rochester-area health care administrators and subject matter experts, and courses are taught by experienced professionals. Students must achieve a program GPA of at least 2.0 in order to be certified. For further information regarding course content and admissions requirements, contact William Walence at 716-475-7359.

Courses	Quarter Credit Hours
Survey of Health Care Systems 0206-310	4
Health Care Administration 0206-320	4
Health Care Economics & Finance 0206-351	4
Legal Aspects of Health Care Administration 0206-421	4
Health Care Quality Assurance 0206-431	4
Health Planning & Program Development 0206-441	4
<b>Certificate Total</b>	<b>24</b>

### Emergency Management

John Morelli, Chairperson

Heightened public and governmental awareness of the hazards associated with high technology has led to stringent new federal and state laws requiring communities to plan comprehensively for toxic chemical or radiation emergencies. In addition, there has always been a need to protect the public during natural emergencies such as floods, earthquakes and tornadoes.

Emergency management practitioner organizations and the federal government are working to develop national standards for the accreditation of emergency managers. CCE's certificate in emergency management is intended to upgrade the skills of existing emergency managers in police, fire and ambulance work; public safety planners; and emergency officials in industry and to provide a strong foundation for emergency response personnel desiring to develop a new career specialty. Possession of this certificate is expected to bear significantly on graduates' ability to qualify for national accreditation.

The five-course sequence is designed to provide students with knowledge of the physical phenomena underlying emergency situations, such as elementary meteorology, earthquake phenomena, toxic chemicals and radiation; the legal aspect of emergency planning and operations; the theory and methodology of emergency planning, including evacuation planning and management; and the theory and practice of operations at a disaster scene. Up to four credits may be awarded to emergency response agency personnel for appropriate training or experience.

Courses are scheduled so that the certificate may be completed in as little as one year. The courses also may be applied toward professional requirements for the BS degree in applied arts and science. Students must achieve a program GPA of at least 2.0 in order to be certified. These courses are offered in the distance learning format.

Certificate courses were developed with the assistance of local and state professionals in emergency management and are taught by such professionals. For advising and further information about this program, call John Morelli, 716-475-7213.

	<i>Quarter Credit Hours</i>
Emergency management	4
Earth Science for the Emergency Manager 0285-311	4
Man-made Hazards 0285-321	4
Emergency Preparedness Laws & Regulations 0285-301	4
Emergency Planning & Methodology 0285-371	4
Emergency Operations 0285-381	4
<b>Certificate Total</b>	<b>20</b>

## Solid Waste/Industrial Environmental Management

John Morelli, Chairperson

The increased cost of waste disposal and concern over related liability have forced both municipal governments and industry to create positions of professional responsibility for waste management. Since no comprehensive solid waste management education existed before the fall of 1991, solid waste managers typically have had little or no formal training in the core topics of their solid waste responsibilities. As related technical and regulatory issues have become more and more complex, the demand for employees with environmental training has increased dramatically. To respond to these inquiries and provide the information and skills to keep pace in this rapidly expanding field, CCE has established a certificate package in solid waste management consisting of three programs. Since courses are typically scheduled in the late afternoon, or are available through distance learning, students may

pursue these programs on a part-time basis.

	<i>Quarter Credit Hours</i>
<b>Solid waste management science certificate</b>	<b>12</b>
Environmental Monitoring & Measurement 0286-360, 362	4
Environmental Geology 0286-370, 372	4
Intro. to Hydrology 0286-380, 382	4
<b>Certificate Total</b>	<b>12</b>

*Prerequisites: college algebra & trigonometry, general chemistry, organic chemistry, college physics I*

	<i>Quarter Credit Hours</i>
<b>Solid waste management technology certificate</b>	<b>24</b>
Principles of Environmental Management 0286-201	4
Recycling 0286-301	4
Waste Reduction 0286-311	4
Land Disposal & Treatment 0286-401	4
Energy Recovery 0286-411	4
Special & Hazardous Wastes 0286-475	4
<b>Certificate Total</b>	<b>24</b>

*Prerequisites: college algebra & trigonometry, general chemistry, geology*

	<i>Quarter Credit Hours</i>
<b>Industrial environmental management certificate</b>	<b>20</b>
Solid & Hazardous Waste Management 0286-350	4
Industrial Wastewater Management 0286-352	4
Air Emissions Management 0286-354	4
Remedial Investigation & Corrective Action 0286-444	4
Corporate Environmental Management 0286-515	4
<b>Certificate Total</b>	<b>20</b>

*Prerequisites: college algebra & trigonometry, general chemistry*

All the courses offered under these certificate programs can be applied to professional concentrations in the BS degree in applied arts and science. Part-time tuition rates are charged for students who are matriculated in the applied arts and science program. Courses also may be applied toward the bachelor of science in environmental management by students who matriculate in that full-time program. For more information regarding these certificates, contact John Morelli at 716-475-7213 or an applied arts and science adviser. Students must achieve a program GPA of at least 2.0 in order to be certified.

## Course requirements, General Education, AA Degree

Required Courses 92 Credits			Qtr. Cr.			Qtr. Cr.
	Humanities 0235-201, 202, 203		12	Economics 0511-301		4
Introduction to Literature 0504-332		4	Psychology 0514-210		4	
Fine Arts: Visual Arts 0505-213		4	Philosophy 0509-210		4	
Fine Arts: Musical Arts 0505-214		4	Electives *		20	
History: Modern European 0507-302		4	Career Skills Area		20	
or						
History: Modern American 0507-301		4				
Political Decision Making 0513-215		4				
Contemporary Science Elective		4				
Science, Technology & Humanity Elective		4				

\* Students may petition the chairperson of liberal arts to apply courses outside the area generally regarded as general education electives. This must be a written request.

## The Liberal Arts Degree Program

Linda Tolan, Chairperson

The associate in arts (AA) is the only liberal arts degree program offered by the College of Continuing Education. Students will sample literature, arts, philosophy, history and the other disciplines that have traditionally been at the core of a college education. At the same time, they will consider the relationship of these studies to 20th century technology and business.

After fulfilling the basic course requirements, students finish the degree by choosing one of two options: to deepen understanding of the liberal arts by adding courses in the humanities, communication and social sciences; or to take advantage of RIT's extensive opportunities in career training by including 20 credits of study in a specific career skill.

Students must achieve a program GPA of at least 2.0 in order to be certified. Examples of career study include:

- Accounting
- Advertising design
- Communication
- Deaf studies
- Fine arts
- General management and supervision
- Industrial management
- Marketing
- Personnel management
- Public relations communications
- Real estate
- Small business management
- Technical communication

For more information in the career skills option, contact Linda Tolan, 716-475-5078.

## Public Relations Communications

Thomas Moran, Chairperson

Public relations communications are vital to virtually every human endeavor. Almost every organization employs individuals, either in house or by contract through public relations agencies, who can prepare press releases, brochures, newsletters, annual reports, point-of-purchase promotions and other persuasive, informative materials in a variety of media.

Underlying successful public relations communications are skills in two key areas: writing and graphic communication. CCE offers a certificate program in each of these specialties. Both programs share a core of courses that provides an introduction to public relations and teaches widely used principles and techniques of advertising, project management and persuasion. The professional writing program provides specialized instruction in writing marketing materials, inbound and outbound publications, corporate-level communications, and speeches and scripts. The graphic communication program (designed specifically for nonartists) focuses on understanding the components of the advertising process, the use of effective design principles in the preparation of layouts, and the combining of creative and technical skills to achieve design success.

These programs are intended for individuals who wish to enter the field of public relations or take on PR responsibilities, those who have been working in a particular aspect of public relations and wish to upgrade or broaden their skill; or those who have been performing PR tasks for which they have had little formal preparation.

Up to four credits may be awarded by examination or for courses taken at another college. Prerequisite for the core courses is demonstration (by examination, portfolio or transcript) of a command of standard written English.

Courses are scheduled so that the core and one or both of the certificate options may be completed in four quarters of part-time study. Students may earn one or both certificates, and students not wishing to take an entire certificate program may take specific individual courses. Courses may be applied toward appropriate diploma, AAS and BS degree programs. Students must achieve a program GPA of at least 2.0 in order to be certified. For advising and further information about these courses, transfer credit, credit for college-level learning and financial assistance, call Thomas Moran at 716-475-4936.

<b>Core Courses</b>	<i>Quarter Credit Hours</i>
Introduction to Public Relations 0236-360	2
Psychology of Persuasion 0237-320	2
Advertising Evaluation & Techniques 0207-214	4
Managing the Project 0236-332	2
<i>Core Total</i>	10

<b>Professional Writing</b>	<i>Quarter Credit Hours</i>
Core Courses	10
Writing for the Organization I 0236-365	2
Writing for the Organization II 0236-366	2
Promotional Writing 0236-331	2
Scripting for AV & Video Presentations 0236-368	2
Speechwriting 0236-369	2
<i>Certificate Total</i>	20

<b>Graphic Communication</b>	<i>Quarter Credit Hours</i>
Core Courses	10
Graphic Communication for the Non-Artist I 0223-270	3
Graphic Communication for the Non-Artist II 0223-271	3
Art for Reproduction 0223-220	3
<i>Certificate Total</i>	19

## Technical Communication

Thomas Moran, Chairperson

In this age of rapidly expanding technologies, technical communication is an essential, challenging and lucrative profession, one that can be practiced within an organization or outside, through independent contracting.

As the technologies grow, so does the need for communicators skilled in conveying many kinds of information in many different forms to many diverse audiences. Industrial, business, scientific, medical and nonprofit sectors have recognized the importance of communication to their successes. The ability to present information effectively—in forms such as manuals, brochures, data sheets, promotional materials, systems documentation, reports, trade and professional journals, and videos, among others—is a highly valued asset in the work place today.

The following sequence of courses, designed to be completed in two consecutive quarters of part-time study, provides a strong, practical foundation in technical communication skills for those wanting to work in the profession or those whose advancement in other careers is directly related to their ability to communicate clearly, correctly and concisely.

<b>Basic technical communication</b>	<i>Quarter Credit Hours</i>
<b>phase I</b>	
Technical Writing & Editing 0236-323	4
Research Techniques 0236-324	2
<b>phase II</b>	
Instructional Design Principles 0236-325	2
Document Design Principles 0236-326	2
Practicum: Designing Manuals 0236-327	2
<i>Certificate Total</i>	12

Up to four credits may be awarded by examination or for courses taken at another college. Prerequisite for the basic sequence is demonstration (by examination, portfolio or transcript) of a command of standard written English. Students must achieve a program GPA of at least 2.0 in order to be certified.

For those interested in further professional development and instruction in more specialized topics, the following sequence of courses, designed to be completed in two quarters of study, is offered.

<b>Advanced technical communication</b>	<i>Quarter Credit Hours</i>
<b>phase I</b>	
Oral Skills for Technical Communication 0236-329	2
Writing Software User Documentation 0236-330	2
Promotional Writing 0236-331	2
<b>phase II</b>	
Writing in the Sciences 0236-328	2
Managing the Project 0236-332	2
Managing Media Presentations 0236-333	2
<i>Certificate Total</i>	12

Up to four credits may be awarded by examination or for courses taken at another college. (With chairperson's permission, up to four credits from a list of approved courses may be substituted for courses in the above sequence.) Prerequisite for the advanced sequence is completion of the basic sequence or the equivalent. Students must achieve a program GPA of at least 2.0 in order to be certified.

Courses in these sequences were developed with the assistance of working technical communicators and are taught by experienced professionals. For advising and further information about these courses, transfer credit and financial assistance, call 716-475-4936.

## Business and Career Communication

Thomas Moran, Chairperson

Business leaders say that a key to success is the ability to communicate successfully. CCE offers three four-credit courses designed to provide competency in those written and oral skills demanded in business and industry. Courses may be taken separately and may be used as elective or professional concentration courses in appropriate CCE degree programs.

<b>Courses</b>	<i>Quarter Credit Hours</i>
Professional Presentations 0236-301	4
Discussion Skills & Leadership 0236-302	4
Communicating in Business 0236-307	4
<i>Total</i>	12

For advising or further information about this program, call Thomas Moran at 716-475-4936.

## Deaf Studies

William Walence, Chairperson

The deaf studies certificate is intended primarily to achieve two purposes: first, to permit employees and volunteers in the private and public sectors to prepare themselves to communicate more effectively with deaf clientele, students, fellow professionals or employees in business, industries, schools, colleges and hospitals; and, second, to provide a stimulating foundation for those who wish to pursue further education in the fields of interpreting for the deaf or deaf education.

Rochester has the second highest population per capita of deaf and hard-of-hearing individuals in the United States, a fact that has led to extensive community and educational resources for them.

The 16-credit curriculum is composed of the seven courses listed below. Although a primary emphasis in the curriculum is learning both Basic Sign Language and American Sign Language, students also will deepen their understanding of the phenomenon of deafness through courses related to the physical, psychological, social and linguistic aspects of deafness.

Although substitution of one course for another generally will not be permitted, students will be able to challenge course content in any of the courses listed. Students must achieve a program GPA of at least 2.0 in order to be certified.

The courses have been designed and are largely taught by the faculty of the National Technical Institute for the Deaf at RIT.

<b>Courses</b>	<i>Quarter Credit Hours</i>
Sign Language & Manual Communication Systems I, II, III 0234-211, 212, 213	6
American Sign Language I, II 0234-311, 312	4
Aspects & Issues of Deafness I, II 0234-241, 242	6
<i>Certificate Total</i>	16

For advising or further information about this program, call William Walence at 716-475-4986 (v/TTY).

## Fine and Applied Arts and Crafts

Eric Bellmann, Chairperson

Fine and applied arts courses are designed to contribute to the student's personal growth and cultural enrichment. Individual courses are offered, or a diploma may be earned by following a program of study in crafts, fine and applied arts, advertising design or interior design.

Options begin with introductory courses to provide students with a basic exploration of the creative process and to help them develop visual organization skills. After taking these courses, the student will be able to earn a fine and applied arts diploma by completing the requirements in any of four areas. Some courses are offered only in alternate years.

Students should consult with a CCE adviser to plan their course of study and to clarify goals. The chairperson can be consulted regarding course substitution.

Students must achieve a program GPA of at least 2.0 in order to be certified.

For more information, call Eric Bellmann at 716-475-4977.

Core requirements	Quarter Credit Hours
Basic Drawing & Media 0224-201, 202, 203	6
Basic Design 0223-201, 202, 203	6
Fine Arts: Visual Arts 0505-213	4
<b>Core Total</b>	<b>16</b>

### Program requirements:

Craft	Quarter Credit Hours
Core requirements *	16
Major craft courses	18
Minor craft courses	6
Third craft choice	2
Electives with adviser's approval	6
<b>Diploma Total</b>	<b>48</b>

In addition to the core requirements, each student must become familiar with three of four areas.

### Fine arts

Core requirements *	16
Advanced Drawing (3 quarters) 0224-306	6
Basic Figure Drawing 0224-207	2
Figure Drawing (2 quarters) 0224-307	4
Electives with adviser's approval	20
<b>Diploma Total</b>	<b>48</b>

### Advertising design

Core requirements *	16
Display Design 0223-211, 212, 213	6
Advanced Design & Typography 0223-261, 262, 263	6
Graphic Design 0223-311, 312, 313	6
Advertising Design 0223-315, 316, 317	6
Basic Figure Drawing 0224-207	2
Electives with adviser's approval	6
<b>Diploma Total</b>	<b>48</b>

### Interior design

Core requirements *	16
Display Design 0223-211, 212, 213	6
Marketing 0207-361	4
Interior Design 0223-224, 225	4
History of Interior Design 0223-226	2
Environmental Design, 0223-251, 252, 253	6
Electives with adviser's approval	10
<b>Diploma Total</b>	<b>48</b>

\* Core requirements are prerequisite for all diploma programs.

## School of Professional Studies

Through its School of Professional Studies, the academic division offers bachelor's degree programs for full-time students. These programs are designed to meet the educational needs and professional work requirements of the 21st century and typically focus on emerging professions that are multidisciplinary in nature. The curricula are intended to provide a balance of breadth and depth in several fields. This balance equips graduates with a range of knowledge and skills that will allow them to work and advance in a wide variety of professional occupations and settings. Because these curricula typically bring several specialties together, the academic division works closely with other RIT colleges to develop and sponsor them.

### Environmental Management

John Morelli, Chairperson

Compliance with environmental regulation may be the first order of business for the environmental manager, but it is not the only level at which the game is played. Indeed, for some organizations, environmental compliance represents no more than *table stakes* in a much broader and more interesting intrigue. Such organizations may "... recognize environmental management as among the highest corporate priorities and as a key determinant to sustainable development ..."<sup>1</sup>

Generally, there are three levels of environmental commitment that determine the type of environmental activities most likely to be performed by an environmental manager: (1) compliance with environmental regulations; (2) development and attainment of corporate environmental goals and policies; and (3) integration of environmental management strategies across the organization. Each level incorporates the substance of the subordinate levels. Depending upon the level of commitment and the environmental manager's level of responsibility, he or she may participate in activities at any or all levels.

RIT prepares its students for a full range of environmental management responsibilities in this exciting and rapidly expanding field. Graduates enter the work force with both in-depth scientific and technical expertise and essential familiarity with environmental law, policy, finance and public relations

<sup>1</sup> *Global Environmental Management Institute (GEMI), excerpt from the "First Principle for Environmental Management," International Chamber of Commerce Business Charter for Sustainable Development, as presented in GEMI's Environmental Self-Assessment Program, Washington, D.C.*

Environmental management students are proud of their commitment and have a strong sense of camaraderie. During the freshman and sophomore years, course sections are scheduled so that they can take many of their classes together. This provides better opportunities for our students to meet, get to know one another and form study groups that will help them succeed during their years at RIT and lasting friendships that will benefit them throughout their careers. For advising or further information, call John Morelli at 716-475-7213.

### Electives

The ample allowance for electives in the curriculum permits students to pursue various competency areas in greater depth and facilitates the acceptance of transfer credits from other institutions.

### Cooperative work study

As noted in a recent handbook on environmental careers, "Hands-on training is practically a must." RIT's cooperative work experience program is one of the best in the country. Beginning in the spring of the third year, environmental management students alternate between full-time employment and academic study. Graduates leave with a full year of professional employment under their belts—and on their résumés. Co-op job descriptions and locations range from field research to office work and from government agencies to industrial manufacturing plants. Typically they're located in the Rochester area or in the hometown of the student's family (to simplify living accommodations), but some more adventurous individuals seek jobs across the continent or overseas.

### Environmental management, BS degree, typical course sequence

	<i>Quarter Credit Hours</i>
<i>First Year</i>	
Chemistry Principles I/Lab 1011-211/205	4
Chemistry Principles II/Lab 1011-212/206	4
Algebra & Trigonometry 1016-204	4
General Biology/Lab 1001-201/205	4
Environmental Mgmt. Seminar 0286-200	2
Software Tools 0602-202	-
or	
Survey of Computer Science 0602-200 *	4
Intro. to Organic Chemistry/Lab 1011-213/207	4
Elementary Statistics 1016-309	-
or	
Data Analysis 1016-319	4
Technical Report Writing 0236-308	4
Introduction to Public Relations 0236-360	2
Liberal Arts Core	16
Physical Education	0
<i>Second Year</i>	
Data Analysis II 1016-320	4
Applied Microbiology 1004-210	4
Teams & Team Development 0220-450	4
Physics for Environmental Management 0286-220	4
Principles of MSW Management 0286-201	4
Environmental Geology/Lab 0286-370/372	4
Financial Accounting 0101-301	4
Liberal Arts Core	20
Physical Education	0
<i>Third Year</i>	
Environmental Health & Safety 0286-450	4
Waste Reduction 0286-311	-
or	
Air Emissions Management 0286-354 †	4
Intro. to Hydrology/Lab 0286-380/382	4
Recycling 0286-301	-
or	
Solid & Hazardous Waste 0286-350 †	4
Business, Public Policy & the Environment 0286-455	4
Environmental Monitoring & Measurement/Lab 0286-360/362	4
Environmental Accounting & Finance 0286-452	4
Professional Electives	4
Cooperative Education (2 quarters)	0
<i>Fourth Year</i>	
Environmental Law I & II 0286-480/481	8
Land Disposal & Treatment 0286-401	-
or	
Industrial Wastewater Management 0286-352 †	4
Special & Hazardous Waste 0286-475	-
or	
Remedial Investigation & Corrective Action 0286-444 †	4
Energy Recovery 0286-411	-
or	
Environmental Permitting 0286-440	4
Project Management 0286-490	4
Liberal Arts Elective	4
Professional Elective	4
Cooperative Education (2 quarters)	0
<i>Fifth Year</i>	
Senior Project Planning 0286-509	1
Senior Project 0286-511	4
Environmental Permitting 0286-440 *	4
or	
Corporate Environmental Management 0286-515	4
Professional Elective	4
Liberal Arts Senior Seminar 0520-501	2
Liberal Arts Electives	12
<b>Total Quarter Credit Hours</b>	<b>191</b>

\* With approval of adviser

† Required for students who choose industrial environmental management concentration

# College of Engineering

Paul E. Petersen, Dean

The programs offered by the College of Engineering prepare students for careers in industry or for graduate study in specialized fields. The curricula emphasize fundamentals and, in the fourth and fifth years, provide courses that allow students to specialize in their chosen fields of study. To help ready students for life in the larger community, a balance among humanistic-social subjects, the physical sciences and professional studies is maintained.

## Resources

The departments of computer, electrical, industrial and manufacturing, mechanical, and microelectronic engineering occupy the James E. Gleason Building and the Center for Microelectronic and Computer Engineering, an adjoining building that has more than 10,000 square feet of laboratory space for the fabrication of integrated circuits plus an integrated circuit design center. The industrial and manufacturing engineering program is housed in the new Center for Integrated Manufacturing Studies. All departments have laboratories with excellent facilities that include state-of-the-art computer workstations for discipline-specific engineering design. In addition, two general-purpose computer user centers housed in the engineering buildings are available to all engineering students. The laboratories are used for both instruction and research and are available to students at all levels of the program. The faculty pride themselves on having integrated real-life engineering practice into the academic program. The overall program incorporates classroom and laboratory instruction, engineering research projects and special student projects to prepare students for their industrial work assignments or for advanced study in graduate school.

## Five-year programs

The college offers six five-year cooperative education programs leading to the bachelor of science degree with majors in electrical, computer, industrial and manufacturing, mechanical, microelectronic and software engineering.

## Transfer programs

The college admits graduates from two-year community colleges in engineering science and engineering technology. Significant numbers of transfer students join the regular undergraduate program and give RIT's engineering programs a unique academic atmosphere.

The AS graduate in engineering science with above-average scholastic achievement can usually enter one of the five BS programs as a regular third-year student. It may be necessary to adjust a few courses to accommodate program differences in the first two years. Transfer credits are granted on the basis of course-by-course evaluation.

The AAS graduate in technology who has demonstrated outstanding achievement should consider transfer to a BS program in engineering as one alternative for continuing formal education. The exact number of transfer credits for which he or she may qualify varies widely, and the student should contact the department head of his or her chosen discipline for transfer credit evaluation.

## The cooperative education plan

All students participating in the five-year cooperative programs attend classes during the fall, winter and spring quarters of their first and second years. Before beginning the third year, students are assigned to co-op block A or B. In any given quarter, students in one block are on their co-op assignments, while those in the other block attend classes.

Employment arrangements are made by each student through his or her co-op coordinator in the Office of Cooperative Education and Placement.

## Cooperative education plan—College of Engineering

Year		Fall	Winter	Spring	Summer
1 and 2		RIT	RIT	RIT	—
3 and 4	A	RIT	Co-op	RIT	Co-op
	B	Co-op	RIT	Co-op	RIT
5	A	RIT	Co-op	RIT	—
	B	Co-op	RIT	RIT	—

## Academic advising

Upon entry into the college, each student is assigned an adviser. The adviser is available for both academic advising and career counseling.

## Orientation

The engineering programs are strongly oriented toward mathematics and the physical sciences. Emphasis is placed on these subjects in the first two years to provide a foundation for the applied sciences and engineering subjects that follow later in the programs.

## Careers

Graduates qualify for professional work in many aspects of engineering design and product development, systems engineering, research and development, supervision of technical projects and managerial positions in industry. In addition, an engineering education can provide a foundation for continued study in business, law, medicine, etc. Increasing numbers of graduates continue their education for the master of science or the doctor of philosophy degrees.

**Entrance requirements (BS)**

Applicants for the engineering program must be high-school graduates and must have completed elementary and intermediate algebra, plane geometry, trigonometry, and both physics and chemistry in high school. Advanced algebra, solid geometry and calculus, while not required, are highly desirable. The applicant should demonstrate proficiency in the required entrance subjects since these provide the basis for the more advanced courses in engineering and science.

All applicants are required to take entrance examinations as described in the admission section of this bulletin.

**Accreditation**

All of the college's programs of study leading to the bachelor of science degree are accredited by the Accreditation Board for Engineering and Technology (ABET) with the exception of the new software engineering program, which was developed using ABET guidelines and will be eligible for accreditation upon the graduation of its first class. The college is a member of the American Society for Engineering Education. All graduating seniors are eligible and encouraged to sit for the intern engineer portion of the New York State Professional Engineering examination during their final quarter.

**Graduate degrees**

Programs leading to the master of science degree are offered in computer, electrical and mechanical engineering and applied and mathematical statistics. The programs may be pursued part time or full time, since most courses are offered in the late afternoon and early evening.

In addition the college offers post-baccalaureate professional programs leading to the master of engineering degree. Study may be pursued in such areas as manufacturing, industrial and mechanical engineering; engineering management; microelectronic manufacturing engineering; and systems engineering. The program is unique in that it extends the undergraduate cooperative work concept to the graduate level in an industrial internship for which academic credit is granted.

Designed as a full-time program, the master of engineering degree may also be pursued on a part-time basis by engineers employed locally.

The College of Engineering offers jointly with the College of Science a program leading to the master of science degree in materials science and engineering.

It also offers jointly with the College of Business a program leading to the master of science degree in manufacturing management and leadership.

**Engineering science and part-time study**

An increasing number of students desire to pursue engineering degrees part time while maintaining full-time employment. In response to their needs, the college offers several options. Those lacking the normal mathematics and science background to meet engineering program admission requirements are encouraged to seek additional preparation through the College of Continuing Education. For those meeting the normal requirements, an associate degree in engineering science (AS) may be earned entirely through part-time evening study. The mathematics, science, liberal arts and core engineering science courses included in this program prepare graduates for transfer into most ABET-accredited engineering programs at the third-year level.

Engineering science graduates with appropriate professional elective courses will be accepted as third-year students in either the mechanical or electrical engineering departments. All upper-division electrical engineering courses are offered in the late afternoon or evening. Mechanical engineering majors will generally be required to take upper-division courses during the normal day schedule. For transfer to other engineer-

ing departments, students are advised to contact the respective department head and arrange the appropriate course schedule before they complete 45 credits of the engineering science program.

As with full-time students, part-time students are required to complete the equivalent of five quarters of approved cooperative work experience. Arrangements can be made for part-time students to use approved portions of their regular employment to satisfy some or all of the co-op requirements. Those wishing further information on part-time study in engineering should contact the Dean's Office at 716-475-2145.

**Engineering science, AS degree, typical course work \***

<i>Liberal Arts</i>	<i>Quarter Credit Hours</i>
Dynamic Communication I, II 0236-204 and 205	
or	
Communication 0236-220	4
Literature 0504-332	4
Two of four social sciences choices:	8
Introduction to Psychology 0514-210	
Principles of Economics I 0511-301	
American Politics 0513-211	
or	
Political Ideologies 0513-215	
Foundations of Sociology 0515-210	
or	
Cultural Anthropology 0510-210	
One humanities course: i.e., History; Fine Arts; Philosophy; or Science, Technology and Society	4
<i>Math and Science, Electrical Option</i>	
Calculus I, II, III 1016-251, 252, 253	12
Calculus IV 1016-305	4
Differential Equations 1016-306	4
Matrix Algebra 1016-331	4
College Chemistry 1011-208	4
<i>Math and Science, Mechanical Option</i>	
Calculus I, II, III 1016-251, 252, 253	12
Calculus IV 1016-305	4
Differential Equations 1016-306	4
Matrices and Boundary Value Problems 1016-318	4
Chemical Principles I 1011-211	3
Chemistry I Lab 1011-205	1
Chemistry of Materials 1011-273	3
Chemistry of Materials Lab 1011-277	1
<i>Physics, Electrical Option</i>	
University Physics I, II, III 1017-311, 312, 313	12
University Physics Lab I, II, III 1017-375, 376, 377	3
Introduction to Modern Physics 1017-314	4
<i>Physics, Mechanical Option</i>	
University Physics I, II, III 1017-311, 312, 313	12
University Physics Lab I, II, III 1017-375, 376, 377	3
Science Elective	4
<i>Professional, Electrical Option</i>	
Statics 0304-336	4
Dynamics 0304-359	5
Introduction to Digital Systems 0301-240	4
Numerical Methods 0301-310	3
C Programming 0301-345	4
Introduction to Microcomputers 0301-365	4
Circuit Analysis I 0301-351	4
Electrical Engineering Lab I 0301-380	1
<i>Professional, Mechanical Option</i>	
Statics 0304-336	4
Dynamics 0305-359	5
Introduction to Graphics 0304-211	3
Problem Solving with Computers 0304-342	3
Mechanics of Materials 0304-347	4
Mechanics of Materials Laboratory 0304-348	1
Circuit Analysis I 0301-351	4
Electrical Engineering Lab I 0301-380	1
<b>Total Quarter Credit Hours</b>	<b>96</b>

\* For suggested quarterly schedule, consult with your academic adviser.

# Undeclared Engineering

The undeclared engineering program is a one-year option for students who prefer additional time in which to decide their major in engineering. Students may choose a major at the end of fall, winter or spring quarter of their first year.

During their first year students take the foundation courses required by all the engineering disciplines. Course work taken as an undeclared engineering student will transfer into all engineering programs without any loss of time toward graduation.

During the fall quarter, undeclared engineering students take a one-credit course, Introduction to Engineering, that provides an overview of all five programs, the chance to learn about the course of study in each program, career opportunities in each of the engineering disciplines and an introduction to the faculty of each program.

## Undeclared engineering program, typical first-year schedule \*

	<i>Quarter Credit Hours</i>
<i>Fall</i>	
Calculus I 1016-251	4
Chemical Principles I 1011-211	3
Chemical Principles Lab I 1011-205	1
Computing for Engineers 0302-215	4
Introduction to Engineering 0302-210	1
Liberal Arts †	4
Physical Education ‡	0
<i>Winter</i>	
Calculus II 1016-252	4
Chemical Principles II 1011-212	3
Chemical Principles Lab II 1011-206	1
University Physics I 1017-311	4
University Physics Lab I 1017-375	1
Liberal Arts †	4
Physical Education ‡	0
<i>Spring</i>	
Calculus III 1016-253	4
Calculus IV 1016-305	4
University Physics II 1017-312	4
University Physics Lab II 1017-376	1
Liberal Arts †	4
Physical Education ‡	0
<hr/> <i>Total Quarter Credit Hours</i>	<hr/> 51

\* For suggested quarterly schedule, consult with your academic adviser.

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

# Computer Engineering

Roy S. Czernikowski, Head

The computer engineering program focuses on the design and development of computer systems and computer-integrated digital systems, with due consideration to such engineering factors as function, performance, cost, reliability and maintainability. The goal of the computer engineer is to build computer systems or computer-integrated systems to meet application requirements with attention to the hardware/software interaction and all the aspects mentioned above.

The program prepares graduates to design and implement various engineering products with embedded computers and to undertake graduate study, where sophisticated computer system design can be addressed.

It strives to interweave and span the topics from formal specifications to heuristic algorithm development, from system architecture to computer design, from interface electronics to real-time applications, and from interprocess communications management to VLSI implementation.

As an engineering discipline, this program emphasizes the careful adoption of design methodology and the application of sophisticated engineering tools. The intensive laboratory requirements ensure the graduate of significant experience with modern facilities and up-to-date design tools.

The cooperative education program enables the student to apply the principles and techniques of computer engineering to real industrial problems, which provides students with a stronger framework on which to build their academic courses. These co-op work periods alternate with academic quarters over the last three years of the program.

## Combined BS/MS degree sequence in computer engineering

The department of computer engineering also offers a combined bachelor of science and master of science degree course sequence over five calendar years. This accelerated sequence provides an excellent opportunity for outstanding undergraduate students to pursue a graduate degree in a cohesive program. Applications to this special sequence will be accepted from matriculated undergraduate computer engineering students who have completed all the courses in the first two years of the baccalaureate program with a cumulative grade point average of at least 3.4 out of 4.0. At least 55 of these credits must have been earned at RIT. Continuance in this program also requires the maintenance of at least a 3.0 overall grade point average and at least 3.0 in the 45 quarter credits directly applicable to the master of science degree portion.

## Bachelor of science degree in computer engineering with a concentration in software engineering

The department also offers a BS degree in computer engineering with a concentration in software engineering. This concentration targets the graduate to develop complex software systems, especially embedded systems, where at least one control processor is designed into a product. The curriculum is identical to that in the first four years of the regular BS degree program in computer engineering. In the fifth year, a cohesive pair of specified professional electives in software engineering (0306-661 and 0306-662) complement the material already presented to round out this concentration within the umbrella of an ABET-accredited computer engineering degree program.

## Principal field of study

For students matriculated in the interdisciplinary computer engineering program, the principal field of study is defined to be all courses taken in the College of Engineering and the School of Computer Science and Information Technology. Matriculated students not maintaining a 2.0 cumulative grade point average in their principal field of study are subject to academic probation and suspension according to Institute policy.

## Computer engineering, BS degree, typical course sequence \*

First Year	Quarter	Credit	Hours
Introduction to Computer Engineering	0306-200		1
Computer Science I	0603-231		4
Computer Science II	0603-232		4
Computer Science III	0603-233		4
College Chemistry I	1011-208		4
Calculus I, II, III	1016-251, 252, 253		12
Calculus IV	1016-305		4
University Physics I, II	1017-311, 312		8
University Physics Lab I, II	1017-375, 376		2
Liberal Arts †			8
Physical Education ‡			0
<b>Second Year</b>			
Intro. to Digital Systems for Computer Engineers	0306-341		4
Modeling of Linear Systems	0306-361		4
Circuit Analysis I	0301-351		4
Electrical Engineering Lab I	0301-380		1
Statics & Dynamics	0304-330		5
Assembly Language for Computer Engineering	0306-250		4
Software Engineering	0603-361		4
Scientific Applications Programming	0601-319		4
Foundations of Discrete Math	1016-265		4
Differential Equations	1016-306		4
University Physics III	1017-313		4
University Physics Lab III	1017-377		1
Modern Physics	1017-314		4
Liberal Arts †			4
Physical Education ‡			0
<b>Third Year</b>			
Computer Organization	0306-550		4
Digital Systems Design for Computer Engineers	0306-561		4
Circuit Analysis II	0301-352		3
Electronics I, II	0301-441, 442		6
Electrical Engineering Lab II, III	0301-390, 395		2
Operating Systems	0603-440		4
Liberal Arts †			8
Cooperative Education (2 quarters)			Co-op
<b>Fourth Year</b>			
Linear Control Systems	0306-452		4
Digital Control Systems Design	0306-553		4
Interface & Digital Electronics	0306-560		4
Introduction to VLSI Design	0306-630		4
Programming Language Concepts	0601-450		4
Probability & Statistics I	1016-351		4
Computer Engineering Design Projects I	0306-654		1
Liberal Arts †			8
Cooperative Education (2 quarters)			Co-op
<b>Fifth Year</b>			
Computer Architecture	0306-551		4
Computer Engineering Design Projects II	0306-657		3
Data & Computer Communications	0306-694		4
Professional Electives §			8
Free Elective			4
Liberal Arts †			8
Liberal Arts (Senior Seminar)			2
Cooperative Education (1 quarter)			Co-op
<b>Total Quarter Credit Hours</b>			<b>199</b>

\* For suggested quarterly schedule, consult with your academic adviser.

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

§ Professional electives must have at least a 25 percent engineering design component.

**Professional electives (partial list)**

Design Automation of Digital Systems	0306-620
Advanced VLSI Design	0306-631
Engineering Design of Software Concurrent and Embedded Software Design	0306-662
Document Image Processing	0306-683
Independent Study	0306-699
Digital Filters and Signal Processing	0301-677
Systems Specification, Design and Implementation	0603-435
Artificial Intelligence	0603-455
Database Concepts	0603-485
Analysis of Algorithms	0603-515
Operating Systems Laboratory	0603-540
Compiler Construction Laboratory	0603-560
Introduction to Computer Graphics	0603-570

# Electrical Engineering

R. Unnikrishnan, Head

Every time you turn on a TV, open a refrigerator, make a phone call, play a computer game or gaze at the images of Venus and Jupiter sent by space probes, you are witnessing electrical engineering at work. From the mundane to the esoteric, electrical engineering has tremendously affected modern living.

RIT has one of the finest electrical engineering programs around, combining the rigor of theory with the flexibility of engineering practice. Electrical engineering has the most comprehensive curriculum of all engineering programs—an electrical engineer synthesizes science, technology and common-sense design into things such as consumer products, electronic components, microchips, computers, signal processing, power systems, microwaves, telecommunications, robotics and transportation, to name a few. Graduates carry the passport to technical and management positions in industry, admission to prestigious graduate schools and opportunities for entrepreneurship. Undoubtedly, electrical engineering holds the key to a challenging and most fulfilling career in this decade and the coming century.

The faculty stresses laboratory use to strengthen students' knowledge of electrical engineering, and the laboratory is an integral part of a large number of courses. There is continual effort by the faculty to keep the laboratory equipment and experience up-to-date.

Since the ability to design is an important part of engineering, the student also is presented with challenging problems of design in a number of courses.

The co-op requirement enhances student knowledge acquired in the classroom and the laboratory. The exposure and experience gained by the student in industry make him or her keenly aware of the constraints imposed by the industrial environment on the solution of engineering problems. The co-op experience also helps the student decide which career path would be most challenging and rewarding. Co-op experience results in the production of a mature graduate with well-developed academic and industrial perspectives.

In modern society, engineering decisions are rarely made without considering the ethical and socio-economic impact. The ability to communicate clearly and effectively with others is also an indispensable tool for the engineer. A significant portion of the curriculum is devoted to the study of liberal arts throughout the five years of the program. These courses are aimed at making students more sensitive to the factors that normally surround any decision-making situation, improving their ability to communicate with others and making their professional life more meaningful and rewarding.

The first two years of the curriculum are devoted to the mastery of laws of mathematics and principles of science essential to the study of electrical engineering. Some technical courses directly involving electrical engineering principles are also offered. The third and fourth years build on the foundation laid in the first two years by focusing on the subjects that form the core of electrical engineering. Courses in circuits, electronics, linear systems, electromagnetic fields, physics of semiconductor devices, communication systems, control systems and energy conversion are taught in these two years. The fifth and final year allows the student to specialize in an area of his or her professional interest. Professional elective courses are generally taken from the electrical engineering department, while the free elective does not have that restriction. Students are also expected to complete a senior design project as part of the graduation requirements.

**Electrical engineering, BS degree, typical course sequence \***

First Year	Quarter	Credit Hours
EE Freshman Seminar	0301-203	1
Introduction to Digital Systems	0301-240	4
Introduction to Microcomputers	0301-365	4
College Chemistry I	1011-208	4
Calculus I, II, III	1016-251, 252, 253	12
University Physics I	1017-311	4
University Physics Lab I	1017-375	1
Liberal Arts (Core) †		20
Physical Education ‡		0
<b>Second Year</b>		
Numerical Methods	0301-310	4
Circuit Analysis I	0301-351	4
Electrical Engineering Lab I	0301-380	1
Elements of Statics & Dynamics	0304-330	5
Calculus IV	1016-305	4
Differential Equations	1016-306	4
Engineering Mathematics	1016-328	4
University Physics II, III	1017-312, 313	8
University Physics Lab II, III	1017-376, 377	2
Modern Physics I	1017-314	4
C-Programming for Engineers	0301-345	4
Liberal Arts (Core) †		8
Physical Education ‡		0
Optional Free Elective		4
<b>Third Year</b>		
Circuit Analysis II	0301-352	3
Electronics I, II	0301-441, 442	6
Electrical Engineering Lab II, III	0301-390, 395	2
Linear Systems I	0301-453	4
Electromagnetic Fields I	0301-471	4
System Modeling and Simulation	0301-452	4
Probability	1016-351	4
Complex Variables	1016-420	4
Cooperative Education (2 quarters)		Co-op
<b>Fourth Year</b>		
Introduction to Automatic Control	0301-513	4
Introduction to Communication Systems	0301-534	4
Introduction to Photonics	0301-521	4
Semiconductor Electronics	0301-544	4
Digital Electronics	0301-545	4
Linear Systems II	0301-554	4
Electromagnetic Fields	0301-472	4
Liberal Arts (Concentration) †		4
Cooperative Education (2 quarters)		Co-op
<b>Fifth Year</b>		
Electromechanical Energy Conversion	0301-531	4
Professional Electives		12
Senior Design Project Part I	0301-697	2
Senior Design Project Part II	0301-698	2
Free Elective		4
Liberal Arts (Concentration) †		8
Liberal Arts (Senior Seminar) †		2
Cooperative Education (1 quarter)		Co-op
<b>Total Quarter Credit Hours</b>		<b>195</b>

\* For suggested quarterly schedule, consult with your academic adviser.

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

Each of the listed professional electives includes significant design emphasis. For convenience they have been grouped by interest areas. Some courses apply to more than one area.

### Professional electives

#### Electromagnetic Fields and Optics

Microwave Engineering	0301-621
Antenna Design	0301-622
Optical Devices and Systems	0301-672
Fiber Optics: Theory and Applications	0301-674
Electro-Optics	0301-776

#### Control Systems

Design of Digital Control Systems	0301-614
Robotic Vision	0301-605
Power Electronics	0301-646
Design of Digital Systems	0301-650
Microcomputer-Based System Design	0301-665

#### Communications

Communication Networks	0301-692
Digital Data Communications	0301-693
Information Theory and Coding	0301-694
Design of Systems	0301-650

#### Signal Processing

Digital Filters and Signal Processing	0301-677
Analog Filter Design	0301-679
Robotic Vision	0301-605
Digital Image Processing	0301-779

#### Computers

Design of Digital Systems	0301-650
ASIC Design	0301-651
Object-Oriented Programming with C++	0301-655
Microcomputer-Based System Design	0301-665
32-Bit Microcomputers	0301-666

#### Microelectronics

Introduction to Microelectronics	0301-670
Design of Digital Systems	0301-650
Analog Electronic Design	0301-610
Semiconductor Physics	0301-723
Analog IC Circuits	0301-726

Senior Design Project 0301-697, 698

### Extended day schedule (for part-time evening students)

In order to permit a person working full time in industry to earn a BS degree in electrical engineering (accredited by the Accreditation Board of Engineering and Technology), courses also are scheduled in the late afternoons and evenings. These courses are offered and taught by the faculty of the department of electrical engineering and meet the same standards as those taught during regular hours. Students entering these programs must be employed full time in a technical position. Applicants to the extended day schedule will be evaluated in the same manner as those transferring to the full-time day schedule of the program. A student must plan to take two courses in each academic quarter.

### Combined five-year BS/MS degree program

In addition to the bachelor of science and master of science degree programs, a combined BS/MS degree program is also available for the electrical engineering student. Enrollment in this program requires successful completion of at least 234 quarter credit hours. After completing this requirement, the student is awarded the BS and MS degrees simultaneously. A student may apply to this program in the second quarter of his or her second year, providing that a minimum cumulative grade point average of 3.4 has been obtained at the end of the previous quarter. Although admission requirements are stricter for this program, overall requirements for graduation remain the same (a minimum GPA of 2.0 for BSEE and 3.0 for MSEE). The work period between the second and third years is credited as co-op for BS/MS students.

Transfer students also are considered for admission to this program after completion of two quarters at RIT with a grade point average of 3.4. All other requirements are the same.

The first three years of the program are identical for the BSEE and the combined BS/MS program. Further information can be obtained from the department of electrical engineering at 716-475-2165. A typical fourth- and fifth-year program sequence follows.

### Electrical engineering, combined BS/MS degree, typical course sequence \*

First Year	Quarter Credit Hours
Same as BSEE	51
Second Year	
Same as BSEE	46
Third Year	
Same as BSEE	30
Fourth Year	
Semiconductor Electronics 0301-544	4
Electromechanical Energy Conversion 0301-531	4
Electromagnetic Fields II 0301-472	4
Liberal Arts †	8
Introduction to Communication Systems 0301-534	4
Analytical Techniques II 0301-554	4
Linear Systems II 0301-554	4
Introduction to Automatic Control 0301-513	4
Introduction to Photonics 0301-521	4
Digital Electronics 0301-545	4
Graduate Course	4
Thesis	1
Fifth Year	
Analytical Techniques III 0301-756	4
Graduate Courses	20
Professional Electives	12
Design Project	4
Liberal Arts †	4
Thesis	8
Senior Seminar	2
<b>Total Quarter Credit Hours</b>	<b>230</b>

Note: Two of the professional electives will be counted twice—once toward the BS and once toward the MS. The free elective will be replaced by a graduate course for the BSEE.

\* For suggested quarterly schedule, consult with your academic adviser.

† See page 10 for liberal arts requirements.

# Industrial and Manufacturing Engineering

Jasper E. Shealy, Head

Industrial engineering differs from other branches of the engineering program in at least two ways. First, industrial engineering education is relevant to most types of industry and commercial activity. Second, it is that major branch of engineering concerned not only with machines, but also with people.

Specifically, industrial engineering is concerned with the design, improvement and installation of integrated systems of people, materials and equipment. It draws upon specialized knowledge and skills in the mathematical and physical sciences, together with the principles and methods of engineering analysis and design.

Because of the flexible nature of the program, the IME student can build a strong concentration in any area of industrial engineering—robotics, automation, design for manufacturing, NC programming, safety, etc. Students may choose one free and four professional electives for this purpose.

In addition, there are two new specific degree options within the department—one in manufacturing, the other in ergonomics. These options are based on selected professional electives, co-op assignments and senior design projects in the concentration areas.

## Combined five-year BS/MS degree program

A joint program exists between the IME department and the Center for Quality and Applied Statistics (CQAS) that allows for a combined BSIE/MS degree in reliability in five years plus one additional academic quarter. For more information on the options or the combined BSIE/MS, contact the IME department at 475-2598.

The industrial engineering curriculum covers the principal concepts of human performance, mathematical modeling, computer programming and applications, management systems and manufacturing processes. The curriculum stresses the application of computers in solving the engineering problems of today. For example:

1. The undergraduate industrial engineering student at RIT uses computer graphics to design the layout of manufacturing plants and to develop dynamic, animated computer simulation models.

2. He or she also uses computers to control flexible manufacturing systems involving robots, machines and conveyors.

3. The industrial engineering student uses the computer in conjunction with cognitive, physiological, biomechanical and anthropometric modeling of human performance in the analysis and design of man/machine systems.

## Careers

Some of the activities of industrial engineers include work measurement, operations research, applied statistics, human factors, plant layout, materials handling, production planning and control, manufacturing and management consulting.

Balance, rather than specialization, has allowed our graduates to pursue varied paths. Examples of the diversity, along with the roles in which an industrial engineer might function, are reflected in the following partial listing of industrial engineering co-op assignments:

1. Hospitals
  - a. improve efficiency of a patient therapy department
  - b. design optimal patient scheduling for physicians
  - c. establish staffing levels for outpatient clinics
2. Manufacturing industries
  - a. perform product life studies
  - b. lay out new and existing work areas
  - c. design and implement an information system
  - d. investigate production processes involved in cleaning carbide dies
  - e. investigate and analyze the costs of purchasing new vs. repairing existing equipment
  - f. investigate waiting lines in connection with a product line
  - g. investigate delivery service, including scheduling, route modification and material handling
  - h. assist in setting up a production control monitoring board
  - i. create computer programs for pricing policies, blending problems and truck scheduling
  - j. perform downtime studies of various operations using time study and work sampling
  - k. develop and computerize a forecasting model
  - l. perform ergonomic studies and evaluations of workstations and product designs
3. Service industries
  - a. evaluate the ergonomics of workstation designs
  - b. design information systems
  - c. monitor safety and health programs
  - d. manage hazardous and toxic materials storage and disposal programs
  - e. do cost analyses of procedures
  - f. schedule operations, information flow
  - g. design supply-ordering systems

**Industrial engineering, BS degree, typical course sequence \***

<i>First Year</i>	<i>Quarter Credit Hours</i>
Introduction to Industrial Engineering 0303-201	4
Computer Tools for Increased Productivity 0303-204	2
Freshman Seminar 0303-203	1
Chemistry I 1011-208	4
Chemistry of Materials, Lab 1011-273, 277	4
Calculus I, II, III 1016-251, 252, 253	12
University Physics I, II 1017-311, 312	8
University Physics Lab I, II 1017-375, 376	2
Liberal Arts (Core) †	12
Physical Education ‡	0
<i>Second Year</i>	
Mechanics I 0304-331	4
Mechanics II 0304-332	4
Calculus IV 1016-305	4
Computing for Industrial Engineers 0303-302	4
Differential Equations 1016-306	4
Matrix Algebra 1016-331	4
University Physics III 1017-313	4
University Physics Lab III 1017-377	1
Materials Processing 0304-343	4
Materials Science 0304-344	4
Science Elective	4
Liberal Arts (Core) †	12
Physical Education ‡	0
<i>Third Year</i>	
Work Measurement & Analysis I 0303-420	4
Engineering Economics 0303-520	4
Introduction to Operations Research I 0303-401	4
Probability 1016-351	4
Applied Statistics I 1016-352	4
Ergonomics 0303-415	4
Management Theory & Practice 0303-481	4
Systems & Facilities Planning 0303-422	4
Cooperative Education (2 quarters)	Co-op
<i>Fourth Year</i>	
Applied Statistics I, II 0303-510, 511	8
Introduction to Operations Research II 0303-402	4
Simulation 0303-503	4
Human Factors 0303-516	4
Computer-Aided Manufacturing 0303-630	4
Engineering Design 0303-530	4
Liberal Arts (Concentration) †	4
Cooperative Education (2 quarters)	Co-op
<i>Fifth Year</i>	
Project Design 0303-560	4
Professional Electives **	16
Liberal Arts (Concentration)	8
Free Elective	3
Liberal Arts (Senior Seminar)	2
Cooperative Education (1 quarter)	Co-op
<b>Total Quarter Credit Hours</b>	<b>199</b>

\* For suggested quarterly schedule, consult with your academic adviser.

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

**\*\*Professional electives (partial list)**

Applied Human Factors	
Design of Experiments	0303-450
Production Control I, II	0303-482, 483
Operations Research III	0303-504
Simulation Modeling Techniques	0303-505
Reliability	0303-512
Operations Research IV	0303-540
Mathematical Techniques of Systems	
Engineering	0303-545
Safety Engineering	0303-550
Concepts in Manufacturing	0303-625
Seminar in Computer-Integrated	
Manufacturing	0303-690

# Mechanical Engineering

Charles W. Haines, Head

Mechanical engineering is perhaps the most comprehensive of the engineering disciplines, and the mechanical engineer's interests encompass the design of such diverse systems as missiles, power plants, robots and machine tools. The spectrum of professional activity for the mechanical engineering graduate runs from research through design and development to manufacturing and sales. Because of their comprehensive training and education in the areas of production and economics, mechanical engineers are often called upon to assume management positions.

The mechanical engineering department is staffed to offer professional courses in the areas of thermal systems, applied mechanics, manufacturing, materials science, environmental air quality, systems analysis, computer-aided graphics and design, robotics, automotive engineering and aerospace engineering. The department's laboratories are equipped to provide extensive experimentation in these areas. For instance, they include a laser doppler anemometer for measuring fluid velocities and particle size, a sting balance for measuring drag and lift, dynamic system simulators, a spectrum analyzer, a modal analysis system, a CNC machine and a stereolithography machine for rapidly building prototype models of computer-aided designs.

Students have an opportunity to participate in design competitions, such as those for the Mini Baja, the Formula SAE car and the SAE Aerodesign, which are entered in regional and national competitions. They are also encouraged to participate in the student chapters of professional societies such as ASME, SWE and SAE.

The 197-quarter-credit program provides students with a broad base of academic and practical experience. Students devote the first two years to the study of mathematics, physics, chemistry and mechanics, while the third and fourth years emphasize engineering science fundamentals in solid body mechanics, thermal fluid sciences and electrical engineering. A student may then specialize by choosing technical and free electives in his or her area of interest. Each of the listed technical electives includes one significant design project.

### The aerospace engineering option

The mechanical engineering department offers a concentration in aerospace engineering for students majoring in mechanical engineering. This option is offered to extend aerospace career opportunities to our graduates.

The aerospace engineering option allows for specialized study in the upper-level undergraduate curriculum focusing on engineering aspects of air- and space-borne vehicles. Building on the fundamental courses completed by all mechanical engineering students, a balanced exposure to the aerospace area is gained through a sequence of five specialized courses in four broad areas: aerodynamics, aerospace structures, propulsion and flight dynamics. In addition, students choosing this option are expected to work on an aerospace engineering design project in Senior Design I and II, capstone design courses taken by all mechanical engineering students in the fifth year of study.

### Environmental air quality option

The mechanical engineering department offers an environmental air quality option for students majoring in mechanical engineering. This option is intended to increase the opportunities for students to enter the growing air quality analysis and control industry.

The option builds upon course work all mechanical engineering students take in fluid dynamics, thermodynamics, numerical modeling and mechanics by offering a series of specialized technical and free-elective courses during the third, fourth and fifth program years. These specialized courses provide a broad introduction to the major areas related to air quality analysis and control. The sequence starts in the third year with an introductory course acquainting the student with the general field of environmental engineering. This is followed in the fourth and fifth years with advanced technical electives in internal combustion engine emissions and control, stationary source emissions and control, and air pollutant dispersion modeling. In addition, all students choosing this concentration are expected to work on an environmentally related design project in the Senior Design I and II capstone design courses in the fifth year of the program.

### Combined five-year BS/MS degree program

In addition to the bachelor of science and master of science degree programs, a combined BS/MS degree program is also available for the mechanical engineering student. A student enrolled in this program is required to successfully complete at least 230 quarter credit hours, after which he or she is awarded the BS and MS degrees simultaneously. A student may apply for admission to this program in the winter quarter of his or her sophomore year. A transfer student may apply after completing one quarter at RIT. Admission is based on the student's cumulative grade point average, which must be at least 3.0; three letters of recommendation from the faculty; and a personal interview with the program coordinator. All students in the program are required to maintain a cumulative grade point average of at least 3.0.

### Writing competency

The writing policy of the mechanical engineering department requires that during the third year all students take the Test of Standard Written English (TSWE). Those receiving a scaled score of 50 or above will be certified as having satisfied the program's writing competency requirements. Those whose score is below 50 must take and pass the College of Liberal Arts course, College Writing I (0502-302), in order to satisfy competency requirements. This course is defined as an overload.

### Mechanical engineering, BS degree, typical course sequence \*

First Year	Quarter Credit Hours
Freshman Seminar 0304-203	2
Calculus I, II, III 1016-251, 252, 253	12
Chemistry I 1011-208	4
Chemistry of Materials, Lab 1011-273, 277	4
Introduction to Graphics 0304-211	3
Materials Processing 0304-343	4
University Physics I 1017-311	4
University Physics Lab I 1017-375	1
Problem Solving with Computers 0304-342	3
Liberal Arts (Core) 1, 2, 3 †	12
Physical Education ‡	0
<b>Second Year</b>	
Calculus IV 1016-305	4
Differential Equations 1016-306	4
Matrices & Boundary Value Problems 1016-318	4
University Physics II, III 1017-312, 313	8
University Physics Lab II, III 1017-376, 377	2
Statistics 1016-314	4
Statics 0304-336	4
Mechanics of Materials 0304-347	4
Mechanics of Materials Lab 0304-348	1
Materials Science 0304-344	4
Computer-Aided Design 0304-311	3
Dynamics 0304-359	5
Liberal Arts (Core) 4 †	4
Physical Education ‡	0
<b>Third Year</b>	
Machine Design 0304-437	4
Numerical Methods 0304-440	4
Thermodynamics 0304-413	4
Science Elective	4
Fluid Mechanics 0304-415	4
Thermal Fluid Sci. & Energy Lab I 0304-416	1
Advanced Computational Techniques 0304-518	4
Introduction to Electrical Engineering 0301-362	4
Liberal Arts (Core) 5 †	4
Cooperative Education (2 quarters)	Co-op
<b>Fourth Year</b>	
Heat Transfer 0304-514	4
Systems Dynamics 0304-543	4
Systems Dynamics Lab 0304-545	1
Transport Phenomena 0304-550	4
Liberal Arts (Core) 6 †	4
Thermal Fluid Sci. & Energy Lab II 0304-551	1
Technical Elective 1, 2	8
Design for Manufacture 0304-464	4
Liberal Arts (Concentration) 1	4
Cooperative Education (2 quarters)	Co-op
<b>Fifth Year</b>	
Senior Design Project I 0304-630	4
Senior Design Project II 0304-631	4
Technical Elective 3	4
Free Elective 1, 2	8
Liberal Arts (Concentration) 2, 3 †	8
Liberal Arts (Senior Seminar) †	2
Cooperative Education (1 quarter)	Co-op
<b>Total Quarter Credit Hours</b>	<b>197</b>

\* For suggested quarterly schedule, consult with your academic adviser.

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

**Technical elective courses***Solid Body Mechanics Courses*

Dynamics of Machinery	0304-672
Stress Analysis	0304-694
Engineering Vibrations	0304-758
Robotics	0304-615
Optimal Design	0304-620
Control Systems	0304-743
Computer-Aided Engineering	0304-618
Vehicle Dynamics	0304-624

*Thermal Fluid Science Courses*

Heat Transfer II	0304-635
Turbomachinery	0304-652
Refrigeration and Air Conditioning	0304-660
Applications in Fluid Mechanics	0304-605

*Aerospace Courses*

Aerospace Structures	0304-671
Aerodynamics	0304-675
Propulsion	0304-678
Flight Dynamics	0304-682

*Environmental Courses*

Internal Combustion Engines and Air Quality	0304-640
Stationary Source Emissions and Controls	0304-641
Air Pollution Dispersion Modeling	0304-642

*Free Elective Courses*

Introduction to Environmental Engineering	0304-460
Introduction to Aerospace Engineering	0304-560
Laser Engineering	0304-637
Advanced Strength of Materials	0304-685
Engineering Economy	0304-687

# Microelectronic Engineering

Lynn F. Fuller, Head

The College of Engineering is proud to offer an undergraduate degree program in microelectronic engineering. This is the only program of its type in the United States that leads to the bachelor of science degree. Offered in conjunction with RIT's College of Imaging Arts and Sciences and College of Science, the ABET-accredited, five-year program provides the broad interdisciplinary background in optics, chemistry, device physics, computer science, electrical engineering, photographic science and statistics necessary for entry into the semiconductor industry.

Students participate in the required co-op portion of the program after completion of their second year of school. Microelectronic engineering co-op students work for all of the major manufacturers of integrated circuits across the United States. Upon graduation students are well-prepared to enter the industry immediately or to go on to advanced work in graduate school.

Students have hands-on experience in the design and manufacture of integrated circuits, the vital component in almost every advanced electronic product manufactured today. The undergraduate microelectronic engineering laboratories at RIT are the best in the nation.

As the worldwide semiconductor industry continues to grow at an astounding pace, RIT graduates will continue to be a valuable resource to the industry. For the students, this program offers an unparalleled opportunity to prepare for professional challenge and success in one of the leading areas of engineering of our time.

## Microelectronic engineering, BS degree, typical course sequence \*

	<i>Quarter Credit Hours</i>
<i>First Year</i>	
Introduction to Microelectronics 0305-201	4
Introduction to Microlithography 0305-221	4
Chemical Principles I, II 1011-211, 212	6
Chemical Principles I, II Lab 1011-205, 206	2
Calculus I, II, III 1016-251, 252, 253	12
University Physics I, II 1017-311, 312	8
Physics Lab I 1017-375, 376	2
Liberal Arts (Core) †	12
Physical Education ‡	0
<i>Second Year</i>	
Circuit Analysis I 0301-351	4
Electrical Engineering Lab I 0301-380	1
Introduction to Digital Systems 0301-240	4
I.C. Technology 0305-350	4
C Language Programming 0602-207	4
Calculus IV 1016-305	4
Differential Equations 1016-306	4
Engineering Mathematics 1016-328	4
Statistics 1016-314	4
University Physics III 1017-313	4
Physics Lab III 1017-377	1
Modern Physics 1017-314	4
Liberal Arts (Core) †	8
Physical Education ‡	0
<i>Third Year</i>	
Circuit Analysis II 0301-352	3
Electronics I, II 0301-441, 442	6
Electrical Engineering Lab II, III 0301-390, 395	2
Linear Systems 0301-455	4
Semiconductor Devices I 0305-460	4
Electromagnetic Fields I, II 0305-530, 540	8
Liberal Arts (Core) †	4
Cooperative Education (2 quarters)	Co-op
<i>Fourth Year</i>	
Design of Experiments 0305-514	4
VLSI Design 0305-520	4
Semiconductor Devices II 0305-560	4
Microlithography I 0305-563	3
Microlithography I Lab 0305-573	1
Microelectronic Engineering 0305-632	4
Thin Film Processes 0305-643	4
Optics for Microelectronics 2051-525	4
Liberal Arts (Concentration) †	4
Cooperative Education (2 quarters)	Co-op
<i>Fifth Year</i>	
Microelectronics Manufacturing 0305-645	4
I.C. Processing Lab 0305-650	4
Seminar/Research 0305-660	4
Microlithography II 0305-665	3
Advanced Microlithography 0305-670	4
Microlithography II Lab 0305-675	1
Liberal Arts (Concentration) †	8
Liberal Arts (Senior Seminar) †	2
Professional Elective	4
Cooperative Education (1 quarter)	Co-op
<b>Total Quarter Credit Hours</b>	<b>197</b>

\* For suggested quarterly schedule, consult with your academic adviser.

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

# Software Engineering

Michael J. Lutz, Coordinator

As software becomes ever more common in everything from airplanes to appliances, there has been increasing demand for engineering professionals who can develop high-quality, cost-effective software systems. In response to this demand, the departments of computer science and computer engineering at RIT have created a unique program that combines traditional computer science and engineering with specialized course work in software engineering. Graduates of this program receive a bachelor of science degree in software engineering.

Students learn principles, methods and techniques for the construction of complex and evolving software systems. The program encompasses both technical issues affecting software architecture, design and implementation, as well as process issues that address project management, planning, quality assurance and product maintenance. Students are prepared upon graduation for immediate employment and long-term professional growth in software development organizations.

An important component of the curriculum is complementary course work in related disciplines. As with other engineering fields, mathematics and natural science are fundamental. In addition, students must complete four courses in related fields of engineering. Three computer engineering courses expose students to basic hardware design and computer architecture. A human factors course from industrial engineering introduces students to experimental and analytical techniques for evaluating human/computer interactions. Finally, a three-course sequence in an application domain helps connect software engineering principles to an area where they are applied.

### Laboratories

Students in software engineering have access to general campus-wide computing facilities, as well as the specialized laboratories supporting both computer science and computer engineering. These laboratories house state-of-the-art equipment for small-group instruction and experimentation. As the program evolves, facilities dedicated to software engineering will be created, as well.

All of these laboratories are connected to the campus-wide network, and from there to the Internet. Students can use their accounts to access Internet resources such as electronic mail, file transfer and the World Wide Web. Indeed, many departments on campus use the Internet as a means of dissemination and communication.

### Cooperative Education

All students in the software engineering program must complete five quarters of cooperative education prior to graduation. Students typically begin co-op in their third year of study, alternating academic quarters and co-op blocks. To ensure that co-op is integrated with the academic program, students must complete their final co-op block prior to their last academic quarter.

**Software engineering, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 3010-101	1
Computer Science 1, 2, 3 0603-231, 232, 233	12
Calculus I, II, III 1016-251, 252, 253	12
College Chemistry I 1011-208	4
University Physics I, II & Lab 1011-311, 312, 375, 376	10
English Composition 0502-220	4
Liberal Arts *	8
Physical Education Electives †	0
<i>Second Year</i>	
Engineering of Software Subsystems 3010-362	4
Computer Science 4 0603-334	4
Professional Communications 0603-341	4
Software Engineering 0603-361	4
Assembly Language Programming 0306-250	4
Introduction to Digital Systems 0306-341	4
Differential Equations 1016-306	4
Discrete Mathematics I, II 1016-365, 366	8
University Physics III & Lab 1017-313, 377	5
Liberal Arts *	8
Physical Education Electives †	0
<i>Third, Fourth, Fifth Years</i>	
Principles of Software Architecture 3010-440	4
Formal Methods of Specification & Design 3010-420	4
Software Requirements & Specification 3010-455	4
Software Engineering Project 1, 2 3010-561, 562	8
Software Engineering Electives ‡	20
Scientific Applications Programming 0603-319	4
Programming Language Concepts 0603-450	4
Computer Architecture 0306-522	4
Human Factors 0303-516	4
Probability & Statistics 1016-351	4
Application Domain Electives §	12
Free Elective	4
Liberal Arts *	18
Cooperative Education (5 quarters required)	Co-op
<b>Total Quarter Credit Hours</b>	<b>194</b>

\* See page 10 for liberal arts requirements.

† See page 11 for physical education policy.

‡ Students must choose five of the following six courses:

Principles of Concurrent Software Systems 3010-411  
 Principles of Distributed Software Systems 3010-442  
 Principles of Information Systems Design 3010-443  
 Software Process & Product Metrics 3010-450  
 Software Verification & Validation 3010-452  
 Software Requirements & Specification 3010-455

§ Each student must complete a three-course sequence in an application domain related to software engineering. Current domains include electrical engineering, industrial engineering, mechanical engineering, communications and networks, embedded systems and commercial applications.

# College of Imaging Arts and Sciences

*Margaret O. Lucas, Ph.D., Dean*

The College of Imaging Arts and Sciences encompasses the School of Art and Design, the School for American Crafts, the School of Photographic Arts and Sciences and the School of Printing Management and Sciences. Students from nearly every state and many foreign countries are enrolled in the four schools.

Visits to the campus and the college are encouraged. Please contact the Admissions Office.

## The School of Art and Design

The School of Art and Design enrolls approximately 850 students in programs leading to the following degrees.

**Associate (AAS):** graphic design, illustration, industrial design, interior design, painting and printmaking

**Bachelor of Fine Arts (BFA):** graphic design, illustration, industrial design, interior design, medical illustration, painting and printmaking

**Master of Science for Teachers (MST):** art education, graphic design, industrial design, interior design, painting and printmaking

**Master of Fine Arts (MFA):** computer graphics design, graphic design, industrial design, interior design, medical illustration, painting and printmaking

## The School for American Crafts

The School for American Crafts offers crafts programs leading to the following degrees.

**Associate (AAS):** ceramics and ceramic sculpture, glass, metalcrafts and jewelry, weaving and textile design, woodworking and furniture design

**Associate in Occupational Studies (AOS):** woodworking and furniture design

**Bachelor of Fine Arts (BFA):** ceramics and ceramic sculpture, glass, metalcrafts and jewelry, weaving and textile design, woodworking and furniture design

**Master of Science for Teachers (MST):** ceramics and ceramic sculpture, glass, metalcrafts and jewelry, weaving and textile design, woodworking and furniture design

**Master of Fine Arts (MFA):** ceramics and ceramic sculpture, glass, metalcrafts and jewelry, weaving and textile design, woodworking and furniture design

## The School of Photographic Arts and Sciences

More than 900 students are enrolled in the School of Photographic Arts and Sciences, which offers programs leading to the following degrees.

**Bachelor of Science (BS):** biomedical photographic communications, imaging systems management, imaging and photographic technology, photographic marketing management (joint program with the College of Business)

**Bachelor of Fine Arts (BFA):** film/video and professional photographic illustration with major options in advertising photography, photojournalism, fine art photography and film/video

**Master of Fine Arts (MFA):** imaging arts with concentrations in photography, computer animation and museum studies

## The School of Printing Management and Sciences

The School of Printing Management and Sciences has approximately 325 students, enrolled in the following degree programs.

**Bachelor of Science (BS):** printing management, newspaper operations management, printing systems, printing and applied computer science

**Master of Science (MS):** printing technology, graphic arts systems, graphic arts publishing

### Resources

The college's specialized laboratories, studios, advanced computer facilities and wide range of equipment make it one of the most complete of any degree-granting institution in the fields of photography, printing, imaging science, art and design, and crafts.

Photographic archives and a comprehensive art library are available for reference; instructional films and other aids are utilized. Exhibitions regularly feature the work of contemporary painters, designers, photographers, illustrators and graphic artists, as well as faculty and student work. Opening receptions provide students with the opportunity to meet the artists and photographers.

Major resources available to students include:

- 160 fully ventilated darkrooms
- 50 studios
- More than \$33 million worth of printing and publishing equipment in 15 laboratories
- Wallace Library, rich in photography; graphic arts publications; and contemporary periodicals in design, arts and crafts for study and research
- Cooperative efforts with the International Museum of Photography at the George Eastman House
- Library of the Kodak Research Laboratories
- The Melbert B. Cary Jr. Graphic Arts Collection, which contains more than 14,000 volumes of rare books illustrating fine printing and other materials detailing the history of printing, book design and illustrations, paper-making, binding and other aspects of the graphic art
- Free student membership at the Rochester Memorial Art Gallery
- Graphic design archives

### Cooperative education

Students in the college may participate in cooperative education experiences or internships. Part of the student's career exploration, this work experience provides an opportunity to observe and perform work directly related to the student's major. Although there is no required co-op in art and design or crafts, many design students co-op during Summer Quarter.

Co-op is required in the School of Printing Management and Sciences and is encouraged in the School of Photographic Arts and Sciences. Students are responsible for finding their co-op positions and for performing productively. Co-op students have the opportunity to evaluate career goals before making employment decisions, develop insight into their chosen fields, gain professional experience for their résumés and increase their potential for placement and rapid career advancement after graduation.

### Policy regarding student work

RIT assumes the right to make a record of student work for use in the classroom or for promotion. This may entail photography, slides or a variety of electronic imaging/recording.

### Accreditation

The programs offered in the college are fully accredited and approved by the New York State Department of Education and the Middle States Association of Colleges and Secondary Schools. In addition the School of Art and Design and the School for American Crafts are accredited by the National Association of Schools of Art and Design.

### Attendance regulations

Some of the programs in the college utilize experiential learning as an essential part of the educational program. Therefore, it is imperative that the student regularly attend all classes unless specifically excused for special projects or activities by the instructor. Failure to attend classes or to complete assignments will be taken into consideration in grading.

### Portfolio guidelines

Acceptance into the School of Art and Design and School for American Crafts requires a combination of academic and artistic skills. Both schools require the submission of a portfolio. Faculty will review the work to gauge general artistic skill and preparation as well as potential for likely success in the major of choice. The following guidelines should be used in submitting freshman and undergraduate transfer portfolios:

1. Portfolio work is normally submitted as 35 mm slides. Original work will be reviewed preliminarily at Open Houses and select Portfolio Days. For dates and locations, 716-475-2646.
2. Submit 10 to 20 slides of your best work in an 8½" x 11" pocketed protector page. There should be a minimum of five samples of drawings made from direct observations (not "fantasy" and not copied from photographs or comics). Other work could include painting, photography, computer images, sculpture, two-dimensional design, and models or mechanical drawings.
3. Portfolios will be evaluated on the basis of drawing and design ability, original ideas and craftsmanship. The clarity of the slide images is of utmost importance.
4. *Medical illustration* applicants should include at least six samples of natural forms, such as shells, figures or animals rendered in a single medium.
5. School for American Crafts applicants are encouraged, where possible, to include samples of work done in the medium of their intended major.

6. *Transfer students* should clearly represent their basic foundation training, as well as any more advanced or “applied” work. Students considering transfer should notify RIT at the earliest possible moment. Contact the chair of the department at 716-475-2646 to discuss our curriculum and possible transfer credits.
7. Each slide should be numbered in order on a separate 8½" x 11" page. These numbers should correspond to a clear description of each slide: title, size, media, assignment/theme, if any, and any exhibition/award notations. All slides and documents should be clearly labeled.
8. Slides can be returned only if proper postage is included with the application.
9. While every precaution is taken to ensure proper handling, the Institute assumes no responsibility for loss of or damage to slides.
10. Personal interviews and tours of the school are encouraged. Occasionally portfolio reviews will be granted, as well.

Send portfolio and application to:

**Rochester Institute of Technology**  
**Office of Admissions**  
**Bausch & Lomb Center**  
**60 Lomb Memorial Drive**  
**Rochester, N.Y. 14623-5604**  
**716-475-6631**

## School of Art and Design

The mission of the School of Art and Design, through its nationally recognized programs, is to educate students to be artists and designers who contribute to their professions, communicate effectively within their disciplines, have a lifelong attitude of inquiry and make a positive impact on society. To this end, we promote an innovative educational community that balances expression, imaginative problem-solving, aesthetic understanding, critical thinking and creativity.

The educational objectives of the School of Art and Design are to encourage imagination, creative ability and a sense of artistic discrimination; to develop the skills essential to professional competence; to relate the various arts and to help students find the means to enjoy them; and to cooperate with the College of Liberal Arts in helping all RIT students grow culturally and socially and inspiring them to make their maximum contributions as creative artists and citizens. Aesthetic and applied concepts are brought together.

### Programs

Major concentrations are offered in graphic design, industrial design, interior design, painting, printmaking, illustration and medical illustration. Electives may be pursued, beginning in the second year, in painting, printmaking, illustration, scientific illustration, industrial design, interior design, graphic design and the crafts. The first year forms the foundation preparation for the major concentration, with courses required in drawing, two- and three-dimensional design, and creative sources.

**Graphic design** involves the process of visually communicating through printed environmental and digital presentations of information and ideas. Graphic design students aesthetically order words (typography), images (photographs, illustrations, diagrams) and secondary elements (abstract shapes, textures, lines and colors) to express qualitative and quantitative messages that can interest, inform and persuade identified audiences.

The **industrial design** program prepares students for careers in the expanding product design fields. Artistic talent

and analytic thought are applied to the design process.

**Interior design** students study three-dimensional concepts as they relate to space, function, and aesthetic resolution. Practical design projects develop aesthetic understanding, technical abilities, sensitivity to human needs and awareness of the social consequences of the designer's effort.

**Illustration** majors solve communication problems by translating concepts and ideas into images. They study traditional and electronic media and design to prepare themselves for their professional goals.

**Painting and printmaking** serve the student who is interested in careers in the fine arts. These two majors are complemented by fine arts course work in drawing, electronic imaging and sculpture.

**Medical illustration** students learn to provide visual support for communications and instruction in medicine and allied health sciences. Graduating students rely on their course work in biology, anatomy and art in their professional roles (see course chart, page 85).

Medical illustration students will be taught Human Gross Anatomy through the University of Rochester during the winter and spring quarters of the junior year. A tuition surcharge will be in effect those quarters.

The credit requirements for students admitted in the School of Art and Design (graphic design, interior design, industrial design, illustration, painting and printmaking) programs are as follows:

	<i>Quarter Credit Hours</i>
Required Major	87
Required Professional Electives	18
Open Electives	9
Liberal Arts	50
Art History	18
Creative Sources	6
<hr/>	
<i>Total Quarter Credit Hours</i>	188

Freshman Kit is suggested for art and design students and is approximately \$375. Students are generally responsible for the additional cost of supplies.

### Electives \*

Graphic Design	2010-411, 412, 413
Illustration Electives	2019-411, 412, 413
Graphic Visualization	2035-320
Industrial Design Elective	2035-411, 412, 413
Color	2021-320
Painting Elective	2021-411, 412, 413
Printmaking Elective	2022-411, 412, 413
Drawing II	2021-450
Sculpture	2021-411, 412, 413
Ceramics Elective	2040-251, 252, 253
Glass Elective	2041-251, 252, 253
Metalcrafts Elective	2042-251, 252, 253
Textiles Elective	2043-251, 252, 253
Woodworking Elective	2044-251, 252, 253
Introduction to	
Filmmaking	2065-243, 244
Still Photography I, II, III	2060-257, 258, 259
Typographical	2081-202, 203
Composition	

**Art History (select two)**

History of Design	2039-300
History of Crafts	2039-310
History of Art Criticism	2039-320
Philosophy in Art	2039-330
Symbols and Symbol Making	2039-340
Asian Art	2039-350
18th and 19th Century Art	2039-360
20th Century Art	2039-370
Native American Art	2039-390
American Art	2039-420
Dada and Surrealism	2039-430
Conceptual Art	2039-440
Pop Art and Pop Culture	2039-450
Media, Advertising and Consciousness	2039-460

\* Electives prerequisite: Completion of foundation program or permission of instructor

**Graphic design, interior design, industrial design, illustration, painting or printmaking, BFA degree, typical course sequences**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Two-Dimensional Design 2013-231, 232, 233	9
Three-Dimensional Design 2013-241, 242, 243	9
Creative Sources 2013-205, 206, 207	6
Drawing 2013-211, 212, 213	12
Liberal Arts *	12
Physical Education Elective †	0
<i>Second Year ‡</i>	
Art & Civilization 2039-225, 226, 227	9
Liberal Arts *	12
Physical Education Elective †	0
Electives (must have two studios each quarter—one of which must be the core in which you are going to major) §	
<b>Introduction to Graphic Design</b> 2010-301	4
<b>Introduction to Typography</b> 2010-302	4
<b>Introduction to Type &amp; Image</b> 2010-303	4
<b>Interior design</b> majors must take each of these courses to complete sophomore year (prerequisite: completion of foundation studies):	
Architectural Drafting 2015-305	3
Perspective Rendering 2015-306	3
Introduction to Interior Design 2015-307	3
Computer-Aided Design Applications 2015-308	1
Interior Design Model Building 2015-309	1
Human Dimension Applications 2015-310	1
<b>Industrial design</b> majors must take each of these courses to complete sophomore year (prerequisite: completion of foundation studies):	
Layout Systems 2035-305	3
Technical Drawing 2035-306	3
Graphic Visualization 2035-307	3
Soft Model Making 2035-308	1
Hard Model Making 2035-309	1
Computer-Aided Design Application 2035-310	1
<b>Fine arts</b> majors must take each of these courses to complete sophomore year:	
Introduction to Painting 2021-305	3
Introduction to Printmaking 2021-307	3
Introduction to Sculpture 2021-412	3
Fine Arts Drawing 2021-306, 308, 309	3
<b>Illustration</b> majors must take each of these courses to complete sophomore year:	
Anatomical Figure Drawing 2019-304	3
Heads, Hands, Facial Expression 2019-306	3
The Figure in the Environment 2019-308	3
Desktop Illustration I 2019-305	1
Reference Photography 2019-307	1
Desktop Illustration II 2019-309	1

*Third Year*

Contemporary Art 2039-380 (one quarter required)	3
Art History Electives (select two) #	6
Liberal Arts *	12
Major (one)	
<b>Illustration</b> majors must take nine of these courses, for a total of 27 credits, to complete junior year:	
The Figure in Advertising 2019-405	3
The Graphic Elements of Illustration 2019-406	3
Illustration Source: Creating the Scene 2019-407	3
Publishing Your Illustrations 2019-408	3
Symbolism in Editorial Illustration 2019-409	3
The Illustrator & the Editorial Statement 2019-410	3
<b>Computer Applications in Book Illustration</b> 2019-415	3
<b>Printmaking</b> 2022-401, 402, 403	18
<b>Graphic design</b> majors must take each of these courses to complete junior year:	
Typography in Graphic Design 2010-401	3
Imagery in Graphic Design 2010-402	3
Symbols in Graphic Design 2010-403	3
Graphic Design for Publications 2010-404	3
Information Design 2010-405	3
Packaging & Environmental Graphics 2010-406	3
<b>Painting II</b> 2021-401, 402, 403	18
<b>Industrial design</b> majors must take each of these courses to complete junior year (prerequisite: completion of sophomore industrial design):	
Materials & Processes Applications 2035-405	3
Consumer Product Design I 2035-406	3
Human Factors Applications 2035-407	3
Equipment Design 2035-408	3
Product Style 2035-409	3
Consumer Product Design II 2035-410	3
<b>Interior design</b> majors must take each of these courses to complete junior year (prerequisite: completion of sophomore industrial design):	
Hospitality Design 2015-404	3
Applications of Color & Light 2015-405	3
Retail Design 2015-406	3
Materials & Processes for Interior Design 2015-407	3
Office Design & Planning 2015-408	3
Interior Specifications 2015-409	3
Art Electives (one per quarter) #	9
<i>Fourth Year</i>	
Open Electives (one per quarter) §	9
Liberal Arts *	14
Major (one)	
<b>Illustration</b> majors must take six of these courses, for a total of 18 credits, to complete senior year:	
The Illustrator as Journalist 2019-501	3
A Contemporary History of Illustration 2019-505	3
Beginning Computer Techniques for Illustration 2019-506	3
Illustration for Books 2019-507	3
Illustration as a Promotional Tool 2019-508	3
Computer Illustration 2019-509 (Required)	3
Personal Focus in Illustration 2019-510	3
Alternative Materials & Media 2019-511	3
Contemporary Computer Issues 2019-512	3
<b>Dimensional Illustration</b> 2019-551	3
<b>Printmaking III</b> 2022-501, 502, 503	27
<b>Graphic design</b> majors must take nine of these senior-level courses:	
Career Skills & Professional Practices 2010-501	3
Corporate Design 2010-502	3
Graphic Systems 2010-504	3
Senior Project 2010-513	3
Advertising Design 2010-505	3
Concept & Symbolism 2010-506	3
Design Marketing Relationships 2010-507	3
Photography in Graphic Design 2010-508	3
Design Specifications 2010-509	3
Advanced Information Design 2010-511	3
Interactive Media 2010-512	3
Editorial Design 2010-552	3
Illustration for Designers 2010-532	3
Public & Social Service Design 2010-552	3
<b>Painting</b> 2021-501, 502, 503	27

**Industrial design** majors must take each of these courses to complete senior year (prerequisite: senior standing in industrial design):

20th Century Designers 2035-505	3
Design Collaborative 2035-506	3
Advanced Product Design 2035-507	3
Furniture Design 2035-508	3
Furniture Research & Development 2035-509	3
Professional Practice 2035-510	3
Product Development 2035-511	3
Advanced Product Design 2035-512	3
Professional Practice II 2035-513	3

**Interior design** majors must take each of these courses to complete senior year (prerequisite: senior standing in interior design):

Multipurpose, Multistory Design 2015-504	3
Codes & Regulations 2015-505	3
Environmental Control Applications 2015-506	3
Health Care Design 2015-507	3
Interior Design Business Practices 2015-508	3
Career Planning 2015-509	3
Working Drawings 2015-510	3
Special Projects 2015-511	3
20th Century Interior Design 2015-512	3

**Total Quarter Credit Hours** 188-191

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Upon completion of the second year, the associate in applied science degree is awarded.

§ Additional intercollege studio courses are available by recommendation of the academic adviser and administrator. Electives are registered on a space-available basis and subject to change without prior notice. Consult the adviser when planning programs.

# Art electives listed on previous page.

**Medical illustration option, BFA degree, typical course sequence**

**First Year** **Quarter Credit Hours**

(Art and design portfolio and additional six drawings of natural forms, to be presented as slides, are required for admission.)

Two-Dimensional Design 2013-231, 232, 233	9
Three-Dimensional Design 2013-241, 242, 243	9
Creative Sources 2013-205, 206, 207	6
Drawing 2013-211, 212, 213	12
Liberal Arts *	12
Physical Education Elective †	0

**Second Year**

Art & Civilization 2039-225, 226, 227	9
Liberal Arts *	12
Physical Education Elective †	0

**Medical illustration** majors must take each of these courses to complete sophomore year:

Anatomical Figure Drawing 2019-304	3
Heads, Hands, Facial Expression 2019-306	3
The Figure in the Environment 2019-308	3
Desktop Illustration I 2019-305	1
Reference Photography 2019-307	1
Desktop Illustration II 2019-309	1
General Biology 1001-205	4
Human Biology 1001-231, 232	8
Art Elective (one per quarter) §	9

**Third Year**

Liberal Arts *	12
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**Medical illustration** majors must take each of these courses to complete junior year:

Medical Illustration Application 2020-401	3
Anatomic Drawing I 2020-406	3
Anatomic Illustration: Wet Media 2020-407	3
Computer Applications in Anatomic Illustration 2020-408	2
Anatomic Drawing II 2020-409	2
Anatomic Illustration: Mixed Media 2020-410	3
Scientific Illustration 2020-551-01	3
Computer Applications in Scientific Illustration 2020-551-02	2
Gross Anatomy (U of R) ‡	7
Art Electives §	6

**Fourth Year**

Liberal Arts *	14
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**Medical illustration** majors must take each of these courses to complete senior year:

Advanced Medical Illustration 2020-501	3
Computer Animation for Medical Instruction 2020-551	3
Marketing & Business Practices in Med. Illus. 2020-507-01	3
Medical Illustration Portfolio 2020-508-01	3
Surgical Drawing & Illustration 2020-505	6
Open Elective (one per quarter) §	9

**Total Quarter Credit Hours** 189

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ A tuition surcharge will be applied in Spring Quarter.

§ Art electives listed on page 83.

# School for American Crafts

As an internationally recognized school that merges art with craft, the mission of the School for American Crafts is to educate, inspire and motivate students while preparing them for professions in the creative and technical understanding of wood, metal, fiber, clay and glass. Through a balance of aesthetic and technical education, the School for American Crafts provides diverse experiences to promote the development of innovative self-expression and problem solving in the creation and appreciation of sculpture and functional objects.

In order to achieve the desired occupational goals, the educational objectives seek to stimulate creative imagination and technical invention, develop knowledge of process and command of skills, and foster appreciation, not only of the crafts, but also the related arts. The programs strive to inspire the student to seek continual improvement through analysis and self-evaluation, and the AAS and BFA programs cooperate with the College of Liberal Arts in assisting students to develop personally and socially.

## Student responsibilities

Students are responsible for the care and cleanliness of their shops and for the care and maintenance of the tools and machines with which they work. No student may use any machine until instruction in its proper use has been given, and responsibility for observing safety precautions is assumed by each student upon entering the school. Some unique supplies are provided for convenience and choice, but financial obligations must be met for successful completion of courses. Fees for kiln firings, supplies and furnace use are student responsibilities.

## Programs of study

The School for American Crafts offers a full-time program of study with opportunity for concentration in one of five craft fields: ceramics and ceramic sculpture, metalcrafts and jewelry, weaving and textile design, woodworking and furniture design, and glass. After satisfactory completion of two years of study, the associate in applied science is granted. Those with the aptitude and interest for further study may continue for two additional years. After successful completion of the four-year program, the bachelor of fine arts is awarded.

A double crafts major with study for two years in each of two craft areas is also available. A bachelor of fine arts is awarded after four years of study.

	<i>Quarter Credit Hours</i>
Required Craft Major	96
Required Professional Electives	12
Open Electives	6
Liberal Arts	50
Art History	18
Creative Sources	6
<b>Total Quarter Credit Hours</b>	<b>188</b>

Double crafts credit requirements are:

	<i>Quarter Credit Hours</i>
Required Crafts (2) Major	93
Required Professional Electives	12
Open Electives	6
Liberal Arts	50
Art History	18
Creative Sources	6
<b>Total Quarter Credit Hours</b>	<b>185</b>

A two-year associate in occupational studies is offered in woodworking and furniture design. The credit requirements are:

## Woodworking and furniture design, AOS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Materials & Processes 2044-220	15
Creative Sources 2013-205, 206, 207	6
Crafts Drawing 2013-261, 262, 263	9
Two-Dimensional Design 2013-231, 232, 233	9
Technical Drawing 2044-231, 232, 233	9
Physical Education Elective *	0
<b>Second Year</b>	<b>21</b>
Materials & Processes 2044-320	9
Three-Dimensional Design 2013-241, 242, 243	9
Furniture History 2044-331, 332, 333	9
Wood Professional Practices 2044-341, 342, 343	8
<b>Total Quarter Credit Hours</b>	<b>90</b>

\* See page 11 for policy on physical education.

## Course descriptions

For a complete outline of courses offered at RIT, please refer to the course description section of this bulletin.

## Craft majors, double crafts majors,\* BFA degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Two-Dimensional Design 2013-231, 232, 233	9
Creative Sources 2013-205, 206, 207	6
Drawing Crafts 2013-261, 262, 263	9
Liberal Arts †	12
Materials & Processes (one):	
Ceramics & Ceramic Sculpture 2040-200	15
Glass 2041-200	15
Metalcrafts & Jewelry 2042-200	15
Weaving & Textile Design 2043-200	15
Woodworking & Furniture Design 2044-200	15
Physical Education Elective ‡	0
<b>Second Year §</b>	<b>9</b>
Art & Civilization 2039-225, 226, 227	9
Three-Dimensional Design 2013-241, 242, 243	9
Liberal Arts †	12
Materials & Processes (one):	
Ceramics & Ceramic Sculpture 2040-300	15
Glass 2041-300	15
Metalcrafts & Jewelry 2042-300	15
Weaving & Textile Design 2043-300	15
Woodworking & Furniture Design 2044-300	15
Physical Education Elective ‡	0

## Third Year

Contemporary Art 2039-380 (one quarter required)	3
Art History Electives (select two) #	6
Liberal Arts †	12
Materials & Processes (one):	
Ceramics & Ceramic Sculpture 2040-400	15
Glass 2041-400	15
Metalcrafts & Jewelry 2042-400	15
Weaving & Textile Design 2043-400	15
Woodworking & Furniture Design 2044-400	15
Art Electives (one per quarter) ¶	9
<b>Fourth Year</b>	
Liberal Arts †	14
Techniques & Thesis (one):	
Ceramics & Ceramic Sculpture 2040-500	24
Glass 2041-500	24
Metalcrafts & Jewelry 2042-500	24
Weaving & Textile Design 2043-500	24
Woodworking & Furniture Design 2044-500	24
Art Elective ¶	3
Open Electives	6
<b>Total Quarter Credit Hours</b>	<b>188</b>

\* Double crafts major: The first two years are the same as a crafts major: third year 204-300 (5 cr.), 204-400 (5 cr.); fourth year 204-400 (5 cr.), 204-500 (8 cr.)

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

§ Upon successful completion of the second year, the associate in applied science degree is awarded.

# Total of 18 quarter credits of art history: Art & Civilization and Contemporary Art are required.

¶ Additional intercollege studio courses are available by recommendation of the academic adviser and administrator. Electives are registered on a space-available basis and are subject to change without prior notice. Consult the adviser when planning programs. Craft students elect in studio other than their major concentrations.

# School of Photographic Arts and Sciences

Elaine O'Neil, Director

The programs of the School of Photographic Arts and Sciences are designed to prepare students for a wide range of careers in photographic and other imaging fields. Studies in photographic arts involve both technical and creative experiences for visual problem solving. The science and technology division of the school emphasizes the physical principles of imaging through studies in image evaluation, unconventional imaging applications and computer applications, as well as other high-technology areas. All first-year BFA students in photography and students in biomedical photographic communications and technical photography are required to have their own handheld small- or medium-format camera and a professional light meter.

Students have the opportunity to supplement their course work with participation in internships, field trips, presentations by guest speakers, departmental student organizations and related activities.

We urge our students to take advantage of our school's location. Reflecting Rochester's historic connection with photography, a comprehensive schedule of programs, including exhibitions, lectures and seminars—is offered by the city's array of cultural institutions every year.

**Degrees offered**

**Department of applied photography:** BFA degree in professional photographic illustration (advertising photography and photojournalism)—Willie Osterman, chair

**Department of biomedical photographic communications:** BS degree in biomedical photographic communications—Michael Peres, chair

**Department of film/video:** BFA and MFA degrees in film/video and animation—Howard Lester, chair

**Department of fine art photography:** BFA degree in professional photographic illustration, fine art photography option; MFA degree in imaging arts—chair

**Department of imaging and photographic technology:** BS degree in imaging and photographic technology—Andrew Davidhazy, chair

**Department of imaging systems management—**BS degree in imaging systems management—Milton L. Cofield, chair

**Graduate programs**

The School of Photographic Arts and Sciences offers the MFA in imaging arts with two areas of concentration: photography and computer animation. We also offer graduate-level courses of study in photographic preservation and archival practice. The MFA degree is described in the Graduate Bulletin, available from the Admissions Office.

**Summer session**

The School of Photographic Arts and Sciences offers a wide selection of photographic courses in the Summer Session. These range from beginning photography courses to those requiring a substantial photographic background. For detailed information, write the associate director of the school.

**Internet address**

Additional information can be requested through the Internet. Use the word "info" in the subject line and send to the following address: ritphoto@rit.edu.

**Memberships**

The school maintains memberships in a number of professional organizations: American Management Association, American Society of Training and Development, Association of Professional Color Laboratories, College Art Association, Biological Photographic Association, National Microfilm Association, Ophthalmic Photographic Society, Professional Photographers of America, Society of Motion Picture and Television Engineers, Society of Photographic Scientists and Engineers, Society for Photographic Education, University Film Association.

**Transfer admission**

Transfer credits from accredited institutions are evaluated on a course-by-course basis. Transfer credits for photography courses are awarded on the basis of a portfolio in addition to course work with a grade of C or better. The portfolio will be reviewed by the department chair. (Portfolio guidelines are available from the Office of Admissions.)

Articulation agreements, which specify the number of transfer credits that are acceptable from another institution, are in effect with approximately 20 colleges and universities.

**Writing Policy**

The School of Photographic Arts and Sciences has a minimum requirement within each of its degree programs. A copy of the school's official writing competency policy may be obtained from the director's office or from the Office of Academic Student Services.

**Summer transfer programs**

Students who meet the requirements for course work and portfolio work may be accepted into one of several summer transfer programs. These 10-week sessions of intensive study bring students to a second- or third-year technical level in their photography programs. Descriptions of the requirements for each program and year level are indicated below.

**Second-year transfer credit requirements**

**Imaging and photographic technology—**To become a fall transfer into the sophomore year, candidates must complete a Summer Transfer Program and should have previously completed the following college-level course work: at least one year of mathematics, including an introductory calculus course; at least four liberal arts courses; and three courses in B&W photography. Additional photography courses may exempt a student from Photography I, a requirement in the Summer Transfer Program. Credit for this is evaluated by transcript and submission of a portfolio. Other credits earned may also be accepted for transfer to upper years. This includes college physics, liberal arts, technical writing, computer programming, chemistry and additional mathematics.

Transfer with other than background suggested above is encouraged in exceptional circumstances.

**Biomedical photographic communications—**To become a fall transfer into the sophomore year, candidates must complete a Summer Transfer Program and should have previously completed the following college-level course work: 12 credit hours of liberal arts, 8 of science and 6 of photography. Students also must complete the 10-week intensive summer courses Photography I and Materials and Processes of Photography.

Applicants may submit a transcript of college courses completed and request a transfer credit audit. Transfer credit for Photography I is based on acceptable comprehensive portfolio review, satisfactory completion of an appropriate college photography course and/or evidence of appropriate work experience.

**Advertising photography or photojournalism—**Normally a minimum of 30 quarter credits, of which there are 9 credits in design; 12 in liberal arts; and 15 in photography, photography and studio art, or an accepted equivalent. The student may be required to complete the 10-week intensive summer courses Photography I, Creative Problems and Introduction to Color Photography.

**Imaging systems management—**to enter the program as a junior, the student must have 60 semester credits or 90 quarter credits, including math, science, English composition, and computer literacy and 20 semester (15 quarter) credits in liberal arts lower-core courses.

**Fine art photography**—After successfully completing one year in RIT's BFA photography program or at an accredited college with an acceptable portfolio (RIT summer transfer courses may be required), the student may major in fine art photography in the second, third and fourth years if a strong portfolio of photography work is submitted along with evidence, in transcript, of good scholarship. Make-up courses may be required, and an interview with the department chairperson is highly recommended.

### Third-year transfer credit requirements

**Advertising photography or photojournalism**—Normally an applicant must have completed an associate degree or equivalent of two years of college with a major in photography (a minimum of 25 quarter credits of photography) plus studio art courses for a minimum of 9 quarter credits, liberal arts for 24 quarter credits, and art history for 9 quarter credits. The student also must complete the 10-week intensive summer course BFA Photography and must make up the courses Materials and Processes of Photography and History and Aesthetics of Photography. Portfolio required.

**Entry into advertising photography or photojournalism requires a portfolio review as well as evaluation of transfer credit.**

If a student has completed two or more years of intensive study in photography at an accredited school, he or she may submit a portfolio for evaluation by the BFA faculty. A list of the requirements for submission of the portfolio may be obtained from the Office of Admissions, Bausch & Lomb Center, 60 Lomb Memorial Drive, Rochester, N.Y. 14623-5604.

## Biomedical Photographic Communications

Michael Peres, Chair

The program prepares students for a photographic career in forensics, research, hospitals and other medical settings, such as ophthalmic clinics and veterinary centers, as well as in other life science situations. The biomedical photographer will be involved in all areas of still imagery—electronic and silver—as well as video.

The first-year courses introduce basic principles and theories plus practical experience with photographic equipment and processes. Medical and biological subject matter is included in these first-year practical experiences.

The second year continues to prepare the student with courses in photomacrography, photomicrography, ophthalmic photography and other studies required for this career. In addition to the traditional film-based activities, second-year students explore computers—their applications in electronic imaging, desktop publishing and graphics. The courses prepare the student for a summer co-op in a medical or scientific facility. Completion of the co-op is required for the associate degree in biomedical photography.

The junior and senior years may include electives in advanced photomacrography, ophthalmic photography, photomicrography, computer graphics, television, advanced color printing and many others selected in consultation with the adviser. Flexibility is provided to allow students to explore many career-oriented areas of photography. The professional concentration courses in the senior year also encourage students to research a photographic area specific to their career direction.

The Biological Photographic Association, one of the certifying and registering professional organizations in the field, has cooperated in the preparation of criteria and in program development. Thus the RIT program can provide the educational background to start work to become a registered biomedical photographer (RBP) after the student enters the profession. The curriculum is also organized to assist students in preparing for the certified retinal angiographer (CRA) exam, given by the Ophthalmic Photographers' Society.

### Biomedical photographic communications, BS degree, typical course sequence

First Year	Quarter Credit Hours
Freshman Seminar 2061-001	0
Biomedical Photography I 2061-201, 202, 203	14
Materials & Processes of Photography 2076-211, 212, 213	9
Survey of Biomedical Photography 2061-213	1
Human Biology 1004-211, 212	8
Survey of Computer Science 0602-200	4
Liberal Arts (Core) *	12
Physical Education †	0
Systems Design 2076-401	3
<b>Second Year</b>	
Biomedical Photography II 2061-301, 302, 303	15
Color Printing/Theory 2076-312	4
Preparation of Biomedical Visuals 2061-312, 313	6
Medical Terminology 1026-301	3
Liberal Arts (Core) *	16
Physical Education †	0
Intro. to Electronic Still Photography 2067-475	5
<b>Summer Quarter Internship (10 weeks in a medical setting) ‡</b>	
<b>Third Year</b>	
AV Production I 2061-401	4
Advanced Photography in Bio. Comm. 2061-402, 403	8
Professional Electives §	9-12
Science Electives #	5-8
Liberal Arts (Concentration) *	12
Summer Internship (Optional)	
Mathematics	8
<b>Fourth Year</b>	
Photographic Concentration 2061-501, 502, 503	12
Business Electives	8
Professional Electives §	9-12
Liberal Arts (Elective) *	12
Liberal Arts (Senior Seminar) *	2
<b>Total Quarter Credit Hours</b>	<b>189-198</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Associate degree awarded upon successful completion of second year and the internship.

§ Possible professional electives: ophthalmic photography; portable video; holography. Selected professional courses may be substituted for 4, 8 or 12 credits with written permission of adviser.

# Options include: electron microscopy; computer courses; advanced courses in the biological sciences; printing & electronic prepress; multimedia; computer animation

## Film/Video

Howard Lester, Chair

The degree program in film, video and animation is for students who recognize the moving image as an expressive force uniquely important to modern life. It will acquaint students with film, video and animation as creative media and develop their production skills.

The curriculum emphasizes production. Freshmen begin working in 16mm film their very first quarter, continue with actual production every quarter until they graduate and may specialize in motion pictures, video, or traditional or computer animation. Our goal is to empower all our graduates to be able to produce, creatively and practically, their own independent work or to fulfill any production responsibility in any medium suitable to their interests and abilities.

Through lectures and laboratories students develop individual skills in moving-image communications and learn the aesthetic principles governing the art. Technology and technique are never taught as an end in themselves but in terms of learning to use the tools necessary to achieve a creative goal in relation to the audience. The curriculum also recognizes the increasing interrelationship between the technologies of film, video, animation and computers. Other RIT students may enroll in film/video courses with the permission of the instructor. There is also an active foreign-exchange program with colleges in Salisbury, England, and Rotterdam, Holland.

Students produce several short films and videos, working through all phases of production: scripting, production planning, budgeting, shooting, sound editing and working with a laboratory. Students combine their learning of visual and sound artistry through hands-on experience with camera and sound equipment. Because film, video and animation projects are designed by individual students, a wide variety of styles and intentions are expressed in the department's work.

### Film/video, BFA degree, typical course sequence

#### First Year

Film/Video Freshman Seminar	2065-101	2
Film/Video Production I, II, III	2065-201, 202, 203	15
Materials & Processes of the Moving Image	2065-221	2
Film Language	2065-222	2
Creative Processes	2065-223	2
Writing for Film/Video I	2065-342	3
Liberal Arts (Core) *		16
Physical Education †		0
Survey of Computer Science	0602-200	4

#### Second Year

Video Tools & Technology	2065-311	
or		
Intro. to 16mm Sync. Sound	2065-431	5
Film/Video History & Aesthetics		12
Introduction to Animation	2065-311	4
<b>Production Emphasis</b>		
Film/Video Production Workshop		4
Writing for Film/Video II	2065-343	3
Film/Video Electives		6-8
<b>Animation Emphasis</b>		
Art/Design Electives		8
Advanced Animation Tools	2065-332	4
or		
2D Computer Animation	2065-427	
Animation Production	2065-333	4
Liberal Arts Core *		12
Physical Education †		0

#### Third Year

Film/Video History & Aesthetics		6-8
Senior Project Seminar	2065-413	1
<b>Production Emphasis</b>		
Video Tools & Technology	2065-311	
or		
Intro. to 16mm Sync. Sound	2065-431	5
Film/Video Production Workshop		8
Film/Video Electives		9-12
<b>Animation Emphasis</b>		
3D Computer Animation	2065-XXX or Tools Class	5
Color Theory	2021-412	3
Advanced Animation Workshop I	2065-437	
or		
Experimental Animation Workshop	2065-447	4
Advanced Animation Workshop II	2065-438	4
Liberal Arts (Concentration) *		12
Film/Video Electives		6-8

#### Fourth Year

Senior Project I, II	2065-507, 508	12
Senior Forum I, II, III	2065-511, 512, 513	6
Film/Video Electives		12
Film/Video History & Aesthetics		6-8
Liberal Arts (Electives) *		12
Liberal Arts Seminar *		2

Total Quarter Credit Hours 181-191

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

## Imaging and Photographic Technology

Andrew Davidhazy, Chair

The curriculum blends a contemporary professional photography program with specialized education in technical, industrial and scientific applications.

It prepares students for entry into any of a variety of picture-making and nonpicture-making positions by providing them with a background adaptable to a variety of fields. Students' technical skills are complemented by academic course work in mathematics, computers, science and liberal arts, including technical writing.

At the same time, however, students develop expertise in a professional or technical field of their choice by taking at least six self-selected elective courses in any one of several available areas of concentration.

The picture-making aspects of photography are included in all four years of the program, with a transition from a comprehensive course in black-and-white photography through color photography and color printing and architectural or nature photography. The required technical courses include Photographic Sensitometry, Optics and Chemistry, Color Measurement and High-Speed Photography. Also available are a variety of technical and photographic electives such as Holography, Photonics, Scanning Electron Microscopy and Photoinstrumentation Applications. Computing and electronic imaging are emphasized from the first year in such courses as C++ Programming, Digital Image Processing and Introduction to Multimedia.

In their last two years, students may choose a field of concentration (see footnote †). While every student's core program is similar, each graduate's background varies with his or her choice of concentration area.

Another unique feature of the program is that graduates complete at least two required cooperative education work blocks before graduation. Co-op is a definite asset to graduates of any program.

An employment survey conducted by the School of Photographic Arts and Sciences shows the need for graduates with photographic technology backgrounds well into the future. Recent graduates of this program are employed as photographic technicians, technologists or research associates in various industrial, scientific, or business enterprises; as photographic engineers or junior engineers in a number of imaging-related disciplines; as technical and sales representatives; technical illustrators; high-speed photographers; and as corporate, industrial, advertising and commercial photographers. The department chairperson has a comprehensive list of graduates' careers available.

The Technical Photography Student Association promotes professionalism among students and interaction with the imaging and photographic technology industry. The association regularly invites professionals to campus for lectures and demonstrations.

If you would like specific information, a personal interview, tour or an opportunity to visit classes and talk with some of our students, call the program chair, Andrew Davidhazy, at 716-475-2592.

For additional information, visit the departmental home page on the World Wide Web: <http://www.rit.edu/~andpph/ipt.html>

**Imaging and photographic technology, BS degree, typical course sequence (applicable as of summer 1994)**

<i>First Year</i>	<i>Quarter Credit Hours</i>
<b>Photographic Technology I</b>	
Photography I 2076-201, 202, 203	12
Materials & Processes of Photography 2076-211, 212, 213	9
Intro. to Programming 0602-208	4
Program Design & Validation 0602-210	4
System Design/Graphic Presentations 2076-401	3
Introductory Calculus 1016-214, 215 *	6
Liberal Arts (Core) †	12
Physical Education ‡	0
<i>Second Year</i>	
<b>Photographic Technology II</b>	
Photographic Sensitometry 2076-301	4
Technical Photographic Chemistry 2076-302	4
Photographic Optics 2076-303	4
<b>Color Photographic Systems</b>	
Color Printing Theory 2076-312	4
Color Measurement 2076-313	4
College Physics 1017-211, 212, 213 §	9
College Physics Lab 1017-271, 272, 273	3
Liberal Arts (Core) †	16
Physical Education ‡	0
Cooperative Education (Summer) #	Co-op
<i>Third Year</i>	
Concentration Electives ¶	12
<b>Photographic Technology III</b>	
Color Photo/Design 2076-311	4
Nature Photography 2076-471	
OR	
Architectural Photography 2076-458	4
Intro. to Digital Image Processing 2076-491	4
Electronic Sensitometry 2076-552	4
Intro. to Portable Video 2065-243	
OR	
Intro. to Multimedia 3001-201	4
Technical Writing 0502-444	4
Liberal Arts †	12
Cooperative Education (Summer) #	Co-op

<i>Fourth Year</i>	
Concentration Electives ¶	12
<b>Photographic Technology IV</b>	
High-Speed/Time-Lapse 2076-511	3
Intro. to Research 2076-501	3
Survey of Nonconventional Imaging 2076-503	3
Managing Quality in GA & Photo 2076-562	3
Statistical Process Control 2068-423	3
Departmental Elective	3-4
Liberal Arts (Concentration/Elective) †	12
Liberal Arts (Senior Seminar) †	2
<i>Total Quarter Credit Hours</i>	Not less than 190

\* Can substitute Engineering Calculus. Consult adviser.  
 † See page 10 for liberal arts requirements.  
 ‡ See page 11 for policy on physical education.  
 § Students may substitute University Physics for College Physics. Consult adviser.  
 # Co-op experiences may be scheduled during the school year as well, but this may disrupt normal course schedule.  
 ¶ Concentration course credits may vary from 3 to 5, but should total approximately 24. A minimum of 190 quarter credit hours are required for the BS degree. Any deficiency must be made up with elective credits.  
 Concentration electives (third and fourth years): Students may pursue one of the following areas of concentration: photographic instrumentation, multimedia, business, graphic arts, photo systems management, digital and electronic imaging, still photography and color printing, science and engineering, desktop publishing, etc. Other concentration areas may be designed by individual students in consultation with an adviser. Concentration lists are provided by advisers and are intended as planning guides. At least three courses from any one concentration are suggested to constitute a major concentration area.

NOTE: Some courses are offered more than once during the school year.

## Photographic Marketing Management

Offered jointly by the College of Business and the College of Imaging Arts and Sciences, RIT's program in photographic marketing is the only one of its kind in the country.

This rigorous program is designed to provide students with a thorough knowledge of the photographic process and a solid background in business administration with courses in economic, finance and marketing principles. The combination of work in these two disciplines prepares students for a multifaceted management-level career in the photographic business. Employment opportunities include customer service positions in photofinishing and professional color laboratories and management training opportunities with photographic manufacturers and retailers. For further information, including transfer requirements, contact the College of Business or the College of Imaging Arts and Sciences.

**Photographic marketing management, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 0102-011	0
Algebra & Calculus for Management Science 1016-225, 226	8
Introduction to Data Analysis I 0106-330	4
Survey of Computer Science 0602-200	4
Economics I & II 0511-301, 302	8
Contemporary Science	8
Liberal Arts *	16
Physical Education †	0
Career Seminar 0102-312	2

<i>Second Year</i>	
Basic Photo Lab Operations I-III 2068-401, 402, 403	12
Financial & Managerial Accounting 0101-301, 302	8
Legal Environment of Business 0101-319	4
Organizational Behavior 0102-430	4
Principles of Marketing 0105-463	4
Management Science 0106-334	4
Liberal Arts *	12
Physical Education †	0
Completion of College Writing Competency Requirement	
<i>Third Year</i>	
Materials & Processes of Photography 2076-211, 212, 213	9
Corporate Finance 0104-441	4
Buyer Behavior 0105-505	4
Marketing Research 0105-551	4
Operations Management 0106-401	4
Liberal Arts *	20
Special Topics 2068-551	3
Cooperative Education (two quarters required; must fall within third and fourth years) ‡	
<i>Fourth Year</i>	
Business Environment 0102-507	4
Strategy & Policy 0102-551	4
Marketing Management Problems 0105-550	4
Information Systems 0106-505	4
Marketing/Management Electives	8
Liberal Arts *	2
Liberal Arts *	4
<hr/> <i>Total Quarter Credit Hours</i>	<hr/> 184

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Students are expected to complete co-op requirements during the junior and senior years in accordance with specific requirements for their major. General co-op guidelines for the College of Business are discussed on page 45.

## Imaging Systems Management

Milton L. Cofield, Ph.D., Chair & James E. McGhee Professor

Imaging is an interdisciplinary science and technology with roots in photographic, printing and information technology. Management and marketing expertise is required to evaluate services that meet both technological and economic objectives. One of the challenges of the imaging industry is to find professional employees with the diverse background knowledge necessary to advance to leadership positions in technical, marketing and production management careers in the industry. The imaging systems management program prepares students to meet this critical industry need.

Students may enter the program from a wide variety of associate degree programs, including business, information technology, electronics technology, telecommunications technology, basic sciences such as chemistry and physics, and photography. Students considering the program are strongly encouraged to complete two laboratory science courses and mathematics through statistics for business prior to enrollment. The program seeks highly motivated, creative students who want to become imaging industry leaders.

The core curriculum stresses knowledge and experience in digital and photographic image processing systems, include E-6 and C-41 processing, custom enlargement and printing, internegatives and slide duping, minilab and high-speed photographic printing, PVAC and Accudata systems, digital color printing, digital film recorders and scanners, color copiers, writing images to Master Photo CD, and image data transmission and archiving. The laboratory facilities are well-equipped and provide a number of unique learning opportunities, including conventional and digital production operations that provide imaging services to the campus community.

A strength of the curriculum is the flexibility to select electives from a wide range of other RIT programs, including photography, telecommunications technology, information technology, imaging science, printing and business. This flexibility allows students to develop unique background experience that mirrors the diversity of imaging system career opportunities in technical, marketing and production management. Opportunities to work closely with faculty on independent-study research projects are readily available.

The program has a high industry visibility that results in intern and cooperative learning experiences in industry-leading organizations, including major manufacturers of equipment and supplies, commercial and wholesale laboratory segments of the industry. Post-graduation employment opportunities are strong and growing.

For more information, see our Web page or contact the department chair.

World Wide Web home page: <http://www.rit.edu/~wwwism/>

Internet address: [mlcpph@rit.edu](mailto:mlcpph@rit.edu)

**Imaging systems management, BS degree, typical course sequence**

<i>Third Year</i>			
Basic Imaging Laboratory Operations I, II, III	2068-401, 402, 403	12	
Electrical Principles for Design	0606-411	4	
Materials & Processes of Photography	2076-211, 212, 213	9	
Photo Process Control	2068-421	4	
Statistical Quality Control	2068-423	3	
Introduction to Programming	0602-208	4	
Financial Accounting	0101-301	4	
Managerial Accounting	0101-302	4	
Professional Elective (Printing, Imaging or Information Technology)		4	
Technical Writing	2080-312, 313	4	
Liberal Arts (Electives) *		4	
Color Measurement	2076-313	4	
<i>Fourth Year</i>			
Advanced Imaging Laboratory Operations I, II	2068-501, 502	8	
Organizational Behavior	0102-430	4	
Principles of Marketing	0105-463	4	
Photolab Materials	2068-511	2	
Imaging Systems Operations Management	2068-513	4	
Data Communications & Networks	0602-211	4	
Professional Electives (Printing, Business, Imaging or Information Technology)		4	
Liberal Arts (Electives) *			
<hr/>			184

\* See page 10 for liberal arts requirements.

Students not meeting the program requirements for two courses in mathematics and two courses in laboratory science should strongly consider Summer Quarter enrollment in the following courses: 4 credits of chemistry or physics with laboratory preferred and 4 credits of college algebra or, if that has been completed, statistics for business. Any student not meeting the mathematics and science requirements may need to complete a second Summer Quarter to complete the program in two years. All incoming transfer students should contact the department chair for advisement on course selection.

# Applied Photography

Willie Osterman, Chair

## Advertising Photography

RIT's program in advertising photography prepares students to express their creativity in the challenging world of a commercial studio, an advertising agency or a corporate setting. Whether the subject is a fashion model or a new automobile, students have both the technical and artistic background to create the desired picture. Graduates receive a bachelor of fine arts degree in professional photographic illustration.

The advertising photography program is flexible enough to provide for each student's particular needs. After the second year, advertising students plan programs that will fulfill their career objectives. With an adviser, a tentative two-year program is planned for available courses that will meet the professional BFA requirements.

**Professional photographic illustration, BFA degree, advertising photography option, BFA degree, typical course sequence**

	<i>First Year</i>	<i>Quarter Credit Hours</i>	
	Applied Photo I 2067-201, 202	12	
	Creative Problems 2067-206, 207	6	
	Intro. to Color 2067-208	5	
	2-D Design 2013-231, 232, 233	9	
	Liberal Arts (Core) *	12	
	Survey of Computer Science 0602-200	4	
	Physical Education †	0	
	<i>Second Year</i>		
	Applied Photo II 2067-301, 302	10	
	Intro. to Electronic Imaging 2067-325	4	
	History & Aesthetics of Photo 2060-301, 302, 303	9	
	Materials & Processes of Photography 2076-211, 212, 213	9	
	Liberal Arts (Core) *	12	
	Physical Education †	0	
	<i>Third Year</i>		
	Advertising Photography 2067-411	5	
	Advertising Core	5	
	Electives	3-5	
	Photo Electives	5	
	Prof. Operations Management 2067-422	4	
	Art & Civilization 2039-225, 226, 227	9	
	Liberal Arts (Concentration) *	12	
	<i>Fourth Year</i>		
	Advertising Core	10	
	Electives	15-17	
	Liberal Arts (Electives) *	12	
	Advertising Senior Seminar (fall term)	1	
	Photo Electives (minimum)	10	
	Liberal Arts (Senior Seminar) *	2	
	<hr/>		
	<i>Total Quarter Credit Hours</i>	187	

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ 20 total photo elective credits required; may be any CIAS course (photo, art, printing, etc.)

## Contemporary Photojournalism

World events today are often etched not by words, but by photographs. RIT's photojournalism program, which leads to a bachelor of fine arts degree in professional photographic illustration, provides the education in both photographic techniques and the artistry of capturing events on film for magazines, newspapers and independent projects. RIT graduates of this program are well respected: alumni have won eight Pulitzer Prizes in photojournalism since 1979. Students have the opportunity to explore related disciplines, such as electronic printing, newspaper production and other related topics within the College of Imaging Arts and Sciences.

### Professional photographic illustration, BFA degree, photojournalism option, typical course sequence

First Year	Quarter Credit Hours
Applied Photo I 2067-201, 202	10
Creative Problems 2067-206, 207	6
Intro. to Color 2067-208	5
2-D Design 2013-231, 232, 233	9
Survey of Computer Science 0602-200	4
Liberal Arts (Core) *	12
Physical Education †	0
<b>Second Year</b>	
Applied Photo II 2067-301, 302	10
History & Aesthetics of Photo 2060-301, 302, 303	9
Design for Photo II 2013-321, 322, 323	6
Materials & Processes of Photography 2076-211, 212, 213	9
Colloquia 2067-311	1
Liberal Arts (Core) *	12
Physical Education †	0
<b>Third Year</b>	
Contemporary Photojournalism I 2067-401, 402	10
Intro. to Electronic PJ	2
Electives 20	3-5
Photo Electives ‡	4-5
Art & Civilization 2039-225, 226, 227	9
Liberal Arts (Concentration) *	12
Writing Core 0535-532	4
<b>Fourth Year</b>	
Advanced Electronic PJ	2
Newspaper Production 2081-307	3
Senior Project	6
Photo Electives ‡	12-15
Electives	15-17
Liberal Arts (Electives) *	12
Liberal Arts (Senior Seminar) *	2
<b>Total Quarter Credit Hours</b>	<b>190</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Minimum of 18 total photo elective credits required; may be any CIAS course (photo, art, printing, etc.)

## Fine Art Photography

If your interests are in art and photography, you should consider fine art photography as your major. This program is designed to encourage and facilitate your artistic development, sensitivity and uniqueness as a visual artist. The department's objective is not to train you for a specific job in photography, but rather to provide you with a rich potential for growth and change and for a lifetime of interesting and challenging work in creative imaging and related fields. Students majoring in fine art photography receive the BFA degree in professional photographic illustration.

### Career opportunities

Graduates of the program find careers in a variety of areas: exhibiting artists, teachers, picture editors, art directors, photographer's representatives, photographic archivists, museum and gallery staff, audiovisual specialists, self-employed photographers, custom color printers, and film/video artists or animators. Some students choose to pursue graduate work and earn an MFA degree in the arts.

### Transfer students

College students who wish to transfer to the program can do so if they are studying photography or related imaging arts areas such as painting, graphic design, communication arts, audiovisual, film and television.

If you would like specific information, a personal interview, tour or an opportunity to visit classes and talk with some of our students, call the program chairperson at 716-475-2616.

### Professional photographic illustration, BFA degree, fine art photography option, typical course sequence

First Year	Quarter Credit Hours
Applied Photo I 2067-201, 202	10
Creative Problems 2067-206, 207	6
Intro. to Color 2067-208	5
2-D Design 2013-231, 232, 233	9
Liberal Arts (Core) *	12
Survey of Computer Science 0602-200	4
Physical Education †	0
<b>Second Year</b>	
Introduction to Fine Art Photography 2060-311, 312, 313	12
History & Aesthetics of Photography 2060-301, 302, 303	9
Photo Media Survey 2060-324	3
Computer Imaging 2060-334	4
Visual Imaging Electives ‡ (or Materials & Processes)	9-11
Liberal Arts (Core) *	12
Physical Education †	0
<b>Third Year</b>	
Photography as a Fine Art I 2060-401, 402, 403	12
Art & Civilization 2039-225, 226, 227	9
Contemporary Issues 2060-411, 412, 413	6
Visual Imaging Electives ‡	9-12
Liberal Arts (Concentration) *	12
<b>Fourth Year</b>	
Photography as a Fine Art II 2060-501, 502, 503	16
Contemporary Art 2039-380	3
Visual Imaging Electives ‡	11-12
Liberal Arts (Electives) *	12
Liberal Arts (Senior Seminar) *	2
<b>Total Quarter Credit Hours</b>	<b>187-193</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Visual imaging electives may be any CIAS course (photo, art, printing, etc.)

# School of Printing Management and Sciences

C. Harold Gaffin, Director

The School of Printing Management and Sciences offers a complete array of programs based on the concepts needed in all printing industry jobs and encourages customized study in other courses to develop individual talents and interests. The completeness of a student's professional education in the School of Printing Management and Sciences differentiates RIT's programs from those at other colleges.

The school's facilities are unsurpassed: students learn with more than \$33 million worth of up-to-date equipment in 15 laboratories and 44,000 square feet of facilities.

## Scholarships and financial aid

Our large number of successful graduates testifies to the value of RIT's printing programs. No student interested in attending the School of Printing Management and Sciences should consider another school without first discussing financial questions with an expert in either the Financial Aid or Admissions office.

The school enjoys substantial scholarship support from alumni and industry. More than 55 scholarships are available to School of Printing Management and Sciences students through the Financial Aid Office, and the school itself administers a number of other scholarships that are awarded to entering freshmen and upperclassmen on the basis of previous performance.

The Education Council of the Graphic Arts Industry also offers scholarships. Application should be made by high school students early in their senior year, because the scholarships involve competitive exams. If information is not available from the high school, candidates may write to:

National Scholarship Trust Fund  
3515 Forbes Ave.  
Pittsburgh, PA 15213

Students who have completed high school should also contact the council. Many types of scholarships are available for students pursuing an education in graphic arts.

In addition to scholarships and other financial aid, students frequently find part-time employment in various positions on campus. The school employs students as laboratory assistants. These positions are filled on the basis of merit, but many of them are restricted to students needing financial aid. Also, part-time work may be available in the Rochester area in private printing firms and in such RIT-affiliated organizations as the Technical and Education Center of the Graphic Arts and Imaging and the Research Corporation. Finally, in addition to its educational benefits, cooperative education gives some students the ability to pay part of their college costs with money earned at work.

## Cooperative education

The cooperative work/study program (co-op) is an important educational feature required in all programs for at least two quarters. Co-op work/study enlarges and improves a college education by combining formal classroom learning with practical work experience. Its main purpose is educational, but in many cases students also use it to help pay the cost of college. The Office of Cooperative Education and Placement helps students find co-op and permanent placements with a large number of firms.

A wide range of opportunities is available. Students have been employed by federal agencies, industrial organizations, commercial printers, the publishing industry and service industries for the printing trade in all areas of production, customer service and plant operations. There are no restrictions on geographic location as long as the position is related to the graphic arts area and approved by the school. Students have been employed all over the United States and in foreign countries. Three students each quarter currently co-op as printing specialists on the *Queen Elizabeth II* cruise ship.

## Transfer credits

RIT encourages transfer students from other colleges and programs by granting the maximum possible transfer credit. Call the school at 716-475-2712 for up-to-date information, transfer recommendations, and other details about transfer credit.

# Printing Management

William H. Birkett, Coordinator

Prospective students should look at all of the school's degree programs before making a choice. The school offers other programs to meet important and specific industry needs (described on succeeding pages), but the printing management program attracts 80 percent or more of students enrolled in the School of Printing Management and Sciences. It allows students the greatest flexibility in customizing their programs for the careers they seek.

This program is based on a solid foundation in technical areas important to the printing industry as well as course work in relevant management disciplines. In addition, it makes available many electives from the management or technical subject areas which can be chosen according to the individual's career goals.

## Program of study

The curriculum includes a broad base of 13 core printing courses in the first two years followed by maximum flexibility through the choice of major and minor professional electives in the last two years.

First-year printing courses include an introduction to the graphic communications industry, information formatting, the lithographic process and two classes devoted to graphic arts software tools. These are supplemented by three mathematics courses that cover material needed in later management and technology courses, two courses in chemistry and four in liberal arts. The math and chemistry courses specified in the curriculum are minimum requirements. Students with good backgrounds in these subjects are encouraged to take higher-level courses to enhance their overall education. The liberal arts program is described in greater detail on page 10.

In the sophomore year, the technology base begun in the first year is extended by courses in imaging technology, electronic communications, finishing and distribution systems, ink and substrates, a third class in graphic arts software tools and one additional process course chosen from flexography, gravure, screen or digital printing. The student is introduced to the business side of the industry through a management overview course that lays the groundwork for a minimum of four managerial courses taken in the third and fourth years. Technical writing rounds out the required professional core. In addition, all students are required to take three courses in liberal arts and two courses in college physics. They may choose a third course in either physics or economics according to their interests.

## Professional major and minor

The third and fourth years involve many professional elective courses plus seven liberal arts courses. Prior to the beginning of the junior year, each student will be required to declare a major and a minor. The student may choose a major in either printing management or printing technology. If the student selects the printing management major, then he or she will be required to complete a minor in printing technology. Conversely, if the student selects a printing technology major, he or she will be required to complete a printing management minor.

A major consists of a minimum of 33 quarter credit hours (nine to 11 courses). A minor consists of a minimum of 16 quarter credit hours (four to six courses). In addition to meeting the major and minor requirements, students must complete at least 12 additional quarter credit hours of professional electives to meet the minimum of 180 quarter credit hours required for the degree. These latter electives may be used to expand a student's area of interest or sample courses from other RIT colleges. The School of Printing Management and Sciences, however, offers more than 60 elective courses.

A printing technology major must take the 33 quarter credit hours from School of Printing Management and Science technical courses. A printing management major must take the 33 quarter credit hours from either School of Printing Management and Sciences management courses or appropriate College of Business courses including one course from each of the following four areas:

- 2080-301 Financial Controls (3 cr.) or
- 0101-301 Financial Accounting (4 cr.)
- 2080-302 Print Planning Concepts (3 cr.) or
- 0105-463 Principles of Marketing (4 cr.)
- 0102-350 Principles of Managerial Leadership (4 cr.)
- 2080-383 Economics of Production Management (4 cr.)

A printing technology minor must take the minimum 16 quarter credit hours from the School of Printing Management and Sciences technical course list. A printing management minor must take the minimum 16 quarter credit hours from either School of Printing Management and Sciences management courses or appropriate College of Business courses including one course from each of the same four areas listed above for the printing management major. Students work closely with faculty advisers to put together a sequence of courses for both the major and minor that best supports their career objectives and interests.

## Printing management, BS degree, typical course sequence\*

First Year	Quarter Credit Hours
Student Seminar 2080-001	0
Intro. to Graphic Communication Industry 2081-254	3
Information Formatting 2081-255	3
Lithographic Process 2081-367	3
Graphic Software Tools I 2081-216	1
Graphic Software Tools II 2081-217	1
Algebra for Management Sciences 1016-225	4
Calculus for Management Sciences 1016-226	4
Data Analysis 1016-319	4
Fundamentals of Trigonometry 1016-220 †	1
Chemical Foundations I, II 1011-281, 282	8
Liberal Arts (Core) ‡	16
Physical Education §	0
<b>Second Year</b>	
Elect. Comm. in Print & Publ. 2080-319	3
Imaging Technology 2081-321	3
Graphic Software Tools III 2081-218	1
Graphic Comm. Distribution Systems 2081-317	3
Printing Process Course—Choice #	3
Management Overview of G.A. Industry 2080-323	3
Ink & Substrates 2081-316	3
Technical Writing 2080-317#	3
College Physics I, III & Labs 1017-211/271, 213/273	8
College Physics II & Lab 1017-212/272	
or	
Principles of Economics I or II 0511-301 or 302	4
Liberal Arts (Core) ‡	12
Physical Education §	0
<b>Third Year</b>	
Printing Major	17
Printing Minor	9
Professional Elective	4
Liberal Arts (Concentration) ‡	12
Cooperative Education	Co-op
<b>Fourth Year</b>	
Printing Major	16
Printing Minor	7
Professional Electives	8
Liberal Arts (Electives) ‡	12
Liberal Arts (Senior Seminar) ‡	2
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* Approval pending

† Required only for those students lacking trigonometry.

‡ See page 10 for liberal arts requirements.

§ See page 11 for policy on physical education.

# Students choose one from flexography, gravure, screen or digital printing courses.

# Students must satisfy the Writing Competency requirement prior to graduation, either by a grade of B or higher in Technical Writing II or by passing the Writing Competency test given each quarter.

# Accelerated BS/MBA in Printing Management Dual Degree Program

Barbara A. Birkett, Coordinator

This is a joint program made available by the faculties of the School of Printing Management and Sciences and the College of Business that will enable students to receive a BS in printing management and a master of business administration in five years. Students who qualify for this joint program will receive a waiver for up to six MBA core courses for specific undergraduate management courses completed with a grade of B or better.

Students interested in this two-degree program should notify their faculty advisers as early as possible during their undergraduate program. Detailed information on selecting courses that meet the program requirements will be provided at that time. Students would apply for admission to the BA program near the end of their undergraduate program. They must meet the admission requirements for the College of Business MBA degree. Part of that requirement includes meeting minimum Graduate Management Admission Test and undergraduate grade standards. Students must satisfy all of the requirements for the BS in printing management to be awarded that degree and all requirements of the MBA degree to receive that degree. Each degree will be awarded to the student as soon as all requirements for that degree have been satisfied.

## Printing Systems\*

Students interested in engineering should consider the printing systems program. Printing systems combines engineering course work with a rigorous preparation for management careers in one of America's largest high-tech industries. These careers involve a mixture of high technology and human factors that many people find rewarding and exciting.

Two quarters of cooperative education are required to fulfill school requirements, but most students in this program find it feasible and desirable to take four or more quarters. Therefore, the course list illustrates completion of the program in five years.

Applicants must meet the admission requirements of both RIT's College of Engineering and the School of Printing Management and Sciences.

### Program of study

The printing systems curriculum features strong courses in printing, industrial or electrical engineering, mathematics, science and liberal arts. Printing courses provide depth and breadth in technology as well as important studies in managing and working with people. During the second year, students begin either industrial engineering or electrical engineering courses.

The industrial engineering courses deal with design and installation of integrated systems of people, materials and equipment. Through these courses, printing systems students become expert in understanding and using computers in both manufacturing and management: for example, in plant layout, process development and control of manufacturing systems with robots and conveyors.

The electrical engineering sequence provides a sound education in the electronics of printing equipment and transmission systems. Printing equipment manufacturers and very large printing companies are interested in graduates with this electrical engineering background.

### Printing systems, BS degree,\* typical course sequence

First Year	Quarter Credit Hours
Student Seminar 2080-001	0
Professional Electives	12
Calculus 1016-251, 252, 253	12
College Chemistry 1011-208, 209	8
Liberal Arts (Core) †	16
Physical Education ‡	0
<b>Second Year</b>	
Financial Controls 2080-301	4
Printing Planning Concepts 2080-302	4
Professional Engineering Specialty §	8
Calculus 1016-305	4
Probability 1016-351	4
University Physics 1017-311, 312, 313	12
University Physics Lab 1017-375, 376, 377	3
Liberal Arts (Core) †	8
Physical Education ‡	0
<b>Third Year</b>	
Professional Engineering Specialty §	20
Liberal Arts (Concentration/Elective) †	12
Cooperative Education	Co-op
<b>Fourth Year</b>	
Professional Engineering Specialty §	8
Professional Electives #	12
Technical Writing 2080-317**	3
Liberal Arts (Concentration/Elective) †	8
Cooperative Education	Co-op
<b>Fifth Year</b>	
Professional Engineering Specialty §	4
Professional Electives #	18
Liberal Arts (Elective) †	8
Liberal Arts (Senior Seminar) †	2
<b>Total Quarter Credit Hours</b>	<b>190</b>

\* This program has been recommended for discontinuance, which is pending approval by the Institute's governing bodies. If discontinuance is approved, admission to the program will be limited to the 1996-97 academic year. No admission will occur beyond that time.

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

§ Professional engineering specialty courses

# Professional electives must include one course in each of these areas: aesthetics, printing materials, printing processes, imaging, print finishing.

\*\* Students must satisfy the Writing Competency requirement prior to graduation, either by a grade of B or higher in Technical Writing II or by passing the Writing Competency test given each quarter.

### Industrial Engineering

#### Second Year

Applied Statistics I 1016-352  
Computing for Ind. Eng.  
0303-202

#### Third Year

Operations Research I 0303-401  
Human Factors I 0303-415  
Work Measurement 0303-420  
Systems & Facilities 0303-422  
Safety Engineering 0303-550

#### Fourth Year

Simulation 0303-503  
Regression Analysis 0303-511

#### Fifth Year

Production Control 0303-482

### Electrical Engineering

#### Second Year

Differential Equations 1016-306  
C Programming for Engineers  
0301-345

#### Third Year

Numerical Methods 0301-310  
Circuits I 0301-351  
Circuits II 0301-352  
Engineering Mathematics  
1016-328

Complex Variables 1016-420

#### Fourth Year

Signals & Systems 0301-453  
Intro. to Communication  
0301-534

#### Fifth Year

Digital Signal Processing  
0301-554

# Newspaper Operations Management

Owen Smith, Coordinator

The printing and publishing industries are undergoing dynamic technological changes. Within the newspaper industry, changes are particularly drastic, completely altering how things are accomplished. In addition, advances in technology and market penetration of related information-handling systems result in greater competition in the areas of reader interest and advertising appeal. These advances have made it imperative to alter not only the way in which a newspaper is printed and distributed but also the very method by which the information is prepared and processed—perhaps even what will be produced. The earlier distinctions among editorial, advertising and production blur as production becomes a function of advertising and editorial preparation, a direction enveloping previously distinct functions as well. These trends will result in the integration of these departments into a single entity utilizing a computer system to handle, transmit and process information and then to control production and delivery.

This new approach requires new abilities and expertise of the people who would guide this changing industry. Graduates of the newspaper operations management program will be well prepared to compete with the existing pools of talent and expertise as the functions of production merge with those of other departments.

The graduate with a BS degree in newspaper operations management has numerous career choices within the newspaper industry. Many young people find entry positions as production assistants, assistant business managers, technical specialists with suppliers and computer specialists. These can lead to positions of production director, director of data processing, operations director, business manager, quality control manager and publisher. All of these positions present a distinct challenge in an industry undergoing vast technological change.

## Program of study

The newspaper operations management program is a four-year course of study leading to a bachelor of science degree. The program stresses management, engineering, sciences, and computer printing technology, as well as liberal arts.

Each student must take mathematics, chemistry and physics. Placement will be determined through testing and a review of the student's academic background. Preparatory math courses are available if needed. Students with strong science and math backgrounds are encouraged to complete high-level courses in these areas to enhance their overall education.

## Professional electives

Students elect courses to suit their individual interests and objectives and to meet the credit requirements of the program. Selection is subject to prerequisite requirements and availability of courses. Twenty-four elective credits are required.

## Newspaper operations management, BS degree, typical course sequence

	Quarter	Credit Hours
<i>First Year</i>		
Student Seminar 2080-001		0
Intro. to Graphic Communication Industry 2081-254		3
Information Formatting 2081-255		3
Imaging Technology 2081-321		3
Newspaper Seminar I, II, III 2080-211, 212, 213		3
Algebra for Management Science 1016-225		4
Calculus for Management Science 1016-226		4
Data Analysis 1016-319		4
Fundamentals of Trigonometry 1016-220 *		1
Chemical Foundations I, II 1011-281, 282		8
Liberal Arts (Core) †		16
Physical Education ‡		0
<i>Second Year</i>		
Printing Financial Controls 2080-301		3
or		
Financial Accounting 0101-301		4
Printing Planning Concepts 2080-302		3
or		
Principles of Marketing 0105-363 §		4
Principles of Managerial Leadership 0102-350		4
Graphic Software Tools I, II, III 2081-216, 217, 218		3
Newspaper Design 2081-306		3
Technical Writing I 2080-317 #		3
Newspaper Production I 2081-307		3
Adv. Concepts of Newspaper Prod. Systems 2081-308		3
College Physics I, III & Labs 1017-211/271, 213/273		8
College Physics II 1017-212/272		
or		
Principles of Economics 0511-301 or 302		4
Liberal Arts (Core) †		12
Physical Education ‡		0
<i>Third Year</i>		
Ink & Substrates 2081-316		3
Circulation & Mailroom 2081-411		3
Dynamics of Personal Leadership 2080-404		3
Elect. Comm. in Printing & Publ. 2080-319		3
Image Capture & Analysis 2081-401		3
Color Separation Systems 2081-409		3
Labor Relations 2080-421		4
Newspaper Presses 2081-408		3
Professional Electives		13
Liberal Arts (Concentration) †		12
Cooperative Education		Co-op
<i>Fourth Year</i>		
Legal Problems in Printing & Publishing 2080-501		4
Systems Planning 2080-502		4
Newspaper Management 2080-503		4
Professional Electives		14
Liberal Arts (Electives) †		12
Liberal Arts (Senior Seminar) †		2
<b>Total Quarter Credit Hours</b>		<b>188-190</b>

\* Required only for those students lacking trigonometry.

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

§ Student must be junior status or above to enroll in this course. See adviser for scheduling.

# Students must satisfy the Writing Competency requirement prior to graduation, either by a grade of B or higher in Technical Writing II or by passing the Writing Competency test given each quarter.

# Printing and Applied Computer Science

Frank Cost, Coordinator

In recent years computers have become widely used in most areas of the graphic arts industry. From typesetting to management information and from inking systems to automated bindery operations, computers in the graphic arts have created a need for personnel with an in-depth knowledge of both printing and computer science. Recognizing this need, the School of Printing Management and Sciences, in cooperation with the department of computer science, established the printing and applied computer science program for students who want to combine both fields.

A survey of employers in the graphic arts industry indicates the strong need for trained printing/computer specialists. As more and more graphic firms adopt computer technology, the need will grow for personnel who can develop and utilize equipment, interpret the graphic arts industry to the computer industry, apply computers to printing processes, manage computer systems and work with vendors.

Many career opportunities are open to graduates with a BS degree in printing and applied computer science. These include data processing supervisor; computer systems analyst; customer training, marketing support and sales for computer-based printing equipment manufacturers; and custom software design and development. These positions can lead to management responsibilities as production manager, director of computer technology and operations manager—all stepping stones to top management opportunities.

Two quarters of cooperative education are required to full-fill school requirements, but most students in this program find it feasible and desirable to take four or more quarters. Therefore, the accompanying chart illustrates completion of the program in five years.

Requirements for admission are given in the general information section of this bulletin. Students must meet the requirements of RIT's School of Computer Science and Information Technology.

Students may transfer into this program from two-year college computer science, computer science transfer, math/science transfer programs or other comparable programs. Transfer students find that many of their two-year college credits are applicable toward the four-year degree.

## Program of study

The School of Printing Management and Sciences offers a four-year course leading to a bachelor of science degree in printing and applied computer science.

Approximately 20 percent of the course work is in computer science, 30 percent in printing technology and management, 25 percent in math and science, and 25 percent in liberal arts.

The first-year curricula of this program and the printing systems program are practically the same. Therefore, a student may transfer between the programs at that time with no loss of credit.

## Professional electives

Students may elect professional courses in printing or computer science and information technology to complete their elective course requirement.

## Printing and applied computer science, BS degree, typical course sequence

First Year	Quarter	Credit Hours
Student Seminar	2080-001	0
Intro. to Graphic Communication Industry	2081-254	3
Information Formatting	2081-202	3
Lithographic Process	2081-367	3
Imaging Technology	2081-321	3
Computer Science I, II, III	0603-231, 232, 233	12
Calculus I, II, III	1016-251, 252, 253	12
Liberal Arts (Core) *		12
Physical Education †		0
<b>Second Year</b>		
Printing Financial Control	2080-301	4
Printing Planning Concepts	2080-302	4
Principles of Managerial Leadership	0102-350	4
Intro. to Software Engineering	0603-312	4
Data Organization and Management	0603-325	4
Calculus IV	1016-305	4
Discrete Math	1016-265	4
Probability & Statistics	1016-351	4
University Physics I, II & Lab	1017-311, 312	10
Liberal Arts (Core) *		8
Physical Education †		0

Third-Fifth Years

Technical Writing 2080-317 ‡	3
Data Communications Systems 0603-420	4
Digital Computer Organization 0603-315	4
Probability & Statistics 1016-352	4
Ink & Substrates 2081-316	3
Applied Database Management 0602-483	4
Graphic Communication Distribution Systems 2081-317	3
Electronic Communications in Printing/Publishing 2080-319	4
Quality Control in Graphic Arts 2081-416	3
Human Factors 0602-425	4
Intro. to Computer Graphics 0603-570	4
Web Offset 2081-414	3
Professional Electives	21
Liberal Arts (Core) *	8
Liberal Arts (Senior Seminar) *	2
Liberal Arts (Concentration) *	12
Liberal Arts (Elective) *	12
Cooperative Education (2 quarters required)	Co-op
<b>Total Quarter Credit Hours</b>	<b>193</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Students must satisfy the writing competency requirement prior to graduation, either by a grade of B or higher in Technical Writing II or by passing the writing competency test given each quarter.

### Certificate of Achievement Programs

The School of Printing Management and Sciences offers two certificate programs for part-time students. Designed to provide course work in specific areas for those with a graphic arts interest, these certificate programs can be completed in two to two-and-a-half years of evening study. The certificates can stand alone or be used as an area of concentration in the College of Continuing Education's applied arts and sciences associate and bachelor's degree programs.

In addition, full-time undergraduate students in nonprinting programs at RIT are encouraged to investigate the ways these courses could complement their degree program.

Whether you are a full- or part-time student, graphic arts courses provide unique tracks that combine well with graphic design, liberal arts and communications, computer science and photography.

For additional information and advising, contact Archie Provan at 716-475-2052.

#### Desktop Design and Publication

This sequence of courses is designed for individuals new to the desktop environment as well as for those who have experimented with publication production using personal computers. The program provides students with a solid foundation in design and typographic principles. Advanced courses enable students to apply those principles using desktop tools and to expand their individual design abilities. Additional courses focus on the production, finishing and distribution of the images created.

Quarter Credit Hours

Design & Typography Fundamentals 2081-225	3
Principles of Copy Preparation 2081-256	3
Print Finishing & Distribution 2081-317	3
Applications of Printing Design 2081-382	3
Image Capture & Analysis 2081-401	3
Desktop Prepress Systems 2081-561	3
Elective *	3-4
<b>Certificate Total</b>	<b>21-22</b>

\* Usually chosen from 2081 courses; courses such as Color Separation Systems and Lithographic Process, or other courses from the electronic color imaging certificate program, are recommended. See adviser for other choices.

#### Electronic Color Imaging

This program acquaints students with both conventional and emerging digital imaging systems. The courses help prepare students for positions in the color printing market in occupations such as prepress manager, color reproduction specialist, technical service or customer service representative, and other technical and managerial functions in the graphic arts industry.

Quarter Credit Hours

Intro. to Graph. Comm. Industry 2081-254	3
Image Capture & Analysis 2081-401	3
Color Separations Systems 2081-409	4
Techniques of Image Assembly 2081-366	3
Lithographic Process 2081-367	3
Electronic Color Imaging & Color Controls 2081-572	3
Elective *	3
<b>Certificate Total</b>	<b>22</b>

\* Usually chosen from 2081 courses; courses such as Desktop Prepress Systems and Lithographic Press Problems, or other courses from the desktop design and publication certificate are recommended. See adviser for other choices.

# College of Liberal Arts

*Dr. William J. Daniels, Dean*

While the College of Liberal Arts offers degree programs in criminal justice, economics, social work, professional and technical communication, and psychology, as well as the technical and liberal studies option (all described in the following pages), it plays another role at RIT that affects the education of every student.

The courses that all students take in the College of Liberal Arts provide a comprehensive education that develops their potential as intellectually aware and responsible human beings. Liberal arts courses form the foundation for students' entire educational experience. Liberal education is distinguishable from professional education in that its purpose is not to nurture specifically professional knowledge or skills, but rather to increase and enhance each student's capabilities as a thinking, creating and socially responsible person.

The program aims to:

- Develop the ability to think rationally, read critically, and speak and write cogently and clearly;
- Develop the ability to analyze issues, question assumptions, investigate problems and seek solutions;
- Develop understanding of aesthetic values and their relevance;
- Expand intellectual horizons by acquaintance with the western heritage;
- Develop awareness of how the past inevitably affects the present and future;
- Promote understanding of our society and how it interrelates with and is indebted to other cultures, thereby liberating the student from narrow provincialism;
- Acquaint students with knowledge of the basic principles and dynamics of individual and group behavior in the many areas of human interaction;
- Develop understanding of the nature of ethical values;
- Develop awareness of the social, ecological and ethical consequences of technology and foster a sense of responsibility to self and society;
- Develop the ability to bring together varied insights and methods of analysis for the purpose of better understanding complex human and social problems.

These goals are fostered throughout a student's education at RIT by the liberal arts curriculum, which offers each student the opportunity to acquire these abilities and understandings through courses in the humanities and social sciences. (See page 10 for specific requirements.) In addition to regular courses a student may engage in independent studies. These are planned by both student and instructor and provide an opportunity for the student to develop initiative and imagination in a flexible program of study.

The college and its faculty are active outside the classroom, sponsoring musical events and symposia to provide a wide range of cultural and academic experiences for the entire RIT community.

Included in the college are undergraduate degree programs in criminal justice, social work, economics, professional and technical communication, psychology, and the technical and liberal studies option, which are described later in this bulletin. The close involvement of these programs with instruction in the liberal arts is an example of what the college endeavors to do throughout the curriculum; that is, to demonstrate the interrelation of all fields of learning.

The college also offers the master of science degree in school psychology.

### Faculty

The faculty of the college is selected nationally from candidates with advanced study in the social sciences and humanities. These men and women are dedicated teachers who have chosen as their professional goals the provision of rich and meaningful teaching and learning experiences for students and continuing growth in their scholarly fields.

### Liberal arts program advising

The College of Liberal Arts is committed to providing faculty academic advisers for students in criminal justice, professional and technical communication, psychology, social work and economics throughout their academic program. Upon arrival at RIT, each student is assigned a faculty adviser who helps formulate career goals and the related field of study and who offers support in dealing with registration and scheduling. In addition the administrative staff of the college can provide referrals to other support areas within RIT.

### Liberal education advising

The Office of Academic Advising within the College of Liberal Arts offers support to all RIT students in the selection of the liberal education courses required for their degrees. The office, located in room 2102 in the Liberal Arts Building, provides advising that is consistent with the general education policies of the College of Liberal Arts (see page 10). Students are served on a walk-in basis during open advising hours, which are posted on the office door and on bulletin boards in all academic departments. The office also evaluates liberal arts courses for transfer credits for all RIT students.

### Part-time students and evening programs and courses

The College of Liberal Arts offers in the evening many of the upper-division humanities and social science courses, as well as the core courses, required in the baccalaureate programs of part-time evening students. These courses are part of the liberal arts curriculum expected of all RIT students pursuing a bachelor's degree.

Courses are scheduled one or two nights a week, Monday through Thursday, or on Saturday. Each course is four academic quarter credits, except the Senior Seminar, which is two credits. Part-time students are welcome to register for liberal arts courses offered during daytime hours if their schedules permit. Diploma or certificate courses will not normally be used toward completion of liberal arts requirements.

It is not necessary to be enrolled in an RIT degree program to register for liberal arts courses on a part-time basis. Part-time and evening students are strongly encouraged to contact either the Liberal Arts Academic Advising Office (716-475-6987) or Scheduling Office (716-475-5267) for assistance in selecting and registering for courses. Both offices are located on the second floor of the College of Liberal Arts.

### Summer

The College of Liberal Arts offers a number of courses each summer in language and literature, science and humanities, and social science, as well as degree program courses in criminal justice, psychology, social work, economics and communication.

Information concerning summer courses can be obtained by contacting the college scheduling officer or by requesting the Summer Bulletin from the Office of Part-time Enrollment Services (716-475-2229), located in the Bausch & Lomb Center on campus.

# Criminal Justice

Richard B. Lewis, Department Chairperson

The bachelor of science degree program in criminal justice offers students a broad education with a curriculum designed to prepare them for a wide range of careers in criminal justice, to provide continuing education for those professionals already employed in criminal justice and to offer a strong academic foundation for graduate school.

RIT's approach to the study of criminal justice combines theoretical perspectives with practical experience. As students study in the areas of crime, criminal behavior, social control mechanisms, administration, planning and management, the emphasis is on problem-solving techniques based on the rapidly growing body of research in the field, as well as students' own guided research.

The program is unique in its broad core curriculum, the scope of professional course offerings and an intensive field experience, where students blend knowledge gained in required and elective courses with a career-oriented internship.

### Career planning

Upon acceptance into the criminal justice program, each student is assigned a faculty adviser who assists in formulating career goals and planning a field of study in accordance with those goals.

Through core courses, students are exposed to the widest possible range of perspectives from which to view crime and the nature of criminal justice administration, thus broadening their career options.

During the junior and senior years, with faculty guidance, students select professional electives in a specific area of interest from courses offered within the program, within the college or in any of RIT's other seven colleges. Criminal justice faculty offer concentrations in criminology, law enforcement, law corrections and security. Other concentrations, planned according to individual career goals, may include courses in computer science, management, photography, liberal studies and social work.

### Career opportunities

Program alumni have entered a variety of careers in the criminal justice system directly following graduation or after completing graduate studies. Many graduates are engaged in law enforcement careers in agencies at all levels of government. A substantial number are employed by the Rochester Police Department, the Monroe County Sheriff's Department and suburban departments throughout the area. At the state and federal level, graduates are pursuing careers in such agencies as the Federal Bureau of Investigation, Secret Service, Marshall's Service, Naval Intelligence Service, Customs, Border Patrol, Immigration and Naturalization Service, Centers for Disease Control, Department of the Interior and National Park Service, among others. A number have advanced in rank to positions of command, including several chiefs and deputy chiefs.

Other alumni work as correctional officers, counselors, probation officers and parole officers, and some have advanced to administrative positions. A significant number have completed law school and entered the legal profession as prosecutors, public defenders, in private practice, or in the state or the U.S. attorney generals' offices. Others serve the legal profession as investigators or paralegals.

Consistent with the liberal arts/social science nature of the program, some graduates have attained advanced degrees in related areas and entered teaching careers at the secondary and college levels. Others have become psychologists, social workers, drug and alcoholism counselors, youth service specialists, and victim assistance and rape crisis counselors. Some have completed advanced degrees in business, public policy, public administration, criminology and criminal justice.

### **Prelaw study**

The criminal justice curriculum prepares students for law school by combining a broad liberal arts background with intensive study in criminal justice. Students work closely with a faculty adviser in selecting appropriate professional and liberal arts electives. During their senior year, prelaw students spend 10 weeks, 30 hours per week, as interns working with attorneys in the office of the district attorney, public defender or state attorney general; private law firms; or in any number of public or private organizations dealing with litigation. The Prelaw Association, comprising interested RIT students, publishes student research papers each year in *Legal Research at RIT*.

### **Field experience**

During the senior year, students have the opportunity to choose an internship from a number of agencies and organizations in the areas of law, law enforcement, institutional and noninstitutional corrections, courts, juvenile advocacy and counseling programs, and security. For one quarter (10 weeks), 30 hours per week, students work under an agency field supervisor and, at the same time, attend a field seminar and a class in planning and change with peers who are doing field placements in other agencies. Placements are individualized to fit a student's career objectives.

### **Cooperative education**

Students have the opportunity to participate in co-op as part of their undergraduate program. In general, they may apply for co-op employment after three quarters of full-time study in criminal justice at RIT. Cooperative education provides a working experience in a criminal justice-related field, but does not carry academic credit hours.

### **The faculty**

The seven full-time faculty in the criminal justice program hold advanced degrees, have had professional experience in criminal justice, have proven teaching ability and are committed to continuing professional growth in their areas of expertise. Their offices are conveniently located, and they spend many nonteaching hours in their offices with an open-door policy in order to assist students with academic or personal concerns and questions.

### **Professional elective options**

One of the strengths of the program is that students may elect to take professional electives from other designated colleges in the Institute and are thus able to develop a concentration in a professional area related to their career goals.

The following professional electives illustrate those offered periodically within the program. A student selects professional elective courses with the advice of his or her faculty adviser.

### **Corrections**

- Constitutional Law
- Legal Rights of Convicted Offenders
- Correctional Administration
- Social Control of Deviant Behavior
- Counseling in the Criminal Justice System
- Alternatives to Incarceration
- Sentencing Process

### **Criminology**

- Organized Crime
- Social Control of Deviant Behavior
- White-Collar Crime
- Victimless Crime
- Computer Crime
- Women and Crime

### **Law**

- Introduction to Para-Legal
- Constitutional Law
- Legal Rights of Convicted Offenders
- Social Control of Deviant Behavior
- Evidence
- Court Administration
- Comparative Criminal Law
- Sentencing Process
- Victimless Crime
- Seminar in Law

### **Law Enforcement**

- Administrative Concepts of Law Enforcement
- Organized Crime
- Investigative Techniques
- Constitutional Law
- Civil Disobedience and Criminal Justice
- White-Collar Crime
- Evidence
- Police Community Relations
- Victimless Crime
- Hostage Taking and Terrorism
- Substance Abuse
- Stress
- Forensic Photographic Evidence
- Management in Criminal Justice
- Computer Crime

### **Security**

- Organized Crime
- Investigative Techniques
- White-Collar Crime
- Physical Security and Safety
- Retail Security
- Computer Crime
- Security Management
- Seminar in Security

### **Related professional areas**

With the approval of the faculty adviser, a student may select an additional professional elective concentration from courses offered within the College of Liberal Arts or in any of the other colleges of the Institute. Many students develop special concentrations in accounting, computer science, management or social work.

**Criminal justice, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Criminal Justice System 0501-201	4
English Composition 0502-220	4
Criminology 0501-203	4
Liberal Arts Core *	12
Computer Applications in Criminal Justice 0501-406	4
Corrections 0501-207	4
Law Enforcement in Society 0501-303	4
Mathematics/Science ‡	12
Physical Education †	0
Cooperative Education (Optional)	
<i>Second Year</i>	
Juvenile Justice 0501-309	4
Professional Elective (e.g., Liberal Arts: Social Science)	4
Public Administration 0501-204	4
Concepts in Criminal Law 0501-301	4
Judicial Process 0501-304	4
Professional Elective (e.g., Investigative Techniques)	4
Liberal Arts Core *	12
Mathematics/Science ‡	12
Physical Education †	0
Cooperative Education (Optional)	
<i>Third Year</i>	
Seminar in Law Enforcement 0501-526	4
Professional Elective (e.g., Forensic Photographic Evidence)	4
Professional Elective (e.g., Hostage Taking & Terrorism)	4
Liberal Arts Electives/Concentrations *	12
Seminar in Corrections 0501-411	4
Professional Elective (e.g., Constitutional Law)	4
Scientific Methodology 0501-401	4
Professional Elective (e.g., Investigative Techniques)	4
Professional Elective (e.g., Evidence or Substance Abuse)	4
Professional Electives (e.g., Management in Criminal Justice)	4
Cooperative Education (Optional)	
<i>Fourth Year</i>	
Field Experience (See C. J. Handbook) 0501-403	4
Field Seminar (See C. J. Handbook) 0501-404	4
Planning & Change in C. J. System 0501-514	4
Liberal Arts Senior Seminar 0520-501 *	2
Etiology of Crime 0501-528	4
Research Methods in Criminal Justice 0501-541	4
Liberal Arts Electives/Concentrations *	12
Professional Elective (e.g., Seminar in Law)	4
Professional Elective (e.g., Computer-Related Crime)	4
<b>Total Quarter Credit Hours</b>	<b>186</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ See page 11 for mathematics/science requirements.

## Social Work

Helen Wadsworth, Department Chairperson

RIT's social work program, established in 1971, provides excellent educational and practical preparation for professional social work practice at one of the most technologically current educational institutions in the country, with a state-of-the-art computer network available to all students.

Accredited by the Council on Social Work Education, the baccalaureate social work program prepares students for entry into beginning-level social work practice in public and private settings offering assistance to individuals, families, groups and communities.

The social work profession is dedicated to the improvement of the human condition. Thus, course work is organized in five basic areas: understanding of human behavior and interaction within the social environment; knowledge of social programs, policy processes and the profession; professional practice methodology and skills; professionally supervised internship in a social agency; and research and evaluation of practice.

RIT's social work program is known for an unusually wide selection of professional courses and a full-time intensive field instruction internship. Each social work student is assigned a faculty adviser to assist with academic planning and career guidance throughout the course of study.

We believe that social workers have a dual role in the process of social change: they directly serve the needs of individuals, families, groups and communities, and they work on behalf of clients to effect change in policies, legislation and society.

### Personal growth

The social work curriculum encourages personal growth as an essential aspect of professional growth. In various courses students learn to increase their own self-awareness, to define their values, to understand and respect the values of others, and to develop the personal and professional strengths necessary for social work practice.

### Curriculum

The social work curriculum aims to develop an understanding of society and people's needs. Students learn how the institutions of society contribute toward resolving problems and may sometimes aggravate them.

Students become well grounded in human behavior and the social environment from psychological, sociological and biological perspectives. This gives them an understanding, on which they can base their social work practice, of how people develop and interact with their environments.

Students take a sequence of courses that introduces them to the concepts of social work practice and teaches fundamental skills needed to work successfully with individuals, families, groups and the community to solve problems and resolve conflict. RIT's program has a strong focus on research skills and the appropriate use of computers in analyzing data from social work practice.

### Social work program and deafness: a unique opportunity

The National Technical Institute for the Deaf (NTID) at RIT provides a special opportunity for students and faculty in the social work program. Because of the close relationship with NTID, RIT's social work program offers an unsurpassed education in working with the deaf community; preparing deaf students for social work careers; increasing sensitization and responsiveness of future professionals, hearing and deaf, to the needs of disabled persons; and offering deaf and hearing students the opportunity to study the applications of social work to the needs of deaf persons.

### Professional electives

Elective courses offer social work students knowledge about and preparation for work in the areas of family violence; services for children, families, deaf individuals and the elderly; alcoholism and substance abuse; mental health; and legal aspects of social work.

### Career and placement focus

Like all programs at RIT, our focus is on careers. We prepare students to enter directly into meaningful and rewarding positions in governmental and voluntary social agencies.

Graduates of the social work program receive advanced standing at most graduate schools of social work in the country. This means they can complete a two-year MSW program in only one year.

Graduates have found their RIT field placement experiences to be extremely helpful in making career decisions and in obtaining jobs. In addition, the resources of RIT's Office of Cooperative Education and Placement are available to all of our students.

**Transfer students**

Transfer students are evaluated and given credit for previous education wherever it is most appropriate. Transfer students with two-year degrees in human services or related programs are given credit for their studies and can expect to complete the social work program in two years.

**Field instruction**

Field instruction is an important part of the program. During the senior year, students complete an internship in a social agency. Supervised by a professional social worker and supported with integrated academic courses, they learn to apply the knowledge and skills acquired in the classroom.

During two academic quarters, students spend 30 hours per week in a social agency or program.

RIT social work students have an opportunity to provide direct services to clients during their field placements. Some have become involved in family support counseling, advising pregnant adolescents, helping children with emotional problems, intervening on behalf of clients in Family Court and in the attorney general's office, and working with people who abuse alcohol and other substances.

As an alternative, some students have preferred to work in the planning and funding of social programs, evaluating program effectiveness and measuring the quality of services, organizing communities to bring about change in local problems, educating the public on a broad social issue or researching a carefully coordinated social work effort.

In field placement, each student is taught by a social worker in the agency and is supervised by a faculty member. Each week students in field placement meet on campus to evaluate experiences and assess development of their professional skills.

**Bilingual opportunities**

The social work curriculum offers students the flexibility of acquiring skills in a second language, if they choose. The most popular and easiest to acquire is sign language with deaf individuals, since students participate in the living laboratory of integrated education during the entire time they are at RIT. Spanish is increasingly valuable as a second language for social workers. Students can acquire proficiency in Spanish through an appropriate liberal arts concentration or electives.

**Social work, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Self-Awareness in the Helping Role 0516-212	4
The Professional Social Work Role 0516-210	4
Computer Literacy for Social Work 0516-218	2
History of Social Welfare 0516-302	4
Liberal Arts Core *	24
History of Social Discrimination 0507-493	4
Liberal Arts Core: English Composition 0502-220 *	4
One Liberal Arts Elective *	4
Physical Education †	0
<i>Second Year</i>	
Structure & Function of Social Welfare 0516-305	4
One Professional Elective	4
Cultural Diversity 0510-505	4
Two Science Requirements	8
Human Behavior & the Social Environment I 0516-354	8
Human Behavior & the Social Environment II 0516-355	4
Mental Health & Mental Illness 0516-357	4
College Mathematics	4
Two Liberal Arts Electives *	8
One Liberal Arts Concentration Course *	4
Physical Education †	0
<i>Third Year</i>	
The Family from a Social Work Perspective 0516-405	4
Computer Applications to SW Research 0516-435	4
Group Theory in Social Work 0516-456	4
Assessing Community Needs 0516-465	4
Interviewing & the Helping Relationship 0516-475	4
Two Professional Electives	4
Introduction to Statistical Methods 1016-301, 302, 303	9
Statistical Methods Laboratory 1016-311, 312, 313	3
Two Liberal Arts Concentration Courses *	8

*Fourth Year*

Assessment & Problem Solving 0516-505	4
Field Instruction I 0516-506	4
Field Seminar I 0516-524	3
Advanced Social Work Research 0516-535	2
Social Intervention 0516-550	4
Field Instruction II 0516-551	4
Field Seminar II 0516-560	3
Evaluation of Practice 0516-540	2
Professional Seminar 0516-598	4
Policy & Planning Processes 0516-595	4
One Professional Elective	8
Liberal Arts Senior Seminar 0520-501 *	2
<b>Total Quarter Credit Hours</b>	<b>186</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

## Economics

Dr. Michael Vernarelli, Department Chairperson

The BS in economics emphasizes the quantitative analytical approach to dealing with economic problems in both the public and private sectors. This emphasis provides students with marketable skills and the intellectual foundation for career growth. The main feature that distinguishes RIT's BS in economics from traditional economics degrees is that our curriculum prepares students for the world of work by developing communication, computer and management skills in addition to economic reasoning and quantitative abilities. Students in the program are involved in a wide variety of management and analytical positions both in co-op and after graduation.

**Curriculum**

Students take rigorous and challenging required courses specifically designed to develop the ability to apply economic analysis to real world problems. Required communication courses enhance the student’s oral and written communication skills. Business courses include accounting, finance and management science. Quantitative analytical skills are developed by a course sequence that includes computer science, mathematics and statistics.

Professional electives allow students to pursue advanced study in their individual areas of interest. Along with finance, marketing, mathematics, statistics or computer science are many other possibilities, limited only by the student’s creativity in designing a personalized program of study.

**Study environment**

The economics faculty serve as mentors and are readily available to enhance students’ personal and professional growth. Students have the opportunity to work as research assistants for the faculty, learning about research techniques using a hands-on approach and receiving a stipend for their work.

**Professional option**

The economics program allows the student to develop a professional option consisting of six courses. This option may be in mathematics, prelaw, or business or can be specially designed by the student. The faculty adviser helps the student develop professional options that will assist him or her in attaining career goals.

**Cooperative education**

Students in the economics program have the option of participating in co-op at RIT and may be placed with financial and brokerage institutions, government offices and large corporations. Co-op can be taken during any quarter after the sophomore year, including summer.

**Opportunities for graduates**

Graduates with a BS degree in economics are prepared for a wide variety of entry-level positions in management and quantitative analysis. Students are further prepared for graduate study in economics, business or law.

**Economics, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Principles of Economics I, II 0511-301, 401	8
Managerial Economics 0511-459	4
Algebra & Calculus for Management Science 1016-225, 226	
or	
Calculus I, II 1016-251, 252	8
Financial & Managerial Accounting 0101-301, 302	8
Survey of Computer Science 0602-200	4
Liberal Arts (Core) *	16
Physical Education †	0
<i>Second Year</i>	
Monetary Analysis and Policy 0511-452	4
Applied Econometrics I 0511-457	4
Applied Econometrics II 0511-458	4
Introduction to Data Analysis 0106-330	4
Free Elective	4
Professional Option	4
Liberal Arts (Core) *	12
Science Requirement	8
Physical Education †	0
<i>Third Year</i>	
Intermediate Microeconomic Theory 0511-453	4
Intermediate Macroeconomic Theory 0511-455	4
Mathematical Methods for Economics 0511-460	4
Corporate Finance 0104-441	4
Professional Option	8
Free Electives	12
Liberal Arts (Concentration) *	12

*Fourth Year*

International Trade & Finance 0511-454	4
Industrial Organization 0511-456	4
Seminar in Applied Economics 0511-461	8
Professional Option	8
Free Elective	4
Liberal Arts (Electives & Senior Seminar) *	14
<b>Total Quarter Credit Hours</b>	<b>182</b>

\* See page 10 for liberal arts requirements.  
 † See page 11 for policy on physical education.

# Professional and Technical Communication

Dr. Bruce Austin, Department Chairperson

The BS in professional and technical communication (PTC) combines education in the theory and practice of spoken, written and visual communication with extensive instruction in one of RIT’s professional or technical programs. PTC students develop practical communication skills grounded in sound theoretical knowledge, along with a working familiarity with the central concepts and processes of a particular professional/technical field.

Numerous studies highlight the importance of effective communication in the technical and specialized world of business and industry. Today employees use communication skills more than any others in their jobs, and use of these skills becomes more frequent and more important with increasingly responsible positions. As knowledge becomes more technical and specialized, there is a growing need to communicate this knowledge to wide and diverse audiences. As communication media make the world more interdependent, college graduates need to be not only skilled in communication, but also equipped with an understanding of communication principles and the changing contexts in which they are applied.

Graduates of the program are qualified for a number of different functions as communication specialists within a specific professional area. Their career opportunities are numerous and varied. The degree also prepares them for graduate work in communication and related academic disciplines.

**The faculty**

Each of the seven full-time PTC faculty hold the Ph.D. degree in communication, have proven teaching ability and are committed to professional growth in their areas of expertise. In addition to their teaching, research and professional responsibilities, PTC faculty act as academic advisers for every PTC student.

**Transfer admission**

Many students transfer to PTC from other colleges and universities. A transfer student’s transcript is evaluated, and RIT transfer credit assigned where most appropriate. Most transfer students with two-year degrees in communication and other liberal arts disciplines can expect to complete their PTC program in two years.

**Curriculum**

The following curriculum description displays the course distribution by academic area. The chart indicates the sequence for the required courses.

**Required communication courses**

(56 total credit hours)

- Foundations of Communication
- Interpersonal Communication
- Effective Speaking
- Written Argument
- Mass Communications
- Rhetoric and Public Discourse
- Persuasion
- Theories of Communication
- Visual Communication
- Technical Writing
- Professional Writing
- Qualitative Research Methods or Critical Research Methods
- Quantitative Research
- Senior Thesis in Communication

**Other required courses**

(48 total credit hours)

	Credit Hours
Professional Core	24
Science	8
Math	8
Computer Science	4
Statistics or Math or Science	4

**Communication electives** 24

**Liberal arts** 54

**Communication electives**

Students are required to take six communication electives. Of these, at least one must be a writing elective. Communication electives include:

Interviewing	0535-324
Newswriting	0502-517
Creative Writing—Poetry	0502-451
Creative Writing—Prose Fiction	0502-452
Organizational Communication	0535-415
Advanced Public Speaking	0535-420
Teleconferencing	
Communication Management	0535-425
History of English Language	0502-445
Public Relations	0535-421
Advanced Creative Writing	0502-453
Uses and Effects of Mass Media	0535-452
Communication and	
Documentary Film	0502-524
Persuasion and Social Change	0535-490
Intercultural Communication	0535-520
Special Topics in Communication	
(e.g., conflict negotiation,	
listening, history of public	
address, propaganda,	
international media,	
crisis management)	0535-525
Writing Technical Manuals	0502-446
Film and Society	0535-550
Small Group Communication	0535-483
Speechwriting	0535-502

**The professional core**

Students are required to take one of five professional core options as part of their degree requirements. Each option is composed of several courses, for a total of 24 credit hours. These credit hours may be taken as a professional core from the School of Computer Science and Information Technology, School of Photographic Arts and Sciences, or the College of Business.

With approval from the academic adviser and the program chairperson, an additional option—an individually designed professional core—is available to students with special study and career interests.

**Cooperative education**

The program includes two quarters of cooperative education, which give students an opportunity to apply classroom knowledge to a professional work environment. RIT's considerable experience with cooperative education indicates that it deepens students' knowledge of their fields, allows them to determine their suitability for a particular position and increases their chances for an advantageous placement after graduation.

**Professional and technical communication, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Foundations of Communication 0535-200	4
English Composition 0502-220	4
Survey of Computer Science	4
Math: Algebra for Management Science	4
Interpersonal Communication 0535-210	4
Liberal Arts: Core *	16
Written Argument 0535-230	4
Math: Calculus for Management Science	4
Effective Speaking 0535-501	4
Physical Education †	0
<i>Second Year</i>	
Persuasion 0535-481	4
Rhetoric & Public Discourse 0535-311	4
Qualitative or Critical Research Methods 0535-316	4
Communication Electives	8
Professional Core	8
Science: Human Biology I and Lab	4
Liberal Arts: Core *	8
Quantitative Research Methods 0535-315	4
Science: Human Biology II and Lab	4
Mass Communications 0535-482	4
Physical Education †	0
<i>Third Year</i>	
Theories of Communication 0535-445	4
Technical Writing 0502-444	4
Liberal Arts Concentration *	8
Professional Core	8
Visual Communication 0535-450	4
Communication Writing Elective	4
Cooperative Education	Co-op
<i>Fourth Year</i>	
Liberal Arts Electives *	12
Communication Electives	12
Liberal Arts Concentration *	4
Professional Core	8
Professional Writing 0535-532	4
Math or Science or Statistics	4
Senior Seminar *	2
Senior Thesis in Communication 0535-595	4
Cooperative Education	Co-op
<hr/>	
<i>Total Quarter Credit Hours</i>	182

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# Psychology

The bachelor of science degree program in psychology will provide students with a strong grounding in the discipline of psychology integrated with a technological focus. Upon entry, each student will be assigned a faculty adviser to mentor his or her progress throughout the entire duration of the program. Students also will be provided with academic advising, discipline awareness, curriculum planning strategies and career counseling through the program's Freshman Seminar.

## The curriculum

The BS degree program in psychology is unique due to the following key elements: 1) the concentration requirement, 2) a choice of two interdisciplinary tracks and 3) a cooperative education/internship requirement.

### Concentration requirement

The program seeks students with an aptitude for technical and quantitative reasoning as well as an interest in psychology. Students are required to complete a technical concentration and may choose from the following areas: 1) science, 2) mathematics and statistics, 3) information technology, 4) imaging science or 5) an individualized concentration developed with the assistance of their adviser.

### Two interdisciplinary tracks

Students will be asked to choose one of the following interdisciplinary tracks: 1) visual perception or 2) information processing. Technology will be integrated with psychology in these two tracks to produce a nontraditional and career-oriented psychology major.

The visual perception track will focus on the human perceptual system and emphasize adaptation to changes in environment. Studies will include psychological principles and psychological processes related to human visual perception. Students will conduct experimental laboratory research that bridges physiological and psychological processes and possesses an applied emphasis.

The information processing track will focus on human factors psychology and human factors and technological interactions. Learning, memory, cognitive processes, judgment and decision making, and learning theories will be explored. Students will study computer simulations of information processing, the operation of human machine systems and artificial intelligence and will gain insight into machine-generated language.

### Co-op/internship requirement

The program requires that students complete a cooperative education experience or internship between the sophomore and senior years of course work. The co-op experience is in a psychology-related field and does not carry academic credits. Internships are credit-bearing experiences associated with various courses.

### Transferability

The psychology program provides excellent transfer opportunities for students from other institutions since it requires a core of psychology courses for which transfer students could receive credit.

The point of entry into the program is highly flexible since there are only three courses in a fixed sequence: Introduction to Psychology, Introduction to Statistics and Experimental Psychology. The technical concentration component increases the number of common courses shared with other programs and provides internal flexibility for students to move from other RIT programs and retain credits from some of the technical courses they may have completed previously.

### Career opportunities

The unique requirements of this program ensure that upon completion of the program, each student should be well prepared for advanced study in psychology, employment in industry, or employment in a human service agency or other career opportunities.

## Psychology, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 0514-201	1
Introduction to Psychology 0514-210	4
English Composition 0502-220	4
Liberal Arts: Humanities *	8
Liberal Arts: Social Science *	4
Liberal Arts: Literature *	4
Mathematics Requirement †	8
Survey of Computer Science 0602-200	4
Tech./Professional Concentration ‡	4
Statistics †	4
Childhood & Adolescence 0514-440	4
<i>Second Year</i>	
Experimental Psychology 0514-310	4
Liberal Arts: Humanities *	4
Liberal Arts: Social Science *	4
Tech./Professional Concentration ‡	12
Science Sequence Requirement	8
Math/Science/Statistics †	4
Interdisciplinary course §	4
Technical Writing 0502-444	4
Social Psychology 0514-444	4
<i>Third Year</i>	
Abnormal Psychology 0514-447	4
Liberal Arts Electives *	8
Ind./Organizational Psych. 0514-448	4
Liberal Arts Concentration *	12
Tech./Professional Concentration ‡	8
Interdisciplinary course §	4
Psychology of Personality 0514-446	4
<i>Fourth Year</i>	
Interdisciplinary course §	8
Liberal Arts Elective *	4
Tech./Professional Concentration ‡	4
Seminar Seminar *	2
Seminar in Psychology 0514-597	4
Institute Electives	20
<b>Total Quarter Credit Hours</b>	<b>183</b>

Students are expected to fulfill the co-op/internship requirement between their second and fourth year.

\* See page 10 for liberal arts requirements.

† Math/statistics courses are suggested by the mathematics department.

‡ Students are required to take 24–48 credit hours within one of the following options:

- 1) information technology
- 2) mathematics and statistics
- 3) science
- 4) imaging science
- 5) individualized

§ Students are required to take 16 credit hours within one of the following tracks:

- 1) visual perception
- 2) information processing

# The Technical and Liberal Studies Option

Dr. Katherine Mayberry, Program Chairperson

Students often are attracted to RIT because of the opportunity to specialize in a career-oriented or technical program beginning with their first year of college. Many freshmen and transfer students have chosen a career area by the time they have been accepted for admission. Others, however, want an opportunity to explore different fields before making a decision. The technical and liberal studies option (TLSO) gives this group of students a chance to formulate an educational and career plan during their first year at RIT.

In addition to sampling introductory and foundation courses in one or more of RIT's departments, full-time TLSO students enroll for liberal arts courses in the humanities and social sciences and in mathematics, science and computer science courses. They also take a one-credit seminar, Academic Fields of Study, in which they explore both their own abilities and inclinations and the array of programs offered at RIT.

As students identify a major suitable to their backgrounds, abilities and interests, they may also take introductory courses in that area to ensure that the major is appropriate for them. They may take courses in any major area represented by RIT departments, although possibilities for exploration in art, crafts and photography are somewhat limited due to heavy enrollment in those areas. Upon definitely identifying a major (sometime during their first year), TLSO students apply for a transfer to the new department.

Students who select the technical and liberal studies option must, of course, meet the standards and requirements of the RIT schools and colleges to which they eventually apply. Occasionally, some additional time may be necessary to complete degree requirements because the TLSO student has spent time in preliminary exploration.

Of the 12 courses that a student would take during three quarters in TLSO, however, at least nine would be required in any RIT baccalaureate degree program. Therefore, the maximum loss of time, no matter what the student's program choice, will be minimal.

Each student is assisted by a faculty academic adviser. The dean of the college also will work directly with any student who has special difficulties in selecting a career path and degree program.

After one to four quarters in TLSO, each student may reasonably anticipate:

- A clearer basis for making a decision regarding long-range career plans
- Credit for courses that would most likely apply to RIT degree programs or to programs at other colleges
- Assistance in matriculating in the curriculum of the student's choice at RIT, provided that relevant standards and requirements are met and that space in the program is available.

By special permission, a student may enroll for portions of this program on a part-time basis.

# College of Science

*Dr. Robert A. Clark, Interim Dean*

**U**ndergraduates in the College of Science receive a unique education, one that emphasizes the applications of science and mathematics in the professional world while providing a comprehensive liberal arts education in the humanities and social sciences. The College of Science curricula, under the direction of our faculty members, reflect modern trends in the application of science and mathematics while preparing students for graduate study, as well as immediate employment in business, industry, government and the allied health professions.

Our emphasis is on the practical aspects of science and mathematics as found in science and computer laboratories; we are career oriented. At the same time we recognize the value of the social sciences, English composition, literature, history, philosophy and fine arts for the intellectual enrichment of our students. In addition to technical competence, many of the skills acquired through the study of these liberal arts subjects are required by employers for promotion and career advancement.

## **Faculty and research**

The College of Science has an ideal size and philosophy to provide a quality education. We have nearly 100 faculty members in the sciences, health professions and mathematics. All are committed to the education of undergraduate students; most hold the Ph.D. degree. They provide a variety of faculty expertise, so a student is likely to find a faculty member with similar interests to act as mentor and friend.

Our faculty members are dedicated teachers who also practice their professions outside of the classroom in research and other professional activities. Our undergraduates are encouraged to work with faculty members as they pursue their research. Many joint student-faculty research projects have resulted in publication in professional literature.

## **Facilities and resources**

The College of Science was built in 1968. A new addition with state-of-the-art laboratories and classrooms will be completed in 1997. Currently, there are 22 teaching laboratories and 16 research laboratories that provide space for laboratory course work and student research projects in the College of Science. Some of the facilities within the science building have specialized purposes. For example, we have a laser light scattering laboratory, an animal care facility, a diagnostic medical imaging laboratory, a plasma etching laboratory, three greenhouses, an electronics laboratory, a nuclear magnetic resonance laboratory and an electron microscope center. The new \$8.5 million Chester F. Carlson Center for Imaging Science building houses research facilities and laboratories for photographic chemistry, digital imaging, holography, emulsion coating, optics, remote sensing and color science. All of these facilities are used by undergraduate students.

State-of-the-art computer facilities are available in the college as well as in labs throughout the Institute. Such facilities are a valuable resource for College of Science programs that use the computer as a tool in the applications of mathematics, health-related work and science.

## **Academic advising**

Each College of Science student is assigned an academic adviser who provides counsel on course selection, advice about careers and information about RIT services. It is common for a science major to have several friends among the faculty, who help with academic, career and personal questions.

## **Our graduates**

The best way to evaluate college programs is to look at the success of the graduates. In recent surveys of our graduates, more than 90 percent responded that they are employed in a field related to their degree, and the same percentage expressed satisfaction with their work.

Employers report that our graduates have good preparation for employment in business and industry and, because of their work experience, immediately fit into their jobs with a high degree of initiative and purpose.

About one-fourth of our graduates enter graduate or professional school directly after graduation. More will return for further education at the graduate level as part of their career development. We have found that they do exceedingly well. Many find that, because of their laboratory and co-op experience, they can move into their graduate research projects more easily than their classmates.

## **The cooperative education plan**

In our cooperative education plan (co-op), a student alternates quarters of paid work with quarters on campus in academic study for two to four years. Co-op employment experience in a student's field of study has many advantages.

Through co-op, students often gain insights that help them with classroom work. Co-op gives them a chance to find out what working in their field is really like, and acquiring practical experience that is valuable in getting a job or into graduate school is another benefit. Income from this work-study program enables students to obtain a high-quality education at a cost often comparable to that of a public education.

Although co-op is not required in any of our programs, many students elect this five-year plan, which works as follows: RIT's school year is divided into four 11-week quarters: Fall, Winter, Spring, Summer. Students in the five-year co-op programs in biology, biotechnology, applied mathematics, applied statistics, computational mathematics, biomedical computing and physics attend classes during the fall, winter and spring of their first two years. During the last half of the second year, they work with the Office of Cooperative Education and Placement to obtain a co-op position, possibly starting as early as the coming summer. At the beginning of the third year, students begin alternating quarters of work and study, as shown in the charts on the following page. Some students are on the A-block schedule and others on the B-block. Students in the five-year chemistry, biochemistry and polymer chemistry co-op plans follow the same kind of schedule, except that their co-op experience could start as early as the summer of the first year.

### Cooperative education schedule for five-year programs in biology, biotechnology, computational, applied mathematics, applied statistics, biomedical computing and physics\*

Year		Fall	Winter	Spring	Summer
1 and 2		RIT	RIT	RIT	Vacation
3 and 4	A	RIT	Work	RIT	Work
	B	Work	RIT	Work	RIT
5	A	RIT	Work	RIT	—
	B	Work	RIT	RIT	—

\*Physics majors are ordinarily all on A-block.

### Cooperative education schedule for five-year chemistry, biochemistry and polymer chemistry programs\*

Year		Fall	Winter	Spring	Summer
1		RIT	RIT	RIT	Vac/Work
2, 3 and 4	A	RIT	Work/RIT	RIT	Work
	B	Work	RIT	Work	RIT
5	A	RIT	Work	RIT	—
	B	Work	RIT	RIT	—

\*Some students may elect to co-op for a double block (i.e., fall and winter)

### The internship plan

Students in the medical technology, nuclear medicine technology, diagnostic medical sonography (ultrasound) and physician assistant programs do not participate in co-op. Instead these students spend three years on campus in academic work and then gain invaluable clinical experience during the fourth year at a clinical training site.

### The transfer plan

Students with associate degrees in a comparable program from other educational institutions normally can expect to transfer at the third-year level. Transfer credit is granted for studies that parallel Institute courses in the curriculum for which admission is sought.

### Graduate degrees

The College of Science offers master of science degrees in chemistry, clinical chemistry, industrial and applied mathematics, imaging science and color science. A master of science degree in materials science and engineering is offered jointly by the College of Science and the College of Engineering. In addition, the nation's only doctoral (Ph.D) program in imaging science is offered through the College's Center for Imaging Science.

## Premedical Studies

Douglas P. Merrill, Ph.D., Director

Premedical studies in the College of Science is an advisory program designed to provide guidance and assistance to students who want to become physicians, dentists, optometrists, podiatrists and veterinarians. Faculty who participate in this program provide personalized advice on course selection, health-related experiences and extracurricular activities, and they provide assistance with the application process. Although admission to medical school is a highly competitive process, more than 80 percent of students in the program have been admitted in the past decade, some into the most prestigious schools in the United States.

### Enrollment in premedical studies

Students cannot apply directly to the premedical studies program because it exists only to assist students who have been admitted to any one of the degree-granting programs offered at RIT or who are enrolled as nonmatriculated students in the premedical core courses (see below). To enroll in the program, students must visit the premedical studies office, room 1102, in the College of Science or call 716-475-7105 for an appointment.

### Premedical core courses and academic programs

To complete the academic requirements necessary to gain admission to doctoral programs in the health professions, a student may enroll in any BS program in the College of Science and combine that program's course requirements with the premedical "core courses" (see chart). The way in which program requirements are combined with the premedical core courses varies according to the program in which the student is enrolled. The curricula of certain programs include all of the premedical core courses. Others require few, if any, so students in these programs will require additional time, perhaps summers, to complete all required courses.

Advanced placement (AP) credit from high school may reduce the additional time needed. It is important that these courses be completed by the end of the third year or before the student expects to take the MCAT, DAT, OAT, GRE or other standardized tests required for admission to medical school. Clearly, careful planning and scheduling, with the guidance of the premedical studies advisers, are crucial to success.

**Premedical core**

Biology	1 year	With laboratory
Chemistry	2 years	General chemistry, 1 year Organic chemistry, 1 year (both years with laboratory)
Physics	1 year	With laboratory
English	1 year	

**Note:** In addition to these courses, which are required by virtually all medical schools, courses in mathematics, psychology/behavioral sciences or biology may be required by specific schools. The admissions requirements of each medical school are published and may be obtained from the premedical advising committee.

**Combining your program's requirements with the premedical core courses\***

<b>If you major in:</b>	<b>You will need to take the courses required for your major, plus:</b>
Applied mathematics	†
Applied statistics	†
Biochemistry	None
Biology	None
Biomedical computing	Elect one year of organic chemistry
Biotechnology	Elect one year of physics
Chemistry	Elect one year of biology
Computational mathematics	†
Diagnostic medical sonography	Elect one year of general chemistry and one year of organic chemistry
Medical technology	One quarter organic chemistry lab
Nuclear medicine technology	Elect one year of organic chemistry
Physician assistant	Elect one year of physics
Physics	†
Polymer chemistry	Elect one year of biology

\* Some rearrangement of the typical pattern of course work within a program may be necessary.

† Course credits beyond the usual 12 quarters needed to complete degree requirements are necessary.

**Health-related experience**

All students interested in the health professions should obtain as much experience as possible in their chosen field of medicine. This may take the form of volunteer activities, "shadowing" practitioners in the field or actual employment in a health care setting. To help, RIT's outstanding co-op program provides students with a host of employment opportunities, including an exclusive nursing assistant position at a local hospital for those who want direct patient care experience.

We believe very strongly that all premedical students should commit themselves to developing the greatest competency possible in the discipline in which they are enrolled. It is important, therefore, that students interested in premedical studies realize that, while their career objectives may include a professional school after graduation, they should select an academic program to which they are prepared to make a sincere and major commitment as an undergraduate. This approach will increase their career options after graduation.

# Undeclared Science

Eileen D. Marron, BS, MA, Director

Many high school students do not know which major they prefer. We encourage such students to come to RIT if they have a strong interest in science, mathematics and statistics, or allied health careers.

A student may apply to the college as an undeclared science major without designating a specific major. The undeclared science option allows a student to postpone definite commitment to a particular major in science, mathematics or allied health without any loss of time toward a degree. This option has been attractive to quite a few first-year students.

Below is a typical distribution of courses for the undeclared science option. The program covers a number of introductory college-level courses in science and mathematics and can be tailored to meet a student's interests. An academic team of advisers assist the student in selecting courses and identifying a major field of interest in which to enroll.

Before the end of the first year, the student should decide upon a specific major. Most students find the decision is easily made after only a quarter or two of course work.

**Undeclared science option, typical course sequence**

First Year	Quarter Credit Hours
General Biology Lecture *	9
General Biology Lab	3
General Chemistry Lecture I, II *	8
General Chemistry I Lab	1
Quantitative Analysis Lecture	4
Quantitative Analysis Lab I, II	3
Calculus I, II, III	12
Physics Lecture I, II *	8
Physics Lab I, II	2
Freshman Seminar for Undeclared Science	1
Liberal Arts (Core) †	12
Physical Education Electives ‡	0

An average of 16–18 credits per quarter is taken

\* Any two of these in a given quarter

† See page 10 for liberal arts requirements.

‡ See page 11 for policy on physical education.

# Biological Sciences

## Biology

Tom Frederick, Ph.D., Head

The department of biological sciences offers programs leading to the AS and BS degrees in biology. Graduates receiving the BS degree find rewarding positions in occupations related to the life sciences, including:

*biomedical research* (e.g., human genetics, new vaccines and therapeutic drugs, diagnosis and treatment of cancer, transplantation)

*ecology and environmental science*

*marine biology*

*pharmaceuticals*

*marketing divisions of major science companies*

*forensic science*

*scientific journalism*

*agriculture and new energy resources*

The program also includes all of the course work and support services to prepare students to enter schools of medicine, dentistry, veterinary medicine, optometry, podiatry and chiropractic medicine.

Graduates are also well-prepared to pursue a master's or Ph.D. in a wide variety of fields in the life sciences.

### Requirements of the BS degree in biology

The student must meet the minimum graduation requirements of the Institute as described on pages 9–11 of this bulletin. In addition, the program requires successful completion of all of the courses listed in the typical course schedule.

### Co-op program

The biology degree curriculum provides opportunities for students to participate in our optional cooperative education program. More than 65 organizations in private industry, government and academia employ our students in short-term (10–20 weeks) full-time, *paid* positions directly related to the students' academic areas of interest. Co-op positions can be held during the summer and/or during the regular academic year. No tuition is charged for any co-op participation. If a student elects to hold a co-op position during the regular academic year, he or she will take the same number of academic class terms, but may need to extend the date of graduation beyond the normal four years.

### Biology, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Biology Symposium 1001-200	1
Introductory Cell Biology 1001-251	4
Introductory Developmental Biology 1001-252	4
General Physiology 1001-253	4
General & Analytical Chemistry 1011-215, 216, 217	10
Chemical Principles Lab 1011-205, 206	2
General & Analytical Chemistry Lab 1011-227	2
Introduction to Calculus I & II 1016-214, 215	6
Liberal Arts (Core) *	12
Physical Education Courses †	0
 <i>Second Year</i>	
Invertebrate Zoology 1001-310	4
Vertebrate Zoology 1001-302	4
Botany 1001-304	4
Organic Chemistry 1013-231, 232, 233	9
Organic Chemistry Lab 1013-235, 236, 237	3
Data Analysis I 1016-319	4
Survey of Computer Science 0602-200	4
Biology Elective	4
Liberal Arts (Core) *	16
 <i>Third/Fourth Years ‡</i>	
General Ecology 1001-340	4
Molecular Biology 1001-350	4
Biological Writing 1001-370	3
Introductory Microbiology 1001-404	5
Genetics 1001-421	4
Biology Seminar 1001-550	2
College Physics 1017-211, 212, 213	9
College Physics Lab 1017-271, 272, 273	3
Biology Electives	13
Liberal Arts (Concentration) *	12
Liberal Arts (Advanced Electives) *	12
Liberal Arts (Senior Seminar) * 0520-501	2
Cooperative Education 1001-499 (Optional)	
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ If a student elects to participate in our optional co-op program, she or he may be scheduling courses in a fifth year but will be using the same number of academic quarters of classes to complete the degree.

## Biotechnology

Tom Frederick, Ph.D., Head

The department of biological sciences program leading to the BS in biotechnology is the leading four-year college degree program in genetic engineering in the United States.

A graduate who earns this degree is prepared to immediately assume challenging positions in research, development and marketing activities in:

*human genetics*  
*human gene therapy*  
*cancer research*  
*autoimmune diseases*  
*vaccine development*  
*agriculture*  
*food products*  
*pharmaceuticals*  
*environment and energy*

The advanced nature of the senior-year courses and the opportunity to participate in faculty-sponsored undergraduate research during the entire four years also give a very sound foundation to those graduates wishing to pursue a master's or Ph.D. degree.

The program can also be designed to include the education necessary for the pursuit of a career in a medical field.

Specialized areas of emphasis include recombinant DNA, genetic engineering, mammalian and plant tissue culture, monoclonal antibody production and purification, large-scale fermentation techniques (bacterial and mammalian cell), and methods for characterization and separation of proteins and nucleic acids.

### Requirements for the BS degree in biotechnology

The student must meet the minimum graduation requirements of the Institute as described on pages 9–11 of this bulletin. In addition, the program requires successful completion of all of the courses listed in the typical course schedule on the next page.

### Co-op program

The biotechnology degree provides opportunities for students to participate in our optional cooperative education program. More than 65 organizations in private industry, government and academia employ our students in short-term (10–20 weeks), full-time *paid* positions directly related to the students' academic areas of interest. Co-op positions can be held during the summer and/or during the regular academic year. No tuition is charged for any co-op participation. If a student elects to hold a co-op position during the regular academic year, he or she will take the same number of academic class terms but may need to extend the *date* of graduation beyond the normal four years.

**Biotechnology, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Biology Symposium 1001-200	1
Introductory Cell Biology 1001-251	4
Introductory Developmental Biology 1001-252	4
General Physiology 1001-253	4
General & Analytical Chemistry 1011-215, 216, 217	10
Chemical Principles Lab 1011-205, 206	2
General & Analytical Chemistry Lab 1011-227	2
Introduction to Calculus I & II 1016-214, 215	6
Liberal Arts (Core) *	12
Physical Education Courses †	0
<i>Second Year</i>	
Cell Biology 1001-311	4
Immunology 1001-402	3
Tissue Culture 1001-445	4
Hybridoma Techniques 1001-442	2
Organic Chemistry 1013-231, 232, 233	9
Organic Chemistry Lab 1013-235, 236, 237	3
Data Analysis I 1016-319	4
Survey of Computer Science 0602-200	4
Liberal Arts (Core) *	16
<i>Third/Fourth ‡</i>	
Plant Physiology 1001-310	4
Molecular Biology 1001-350	4
Biological Writing 1001-370	2
Cell Physiology 1001-403	4
Introductory Microbiology 1001-404	5
Microbial & Viral Genetics 1001-407	4
Industrial Microbiology 1001-417	4
Genetics 1001-421	4
Plant Tissue & Cell Culture 1001-446	4
Genetic Engineering 1001-450	5
Biology Seminar 1001-550	2
Analytical Chemistry: Separations 1008-312	3
Analytical Chemistry: Separations Lab 1008-319	1
Two Biochemistry Courses	6
Liberal Arts (Concentration) *	12
Liberal Arts (Advanced Electives) *	12
Liberal Arts (Senior Seminar) * 0520-501	2
Institute-wide Electives	7
Cooperative Education 1001-499 (Optional)	
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ If a student elects to participate in our optional co-op program, she or he may be scheduling courses in a fifth year but will be using the same number of academic quarters of classes to complete the degree.

# Chemistry

Gerald A. Takacs, Ph.D., Head

The department of chemistry offers programs leading to the AS and BS degrees in chemistry, the BS degree in biochemistry, the BS degree in polymer chemistry, the MS degree in chemistry, a five-year combined BS chemistry/MS chemistry program and a five-year BS polymer chemistry/MS chemistry program.

**Requirements for the BS degree**

The student must meet the minimum graduation requirements of the Institute as described on pages 9–11 and in addition must complete particular program requirements, or the equivalent, as determined and approved by the department of chemistry.

To meet the requirements leading to the BS degrees in chemistry and polymer chemistry approved by the Committee on Professional Training of the American Chemical Society, the student must take specifically designated courses in chemistry and related sciences and must complete a minimum of 180 quarter credit hours.

All students must meet the requirements for the Institute's writing policy, as specified by the department of chemistry.

**Extended-day and part-time studies in chemistry**

All BS degree options in chemistry, biochemistry and polymer chemistry are designed to accommodate part-time students, beyond the associate degree, during day or evening (extended day) hours. Academic advising is available throughout, and the American Chemical Society-approved chemistry degrees are offered at extended-day hours. This option is especially designed for transfer students who work full time, but it is flexible enough to meet the needs of any part-time student.

**Five-year combined BS chemistry/MS chemistry and BS polymer chemistry/MS chemistry degree programs**

These programs combine the existing BS and MS programs, allowing undergraduate chemistry and polymer chemistry majors to acquire both degrees in a total of five years. Undergraduate students with both an overall and professional field-of-study GPA of 3.0 or above may apply to the chemistry graduate committee for entry into the program as early as the third year. Students in the combined programs will be advised to complete only three quarters of cooperative education and to take graduate-level chemistry elective courses, including two summers of full-time chemistry research and thesis guidance (1010-879) during the fourth and fifth years. Students will complete a total of 225 quarter credit hours: 180 toward the BS chemistry or BS polymer chemistry degree and 45 toward the MS chemistry degree.

## Chemistry

The BS chemistry degree, which has been approved by the Committee on Professional Training of the American Chemical Society, may be completed in four or five years, depending on the amount of cooperative (co-op) experience the student elects. Co-op may begin as early as the summer of the first year. The five-year course schedule shown on this page assumes that the student will co-op a total of eight academic quarters. Students may elect to complete the BS degree requirements in a traditional (non-cooperative) four-year program.

The program prepares graduates for positions in several fields of chemistry, including professional industrial work in processing and laboratory operations, research and experimental work, supervision of technical projects and managerial positions. A substantial fraction of graduates continue their education for advanced degrees in chemistry or pursue careers in pharmacy, medicine and dentistry.

The chemistry program allows for flexibility in the type and number of chemistry and Institute-wide elective courses taken by the student. For example, it is highly recommended that students take the undergraduate chemistry research courses as Institute-wide electives. The program also provides students with the option of planning an elective concentration in complementary fields such as imaging science, business, graphic arts, audiovisual communications, biology, criminal justice, engineering, environmental science, packaging science, printing, computer science, physics or mathematics.

**Chemistry (ACS certified), BS degree, typical course sequence**

First Year	Quarter	Credit Hours
Chemical Safety 1010-200		1
Introduction to Co-op Seminar 1010-230		1
General Chemistry I, II 1010-251, 252		7
General Chemistry I Lab 1010-255		1
Quantitative Analysis I, II 1008-261, 262		7
Quantitative Analysis Lab I, II 1008-265, 266		3
Calculus I, II, III 1016-251, 252, 253		12
Computer Techniques (FORTRAN) 0602-205		3
Liberal Arts (Core) *		16
Physical Education Electives †		0
Cooperative Education 1010-499 (Optional, summer)		0
<b>Second Year</b>		
Instrumental Analysis 1008-311		3
Instrumental Analysis Lab 1008-318		1
Separations Techniques 1008-312		3
Separations Techniques Lab 1008-319		1
Calculus IV 1016-305		4
Organic Chemistry I 1013-431		3
Preparative Organic Chemistry I Lab 1013-435		1
University Physics 1017-311, 312		8
University Physics Lab 1017-375, 376		2
Liberal Arts (Core) *		8
Cooperative Education 1010-499 (Optional)		
<b>Third Year</b>		
Introduction to Physical Chemistry 1014-340		3
Differential Equations 1016-306		4
University Physics 1017-313		4
University Physics Lab 1017-377		1
Organic Chemistry II, III 1013-432, 433		6
Preparative Organic Chemistry II Lab 1013-436		1
Systematic ID of Organic Compounds III Lab 1013-437		2
Chemical Thermodynamics 1014-441		3
Chemical Thermodynamics Lab 1014-445		1
Liberal Arts (Core/Concentration/Electives) *§		8
Cooperative Education 1010-499 (Optional)		
<b>Fourth Year</b>		
Quantum Chemistry 1014-442		3
Quantum Chemistry Lab 1014-446		1
Chemical Kinetics 1014-443		3
Chemical Kinetics Lab 1014-447		1
Chemical Literature 1010-401		2
Matrix Algebra 1016-331		4
Inorganic Chemistry I 1012-562 #		3
Liberal Arts (Concentration/Elective) *§		16
Institute-wide Elective ‡		‡
Cooperative Education 1010-499 (Optional)		
<b>Fifth Year</b>		
Inorganic Chemistry II, III 1012-563, 564 #		6
Advanced Instrumental Analysis 1008-711		3
Advanced Instrumental Analysis Lab 1008-720		2
Chemistry Electives		6
Liberal Arts (Concentration) *§		4
Liberal Arts (Senior Seminar) * 0520-501		2
Institute-wide Electives ‡		‡
Cooperative Education 1010-499 (Optional)		
<b>Total Quarter Credit Hours</b>		<b>182</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ 1010-541, -542, -543. Chemistry Research may be used as Institute-wide electives and are highly recommended. Electives are necessary to bring the total quarter credit hours to 180 for graduation. Twelve quarter credit hours are necessary for full-time status.

§ ACS (American Chemical Society) requirements include two quarters of a language (preferably German) unless a student had three years of one language in high school.

# For students beginning Fall 1993 or later, Inorganic Chemistry I and II, 1012-562 and 1012-563, will be taken in the fourth year for 8 credits, and Preparative Inorganic Chemistry, 1012-765, will be taken in the fifth year for 2 credits.

**Chemistry, combined BS/MS degree,  
typical course sequence (BS is ACS certified)**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Chemical Safety 1010-200	1
Introduction to Co-op Seminar 1010-230	1
General Chemistry I, II 1010-251, 252	7
General Chemistry I Lab 1010-255	1
Quantitative Analysis I, II 1008-261, 262	7
Quantitative Analysis Lab I, II 1008-265, 266	3
Calculus I, II, III 1016-251, 252, 253	12
Computer Techniques (FORTRAN) 0602-205	3
Liberal Arts (Core) *	20
Physical Education Electives †	0
Cooperative Education 1010-499 (Optional, summer)	
<i>Second Year</i>	
Instrumental Analysis 1008-311	3
Instrumental Analysis Lab 1008-318	1
Separations Techniques 1008-312	3
Separations Techniques Lab 1008-319	1
Calculus IV 1016-305	4
Differential Equations 1016-306	4
Organic Chemistry I 1013-431	3
Preparative Organic Chemistry I Lab 1013-435	1
University Physics 1017-311, 312, 313	12
University Physics Lab 1017-375, 376, 377	3
Liberal Arts (Core) *	12
Liberal Arts Concentration *‡	8
Cooperative Education 1010-499 (Optional, summer)	
<i>Third Year</i>	
Introduction to Physical Chemistry 1014-340	3
Chemical Literature 1010-401	2
Organic Chemistry II, III 1013-432, 433	6
Preparative Organic Chemistry II Lab 1013-436	2
Systematic ID of Organic Compounds III Lab 1013-437	2
Chemical Thermodynamics 1014-441	3
Chemical Thermodynamics Lab 1014-445	1
Matrix Algebra 1010-331	4
Liberal Arts (Concentration) *‡	8
Liberal Arts (Electives) *	12
Chemistry Electives §	5
Cooperative Education 1010-499 (Optional, summer)	
<i>Fourth Year</i>	
Quantum Chemistry 1014-442	3
Quantum Chemistry Lab 1014-446	1
Chemical Kinetics 1014-443	3
Chemical Kinetics Lab 1014-447	1
Advanced Instrumental Analysis 1008-711	3
Advanced Instrumental Analysis Lab 1008-720	2
Matrix Algebra 1016-331	4
Inorganic Chemistry I, II, III 1012-762, 763, 764 #	9
Liberal Arts (Senior Seminar) * 0520-501	2
Liberal Arts (Concentration) *	12
Chemistry Electives §	5
Research and Thesis Guidance 1010-879 ¶	3
<i>Fifth Year</i>	
Chemistry Seminar 1012-870	2
Research and Thesis Guidance 1010-879 ¶	6-13
Course work in this year will be determined by the Graduate Committee and will need to fulfill the requirement of 225 total credit hours §	5
<hr/>	
<i>Total Quarter Credit Hours</i>	<i>227</i>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ ACS requirements include two quarters of a language (preferably German) unless a student had three years of one language in high school.

§ A minimum of 36 hours of 700-level or higher chemistry courses is required to graduate with both a BS and MS degree in chemistry.

¶ A student will normally have 9-16 credit hours of Research and Thesis Guidance.

# For students beginning Fall 1993 or later, Inorganic Chemistry I and II, 1012-762 and 1012-763, will be taken in the fourth year for 8 credits, and Preparative Inorganic Chemistry, 1012-765, will be taken in the fifth year for 2 credits.

## Biochemistry

Biochemistry is an exciting variation of the BS chemistry program and may be completed in four or five years, depending on the amount of cooperative education. Co-op may begin as early as the summer of the first year. Students who enroll in the program often have an interest in combining the life and health sciences with a chemistry degree. Students take a year of general biology in addition to a typical chemistry curriculum during the first two or three years. During the upper-level years, students in the biochemistry program take a substantial core of biochemistry courses, physical chemistry, chemical literature, liberal arts and elective courses in biology, biotechnology and clinical sciences.

Employment opportunities for biochemistry graduates exist in the chemical, pharmaceutical, agricultural, forensic and rapidly expanding biotechnological fields. Graduates also are well-prepared to enter advanced degree programs in biochemistry, medicine, dentistry and veterinary medicine.

**Biochemistry, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Chemical Safety 1010-200	1
Introduction to Co-op Seminar 1010-230	1
General Chemistry I, II 1010-251, 252	7
General Chemistry I Lab 1010-255	1
Quantitative Analysis I, II 1008-261, 262	7
Quantitative Analysis Lab I, II 1008-265, 266	3
Calculus I, II, III 1016-251, 252, 253	12
General Biology 1001-201, 202, 203	9
General Biology Lab 1001-205, 206, 207	3
Computer Techniques (FORTRAN) 0602-205	3
Liberal Arts (Core) *	4
Physical Education Electives †	0
Cooperative Education 1010-499 (Optional, summer)	
<i>Second Year</i>	
Instrumental Analysis 1008-311	3
Instrumental Analysis Lab 1008-318	1
Calculus IV 1016-305	4
Organic Chemistry I 1013-431	3
Preparative Organic Chemistry I Lab 1013-435	1
Physics 1017-311, 312 (or 1017-211, 212)	8 (6)
Physics Lab 1017-375, 376 (or 1017-271, 272)	2
Liberal Arts (Core) *	8
Institute-wide Electives ‡	‡
Cooperative Education 1010-499 (Optional)	
<i>Third Year</i>	
Introduction to Biochemistry 1009-300	1
Introduction to Physical Chemistry 1014-340	3
Differential Equations 1016-306	4
Physics 1017-313 (or 1017-213)	4 (3)
Physics Lab 1017-377 (or 1017-273)	1
Organic Chemistry II, III 1013-432, 433	6
Preparative Organic Chemistry II Lab. 1013-436	1
Systematic ID of Organic Compounds III Lab 1013-437	2
Chemical Thermodynamics 1014-441	3
Chemical Thermodynamics Lab 1014-445	1
Liberal Arts (Core) *	8
Cooperative Education 1010-499 (Optional)	
<i>Fourth Year</i>	
Chemical Kinetics 1014-443	3
Chemical Kinetics Lab 1014-447	1
Chemical Literature 1010-401	2
Biochemistry 1009-502	3
Biochemistry: Nucleic Acids 1009-504	3
Biochemistry: Experimental Techniques Lab	3
Liberal Arts (Core) *	8
Liberal Arts (Concentration) *	4
Institute-wide Electives ‡	‡
Cooperative Education 1010-499 (Optional)	
<i>Fifth Year</i>	
Biochemistry-Metabolism 1009-503	3
Science Electives ‡	‡
Liberal Arts (Electives) *	12
Liberal Arts (Senior Seminar) * 0520-501	2
Liberal Arts (Concentration) *	4
Cooperative Education 1010-499 (Optional)	
<b>Total Quarter Credit Hours</b>	<b>180</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ 1009-541, 542, 543, Biochemistry Research, may be used as science electives and are highly recommended. Electives are necessary to bring the total quarter credit hours to 180 for graduation. Twelve quarter credit hours are necessary for full-time status.

**Polymer Chemistry**

Polymer science is one of the increasingly important areas of modern science. The polymer chemistry program has been approved by the Committee on Professional Training of the American Chemical Society. The program is one of a handful in the nation and provides students with a solid background in the traditional areas of chemistry (general, analytical, organic, physical and inorganic) supplemented with advanced courses and intensive laboratory experiences in polymer science. The polymer program may be completed in four or five years, depending on the amount of cooperative education, which may begin as early as the summer of the first year. It is highly recommended that students take the undergraduate chemistry research courses as Institute-wide electives in this program. Because two-thirds of all chemists work with polymers during their professional lives, this program provides the background important for success in many industrial research areas and also enables graduates to pursue further education in chemistry, polymer chemistry or materials science and engineering.

**Polymer chemistry, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Chemical Safety 1010-200	1
Introduction to Co-op Seminar 1010-230	1
General Chemistry I, II 1010-251, 252	7
General Chemistry I Lab 1010-255	1
Quantitative Analysis I, II 1008-261, 262	7
Quantitative Analysis Lab I, II 1008-265, 266	3
Calculus I, II, III 1016-251, 252, 253	12
Computer Techniques (FORTRAN) 0602-205	3
Liberal Arts (Core) *	20
Physical Education Electives †	0
Cooperative Education 1010-499 (Optional, summer)	
<i>Second Year</i>	
Instrumental Analysis 1008-311	3
Instrumental Analysis Lab 1008-318	1
Separations Techniques 1008-312	3
Separations Techniques Lab 1008-319	1
Calculus IV 1016-305	4
Organic Chemistry I 1013-431	3
Preparative Organic Chemistry I Lab 1013-435	1
University Physics 1017-311, 312	8
University Physics Lab 1017-375, 376	2
Liberal Arts (Core) *	8
Cooperative Education 1010-499 (Optional)	
<i>Third Year</i>	
Introduction to Polymer Technology 1014-301	2
Introduction to Physical Chemistry 1014-340	3
Differential Equations 1016-306	4
University Physics 1017-313	4
University Physics Lab 1017-377	1
Organic Chemistry II, III 1013-432, 433	6
Preparative Organic Chemistry II Lab 1013-436	1
Chemical Thermodynamics 1014-441	3
Chemical Literature 1010-401	2
Chemical Thermodynamics Lab 1014-445	1
Liberal Arts (Core/Concentration) *‡	4
Cooperative Education 1010-499 (Optional)	

## Fourth Year

Quantum Chemistry	1014-442	3
Quantum Chemistry Lab	1014-446	1
Chemical Kinetics	1014-443	3
Chemical Kinetics Lab	1014-447	1
Organic Chemistry of Polymers	1013-601	4
Synthesis of High Polymers Lab	1014-605	2
Inorganic Chemistry I	1012-562 §	3
Physical Chemistry of Polymers	1014-602	4
Liberal Arts (Concentration)*		8
Cooperative Education	1010-499 (Optional) ¶	

## Fifth Year

Structure-Property Relationships in Polymers	1014-603	4
Characterization of High Polymers Lab	1014-604	2
Chemistry Electives		6
Liberal Arts (Electives)*‡		12
Liberal Arts (Senior Seminar)*	0520-501	2
Institute-wide Electives #		
Cooperative Education	1010-499 (Optional) ¶	

Total Quarter Credit Hours 182

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ ACS requirements include two quarters of a language (preferably German) unless a student had three years of one language in high school.

§ Inorganic Chemistry I will be 4 credits as of 1997-98.

# 1010-541, 542, 543, Chemistry Research, may be used as Institute-wide electives and are highly recommended. Electives are necessary to bring the total quarter credit hours to 180 for graduation. Twelve credits are necessary for full-time status.

¶ Students must take A-block co-op.

### Polymer chemistry, combined BS/MS degree, typical course sequence (BS degree is ACS certified)

## First Year

	Quarter Credit Hours	
Chemical Safety	1010-200	1
Introduction to Co-op Seminar	1010-230	1
General Chemistry I, II	1010-251, 252	7
General Chemistry I Lab	1010-255	1
Quantitative Analysis I, II	1008-261, 262	7
Quantitative Analysis Lab I, II	1008-265, 266	3
Calculus I, II, III	1016-251, 252, 253	12
Computer Techniques (FORTRAN)	0602-205	3
Liberal Arts (Core)*		20
Physical Education Electives †		0
Cooperative Education	1010-499 (Optional, summer)	

## Second Year

Instrumental Analysis	1008-311	3
Instrumental Analysis Lab	1008-318	1
Separations Techniques	1008-312	3
Separations Techniques Lab	1008-319	1
Calculus IV	1016-305	4
Differential Equations	1016-306	4
Organic Chemistry I	1013-431	3
Preparative Organic Chemistry I Lab	1013-435	1
University Physics	1017-311, 312, 313	12
University Physics Lab	1017-375, 376, 377	3
Liberal Arts (Core)*		12
Liberal Arts (Concentration)*‡		8
Cooperative Education	1010-499 (Optional)	

## Third Year

Introduction to Polymer Technology	1014-301	1
Introduction to Physical Chemistry	1014-340	3
Chemical Literature	1010-401	2
Organic Chemistry II, III	1013-432, 433	6
Preparative Organic Chemistry II Lab	1013-436	1
Chemical Thermodynamics	1014-441	3
Chemical Thermodynamics Lab	1014-445	1
Liberal Arts (Concentration)*‡		8
Liberal Arts (Electives)*‡		12
Chemistry Electives §		5
Cooperative Education	1010-499 (Optional)	

## Fourth Year

Quantum Chemistry	1014-442	3
Quantum Chemistry Lab	1014-446	1
Organic Chemistry of Polymers	1013-601	4
Physical Chemistry of Polymers	1014-602	4
Characterization of High Polymers Lab	1014-604	2
Synthesis of High Polymers Lab	1014-605	2
Chemical Kinetics	1014-443	3
Chemical Kinetics Lab	1014-447	1
Advanced Instrumental Analysis	1008-711	3
Advanced Instrumental Analysis Lab	1008-720	2
Inorganic Chemistry I	1012-762 #	3
Liberal Arts (Senior Seminar)*	0520-501	2
Chemistry Electives §		5
Research & Thesis Guidance	1010-879 ¶	3

## Fifth Year

Structure-Property Relationships in Polymers	1014-603	4
Chemistry Seminar	1010-870	2
Research & Thesis Guidance	1010-879 ¶	6-13
Course work in this year will be determined by the Graduate Committee and will need to fulfill the requirement of 225 total credit hours.	§	

Total Quarter Credit Hours 227

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ ACS requirements include two quarters of a language (preferably German) unless a student had three years of one language in high school.

§ A minimum of 36 hours of 700-level or higher chemistry courses is required to graduate with both a BS and MS degree in chemistry.

# Inorganic Chemistry I will be 4 credits as of 1997-98.

¶ A student will normally have 9-16 credit hours of Research and Thesis Guidance.

## Mathematics and Statistics

Rebecca E. Hill, Professor, Head

Over the past several years a growing demand has developed for mathematicians and statisticians with broad-based quantitative backgrounds and extensive computer skills. Indeed, mathematical and statistical theory is the basis for many fields of practical application, and employers need people whose education merges mathematics with another field of study: computer science, statistics, chemistry, physics, engineering, or business, to name a few.

The department of mathematics and statistics has established three BS degree programs in response to these long-term industry needs: applied mathematics, computational mathematics and applied statistics. Each has been carefully designed to meet the needs of both students and their potential employers. Constant feedback from industry has enabled the department to continuously update its courses, programs and equipment in order to make sure students are well-trained in current techniques, equipment and applications. Students utilize symbolic computation software in many of their courses. Our innovative "smart classroom" and new symbolic computation lab lend support to all of our programs. Industrial needs and trends are carefully discussed with employers in order to update the curricula, and graduates find that their RIT backgrounds seem tailor-made for their professional careers.

Many exciting career opportunities exist for mathematics majors. Students typically become involved in research, consulting, or using computers for statistical analyses or to analyze complex mathematically modeled physical problems.

Examples of co-op and permanent jobs typically obtained by department of mathematics and statistics majors include the following:

*actuary  
analyst for mathematical modeling  
statistician  
mathematical statistician  
demographics analyst  
software designer  
scientific programmer  
systems analyst  
cryptographic mathematician  
manufacturing engineering consultant  
biological systems analyst  
computer modeling consultant  
graphic modeling consultant  
simulations programmer  
reliability analyst  
statistical forecaster  
robotics software specialist  
database programmer  
data analyst  
telecommunications analyst  
software engineer  
marketing analyst  
aerospace systems analyst*

Students in all three programs enjoy small classes and frequently get to know their teachers outside the classroom. Job opportunities for graduates are plentiful, and the department is proud of its outstanding record in placing students in both co-op and permanent jobs.

### **Actuarial studies**

A sequence of courses has been designed to assist students seeking a career in the actuarial sciences. The courses 1016-541 through 1016-545 not only provide a foundation for students who will work as actuaries, but also prepare students to take the first five actuarial exams. These courses may count for credit in any of the three major programs in the department of mathematics and statistics or may be taken independently.

### **BS/MS programs**

Each of the three BS degree programs has a complementary master's degree program that can be completed in one additional year. Students in all three BS programs will also be eligible to go directly into the department of mathematics and statistics' recently approved master of science program in industrial and applied mathematics.

### **Transfer programs**

Transfer programs are arranged on an individual basis.

### **Requirements for the BS degree**

The student must meet the minimum requirements of the Institute as described on pages 9–11. In addition he or she must complete the requirements contained in one of the particular programs listed here, or its equivalent, as determined and approved by the department of mathematics and statistics. In conjunction with a faculty adviser, individual student programs will be established to meet particular needs, interests and goals.

# Applied Mathematics

The applied mathematics program focuses upon the study and solution of problems that can be mathematically analyzed. Industry has a great need for individuals with this type of education. Students choose a sequence of courses from one of more than 20 application areas that provide them with the knowledge and skills to collaborate on complex problems with scientists, engineers, computer specialists or other analysts. Some application minors are applied statistics; biology; business; economics; chemistry; electrical, industrial or mechanical engineering; operations research; and imaging science.

Graduates typically are employed in scientific, engineering and business environments, applying their mathematics background to the analysis and solution of real-world problems.

Applied mathematics students who minor in business can accelerate the MBA degree from RIT through careful choice of undergraduate courses. With one year of additional study, the BS and MBA can be granted simultaneously.

## Applied mathematics, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 1016-210, 211	2
Calculus I, II, III 1016-251, 252, 253	12
Calculus IV 1016-305	4
Introduction to Programming 0602-208	4
Program Design & Validation 0601-210	4
Computer Techniques—Fortran 0602-205	4
Science Electives	12
Liberal Arts (Core) *	8
Physical Education Electives †	0
<i>Second Year</i>	
Differential Equations I 1016-306	4
Probability & Statistics I, II 1016-351, 352	8
Co-op Seminar 1016-399	0
Foundations of Discrete Mathematics 1016-265	4
Differential Equations II 1016-307 or Matrices & Boundary Value Problems 1016-318 or Applied Statistics 1016-353	4
Matrix Algebra 1016-331	4
Liberal Arts (Core) *	16
Institute-wide Electives	8
<i>Third Year</i>	
Computer Methods in Applied Math 1016-437 or Numerical Analysis I 1016-511 or Numerical Analysis II 1016-512	4
Linear Algebra 1016-432	4
Mathematical Modeling 1016-461	4
Mathematics Elective	12
Liberal Arts (Core/Concentration) *	8
Cooperative Education 1016-499 (Optional)	0
<i>Fourth Year</i>	
Real Variables I, II 1016-411, 412	8
Mathematics Electives	8
Applications Minor	4
Liberal Arts (Concentration/Electives) *	12
Cooperative Education 1016-499 (Optional)	0
<i>Fifth Year</i>	
Abstract Algebra I, II 1016-531, 532	8
Applications Minor	8
Liberal Arts (Electives) *	8
Liberal Arts (Senior Seminar) * 0520-501	2
Cooperative Education 1016-499 (Optional)	0
<b>Total Quarter Credit Hours</b>	<b>184</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

# Computational Mathematics

Computational mathematics prepares students for a mathematical career that incorporates extensive computer science skills. In this program, much emphasis is given to use of the computer as a tool to solve mathematically modeled physical problems. Graduates of the program often choose positions as mathematical analysts, scientific programmers, software engineers or systems analysts. Job opportunities in private industry and government literally abound in this field.

The BS in computational mathematics can be joined with the MS in computer science. An accelerated program of study allows students who choose this option to receive both the BS and MS degrees following one year of graduate study.

## Computational mathematics, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 1016-210, 211	2
Calculus I, II, III 1016-251, 252, 253	12
Calculus IV 1016-305	4
Computer Science 1 0603-231	4
Computer Science 2 0603-232	4
Computer Science 3 0603-233	4
Science Electives	12
Liberal Arts (Core) *	8
Physical Education Electives †	0
<i>Second Year</i>	
Differential Equations I 1016-306	4
Probability & Statistics I, II 1016-351, 352	8
Foundations of Discrete Mathematics 1016-265	4
Co-op Seminar 1016-399	0
Matrix Algebra 1016-331	4
Computer Science 4 0603-334	4
Intro. to Digital Design 0603-351	4
Computer Organization 0603-352	4
Institute-wide Elective	4
Liberal Arts (Core) *	12
<i>Third Year</i>	
Linear Algebra 1016-432	4
Theory of Graphs & Networks 1016-467	4
Mathematical Modeling 1016-461	4
Software Engineering 0603-361	4
Mathematics Elective	4
Computer Science Elective	4
Liberal Arts (Core) *	8
Cooperative Education 1016-499 (Optional)	0
<i>Fourth Year</i>	
Real Variables I 1016-411	4
Numerical Analysis I, II 1016-511, 512	8
Mathematics Electives	4
Institute-wide Elective	3
Liberal Arts (Concentration) *	12
Cooperative Education 1016-499 (Optional)	0
<i>Fifth Year</i>	
Abstract Algebra I, II 1016-531, 532	8
Mathematics Elective	4
Computer Science Elective	4
Liberal Arts (Electives) *	12
Liberal Arts (Senior Seminar) * 0520-499	2
Cooperative Education 1016-499 (Optional)	0
<b>Total Quarter Credit Hours</b>	<b>189</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ The following sequence may be substituted: Introduction to Programming, 0602-208; Program Design & Validation, 0602-210; and Fundamentals of Computer Science for Transfer Students, 0603-360.

## Applied Statistics

The applied statistics program provides the student with a solid foundation in mathematical and statistical principles, experience in the application of statistics, thorough knowledge of computers and statistical software, and the skills to communicate the results of a statistical analysis. The demand for graduates with this type of preparation is precipitated from the recognition by business, industry and government that a large number of problems can be effectively analyzed and solved using statistical methodology.

Graduates of the program collaborate with specialists in both scientific as well as nontechnical areas to design, experiment and interpret the results. Application areas include product designs, quality control, marketing, customer satisfaction and actuarial sciences.

The BS in applied statistics may be combined with an MS in applied and mathematical statistics. An accelerated program of study allows the student who chooses this option to receive both the BS and MS degrees following one year of graduate study.

### Applied statistics, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar 1016-210, 211	2
Calculus I, II, III 1016-251, 252, 253	12
Calculus IV 1016-305	4
Introduction to Programming 0602-208	4
Program Design & Validation 0602-210	4
Computer Techniques (FORTRAN) 0602-205	4
Science Electives	12
Liberal Arts (Core) *	8
Physical Education Electives †	0
<i>Second Year</i>	
Differential Equations 1016-306	4
Probability & Statistics I, II 1016-351, 352	8
Foundations of Discrete Mathematics 1016-265	4
Co-op Seminar 1016-399	0
Applied Statistics 1016-353	4
Matrix Algebra 1016-331	4
Statistical Quality Control 1016-358 or Research Sampling Techniques 1016-457	4
Institute-wide Elective	4
Liberal Arts (Core) *	16
<i>Third Year</i>	
Linear Algebra 1016-432	4
Regression Analysis 1016-354	4
Design of Experiments 1016-355	4
Mathematics Elective ‡	4
Institute-wide Electives	8
Liberal Arts (Core/Concentration) *	8
Cooperative Education 1016-499 (Optional)	
<i>Fourth Year</i>	
Nonparametric Statistics 1016-454	8
Mathematics Electives ‡	12
Institute-wide Elective	4
Liberal Arts (Concentration/Electives) *	12
Cooperative Education 1016-499 (Optional)	
<i>Fifth Year</i>	
Mathematical Statistics I, II 1016-451, 452	8
Statistics Seminar 1016-555	4
Mathematics Elective ‡	4
Liberal Arts (Electives) *	8
Liberal Arts (Senior Seminar) *	2
Cooperative Education 1016-499 (Optional)	
<b>Total Quarter Credit Hours</b>	<b>188</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Up to 16 quarter credits of mathematics electives may be chosen from the applied mathematics minor courses.

## Physics

Arthur Z. Kovacs, Ph.D., Head

The department of physics offers programs leading to the AS and BS degrees in physics. The BS degree in physics is a five-year program with cooperative work experience beginning as early as the summer of the second year. Graduates with this degree find employment opportunities with industrial, academic and governmental agencies, or continue their education in MS or Ph.D. programs in physics or physics-related areas, such as biophysics, geophysics, atmospheric science, imaging science and engineering. Students may also prepare for entry into medical, law or business schools.

### Requirements for the BS degree in physics

The student must meet the minimum requirements of the Institute as described on pages 9–11. In addition, he or she must complete the requirements contained in the program shown here or its equivalent as determined and approved by the department of physics. In conjunction with a faculty adviser, individual student programs will be established to meet particular needs, interests and goals. A planned elective concentration in another field such as biology, chemistry, mathematics, computer science, business or imaging science is possible.

Students may elect to take a concentration in optics as part of their BS degree in physics. The concentration includes, in part, three courses: Optical Physics II, Laser Physics and Experimental Optics. These can be taken as physics, technical or free electives during the fourth and fifth years with no additional credit hours to obtain a BS degree.

For additional information on the AS and BS degree requirements, contact the head of the department of physics.

### Physics, BS degree, typical course sequence

First Year	Quarter Credit Hours
Physics Orientation 1017-200	1
University Physics I, II 1017-311, 312	8
University Physics Lab I, II 1017-371, 372	2
Calculus I, II, III 1016-251, 252, 253	12
Chemical Principles I, II 1011-211, 212	6
Chemistry Lab I, II 1011-205, 206	2
Computational Physics with FORTRAN Applications 1017-317	4
Liberal Arts (Core) *	16
Physical Education Electives †	0
<b>Second Year</b>	
University Physics III 1017-313	4
University Physics Lab III 1017-373	1
Introduction to Modern Physics 1017-314	4
Introduction to Semiconductor Physics 1017-315	4
Introduction to Laboratory Techniques 1017-321	4
Modern Physics Lab 1017-374	1
Sophomore Physics Seminar 1017-350	1
Calculus IV 1016-305	4
Differential Equations I 1016-306	4
Free Elective or Electronic Measurements 1017-431‡	4
Liberal Arts (Core) *	12
(Free Electives) (Optional)	(6-8)
Cooperative Education 1017-499 (Optional)	
<b>Third Year</b>	
Intermediate Mechanics 1017-401, 402	8
Thermal Physics 1017-415	4
Electronic Measurements 1017-431 (or Free Elective‡)	4
Theoretical Physics I, II 1017-480, 481	8
Liberal Arts (Concentration) *	8
Cooperative Education 1017-499 (Optional)	
<b>Fourth Year</b>	
Electricity and Magnetism 1017-411, 412	8
Experimental Physics I 1017-421	3
Optical Physics I 1017-455	4
Introduction to Quantum Mechanics 1017-522	4
Physics Elective (400-500-level)	4
Liberal Arts (Concentration)	4
Liberal Arts (Elective) *	4
Cooperative Education 1017-499 (Optional)	
<b>Fifth Year</b>	
Solid State Physics 1017-531	4
Physics Seminar 1017-550	1
Technical Elective	3
Free Elective	8
Liberal Arts (Electives) *	8
Liberal Arts (Senior Seminar) * 0520-501	2
(Free Electives) (Optional)	(8)
Cooperative Education 1017-499 (Optional)	
<b>Total Quarter Credit Hours</b>	<b>183</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Permission of adviser required

## Allied Health Sciences

John M. Waud, Ph.D., Head

The department of allied health sciences includes programs of study in biomedical computing, medical technology, physician assistant and two medical imaging technologies: diagnostic medical sonography (ultrasound) and nuclear medicine technology. Each is designed to prepare students for entry into careers in the health sciences. Graduates find employment opportunities in hospitals and clinics, in research facilities, in industry and with many governmental agencies. Some continue their education in graduate and professional schools.

All of the BS programs offered by the department of allied health sciences can serve as preprofessional programs for schools of medicine, veterinary medicine or dentistry.

In addition to the BS programs, the department of allied health sciences offers a certificate option in diagnostic medical sonography and nuclear medicine technology as well as an MS degree program in clinical chemistry.

## Biomedical Computing

Nicolas A. Thireos, MS, Program Director

RIT's BS degree curriculum in biomedical computing is one of only a few similar programs in the United States. It was developed by the College of Science and the School of Computer Science because of the increasing use of computers in every aspect of health care as well as biomedical research and education. Students receive training in the basic sciences, medical sciences and computer science with emphasis on clinical and laboratory applications. This array of courses provides graduates with the ability to communicate with medical personnel and trains them to develop computer applications for the solution of clinical problems, laboratory analyses, medical information systems, medical research and education.

Students are strongly encouraged to obtain experiential biomedical computing education by participation in the cooperative education program (co-op). Co-op allows them to alternate quarters in school with quarters in paid employment, starting with the summer at the end of the second year. It also provides the opportunity to practice new skills in real-life situations and to test their chosen field before making a lifelong commitment. The experiences students acquire not only make their education more relevant, but also make them more valuable to prospective employers.

Students consult with faculty advisers in order to tailor their academic programs to individual career goals. Upper-level electives are used to prepare graduates for specialized employment opportunities within biomedical computing, for graduate school in the sciences or computer science, or for post-graduate professional school.

### Requirements for the BS in biomedical computing

The student must meet the minimum requirements of the Institute as described on pages 9-11 and, in addition, must complete the requirements contained in this program or its equivalent, as determined and approved by the department of allied health sciences. Transfer students may be required to take additional course work, depending on the program they attended at their previous school. Specific requirements will be determined for each transfer student by the department.

For more information on AS and BS degree requirements, contact the head of the department of allied health sciences.

**Biomedical computing, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
General Biology 1001-201, 202, 203	9
General Biology Lab 1001-205, 206, 207	3
General & Analytical Chemistry Lecture 1011-215, 216, 217	10
General & Analytical Chemistry Lab 1011-205, 206, 227	4
Computers in Medicine 1026-230	4
M Programming 1027-305	4
Computer Science Elective	4
Freshman Seminar 1026-203	1
Liberal Arts (Core) *	8
Physical Education Electives †	0
<i>Second Year</i>	
Computer Science 1 0603-231	4
Computer Science 2 0603-232	4
Computer Science 3 0603-233	4
Calculus I, II 1016-251, 252	8
or	
Introduction to Calculus I, II 1016-214, 215	(6)
Medical Terminology 1026-301	3
Introduction to Biomedical Computing Seminar 1027-201	1
Physiology & Anatomy I, II 1001-305, 306	10
Program Elective	4
Liberal Arts (Core) *	8
<i>Third Year</i>	
Discrete Mathematics I 1016-265	4
Introduction to Digital Design 0603-351	3
Computer Organization 0603-352	3
Clinical Lab Instrumentation 1024-432	4
Data Analysis I 1016-319	4
University Physics I, II 1017-311, 312	8
University Physics Lab I, II 1017-375, 376	2
or	
College Physics I, II 1017-211, 212	(6)
College Physics I, II Lab 1017-271, 272	(2)
Liberal Arts (Core/Concentration) *	8
Cooperative Education 0000-000 (Optional)	
<i>Fourth Year</i>	
Computer Science 4 0603-334	4
Electricity & Electronics 1017-331	4
Liberal Arts (Electives/Concentration) *	16
Program Electives	16
Chemistry Electives	6
Liberal Arts (Senior Seminar) * 0520-501	2
Cooperative Education 0000-000 (Optional)	
<b>Total Quarter Credit Hours Required</b>	<b>185</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

NOTE: Cooperative education (co-op) can be any quarter beginning with the summer at the end of the second year.

## Medical Technology

James C. Aumer, MS, C(ASCP), Program Director

The medical technology program prepares students for employment in hospital laboratories; industrial, medical or research laboratories; and pharmaceutical companies. As medical technologists, they will perform analyses that aid in the diagnosis and treatment of disease. They must be able to carry out complex test determinations, operate sophisticated instrumentation, and detect and correct errors. The program leads to a bachelor of science degree and meets all requirements of the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).

Students attend classes at RIT during the fall, winter and spring quarters for three years. During the third year, they take a concentration of clinically oriented courses that prepare them for their hospital experience. In the Fall Quarter of their third year, they apply to hospital schools of medical technology that are approved by the National Accrediting Agency for Clinical Laboratory Science (NAACLS). They will

then spend their fourth academic year at the hospital that accepts them as an intern for clinical training in medical technology. While at the hospital, students receive additional course work as well as practical experience in each of the laboratory areas: hematology, microbiology, chemistry and immunohematology.

The medical technology program is affiliated with Rochester General Hospital and St. Mary's Hospital in Rochester, Daemen College in Buffalo, the Boston Veterans' Administration Medical Center and the Albany Medical Center Hospital. Students may, however, seek admission to any approved hospital for their clinical experience.

Upon successful completion of the hospital experience, the bachelor of science degree is awarded. The student is then eligible to take a national registry examination for certification as a medical technologist.

### Requirements for the BS degree in medical technology

The student must meet the minimum requirements of the Institute as described on pages 9–11 and, in addition, must complete the requirements contained in this program or its equivalent, as determined and approved by the department of allied health sciences. Transfer students will be required to complete a minimum of 45 quarter credit hours on campus and to complete all program requirements before beginning the clinical training experience. Specific requirements will be determined for each transfer student by the program director.

For more information on AS and BS degree requirements, contact the head of the department of allied health sciences.

### Medical technology, BS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
General Biology 1001-201, 202, 203	9
General Biology Lab 1001-205, 206, 207	3
General & Analytical Chemistry 1011-215, 216, 217	10
Chemistry I, II Lab 1011-205, 206	2
General & Analytical Chemistry III Lab 1011-227	2
Freshman Seminar 1026-203	1
Computers in Medicine 1026-230	4
Calculus for Management Science 1016-226	4
Liberal Arts (Core) *	12
Physical Education Electives †	0
<i>Second Year</i>	
Medical Technology Seminar 1024-210	1
Physiology & Anatomy 1001-305, 306	10
Organic Chemistry 1013-231, 232, 233	9
Organic Chemistry Lab 1013-235, 236	2
College Physics 1017-211, 212, 213	9
College Physics Lab 1017-271, 272, 273	3
Medical Genetics 1004-315	2
Liberal Arts (Core) *	16
<i>Third Year</i>	
Clinical Laboratory Topics 1026-351, 352, 353	3
Hematology/Immunohematology 1024-401	4
Microbiology 1001-404	5
Biochemistry 1009-334	4
Clinical Lab Instruments; Clinical Chemistry 1024-432, 433	8
Data Analysis I 1016-319	4
Immunology 1001-402	3
Diagnostic Bacteriology and Mycology 1024-405	4
Liberal Arts (Concentration) *	12
Elective	4
<i>Fourth year taken at an approved hospital for training medical technologists</i>	
<b>Total Quarter Credit Hours</b>	<b>148</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

## Physician Assistant

Heidi Miller, PA-C, BS, Program Director  
Nancy Valentage, PA-C, BS, Clinical Coordinator

The RIT physician assistant program is a four-year curriculum focusing on primary care and awarding a bachelor of science (BS) degree upon completion. The first two years involve core courses in basic sciences, mathematics and liberal arts. The third and fourth years, considered the upper division of the program, encompass 21 months. (Students participate in the program during the summer between these last two years.) This includes nine months of clinical course work and 12 months of clinical rotations. Qualified transfer students are accepted into any one of the first three years of the program.

Physician assistants provide diagnostic and therapeutic health care in conjunction with a supervising physician. They perform tasks that have, in the past, been performed by physicians, such as:

- Eliciting medical histories
- Conducting physical examinations
- Ordering laboratory and radiological testing
- Diagnosing common illnesses
- Determining treatment
- Giving medical advice
- Counseling and educating patients
- Promoting “wellness” and disease prevention
- Assisting in surgery
- Casting and suturing

Physician assistants' duties vary depending on the state and the specialty in which they practice. In most states, PAs also prescribe medications. Specialties include internal medicine, emergency medicine, geriatrics, pediatrics, obstetrics/gynecology, general surgery, orthopedic surgery, neurosurgery, neonatology, etc. The clinical rotations during the upper division provide the student with an opportunity to explore these specialty areas.

In addition to RIT's general admission procedures (see page 331), the physician assistant program requires completion of a supplemental data packet, application and successful completion of an admission interview (by invitation). For details of the admission procedure utilized by the physician assistant program, please contact the RIT Office of Admissions (716-475-6631). It is also important to note that the minimum grade point average for acceptance into the physician assistant program is 3.0 (on the basis of a 4.0 maximum) for high school students and 2.8 (on the basis of a 4.0 maximum) for transfer students. In order to graduate from the program, a GPA of 2.8 or better must be maintained.

### Physician assistant, BS degree, typical course sequence

First Year	Quarter Credit Hours
Freshman Seminar 1026-203	1
General Biology 1001-201, 202, 203	9
General Biology Lab 1001-205, 206, 207	3
Calculus for Management Science 1016-226	4
General & Analytical Chemistry I, II, III 1011-215, 216, 217	10
Chemistry I, II 1011-205, 206	2
General & Analytical Chemistry III Lab 1011-227	2
Computers in Medicine 1026-230	4
Behavioral Medicine 1032-200	2
Liberal Arts (Core) *	12
Physical Education Electives †	0

Second Year	Quarter Credit Hours
Physiology & Anatomy 1001-305, 306	10
Organic Chemistry 1013-231, 232, 233	9
Organic Chemistry Lab 1013-235, 236, 237	3
Data Analysis I 1016-319	4
Physician Assistant Seminar 1032-210	1
Program Elective	4
Liberal Arts (Core) *	20

Third Year	Quarter Credit Hours
Medical Microbiology 1032-406	4
Medical Pathophysiology 1026-415	4
Medical Lab Testing 1024-450	4
Patient History and Physical Exam I, II, III 1032-401, 402, 403	4
Clinical Skills 1032-410	1
Clinical Pharmacology I, II, III 1032-420, 421, 422	8
Clinical Diagnostic Imaging 1032-430	1
Clinical Medicine I, II, III 1032-440, 441, 442	15
Clinical Rotation I 1032-490 ‡	12
Liberal Arts (Core) *	8

Fourth year taken at an approved hospital for training physician assistants	Quarter Credit Hours
Clinical Rotation II, III, IV 1032-491, 492, 493	36

**Total Quarter Credit Hours** 197

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Mandatory rotations are in fields of general clinical practice that build a solid basic understanding and groundwork. These required rotations are Internal Medicine (in-patient and out-patient), Family Practice, Emergency Medicine, OB/Gyn, Pediatrics, General Surgery and Psychiatry. Students also will be provided with two elective rotations. These latter rotations allow students to individualize their experiences according to their own areas of interest.

## Medical Imaging Technologies

### Nuclear Medicine Technology

Kristen M. Waterstram-Rich, BS, CNMT, Program Director  
Nancy H. McKee, BS, CNMT, Clinical Coordinator

The program leading to a BS degree in nuclear medicine technology spans four years, the first three of which are spent on campus. The fourth year consists of clinical education at one or more approved hospitals in addition to classes at RIT that reinforce the clinical education.

#### Clinical training

Students who complete all required courses of the first three years of the program with a minimum overall and principal field of study GPA of 2.0 are eligible to begin clinical training in August of their fourth year. The first three weeks of training are an intensive introduction to the theory and practice of nuclear medicine technology. Classes during this time are held on the RIT campus, and laboratory sessions may take place at affiliated hospitals. Before students are allowed to begin their clinical education, they must be certified in community CPR (cardiopulmonary resuscitation).

Most of the clinical education is provided in nuclear medicine departments of the program's hospital affiliates. Each student is assigned (subject to the hospital's approval) a particular combination of three hospitals and trains approximately three months in each. The teaching is done primarily by physicians and technologists on the hospital staffs. Student progress and performance are monitored by the RIT nuclear medicine technology clinical coordinator, who makes periodic visits to the hospital departments.

The RIT nuclear medicine technology program has affiliations with hospitals in the Syracuse, Rochester, Buffalo, Binghamton and Elmira areas of upstate New York.

**Requirements for the BS degree**

The student must meet the minimum requirements of the Institute as described on pages 9–11 and, in addition, must complete the requirements contained in this program or its equivalent, as determined and approved by the department of allied health sciences. In conjunction with a faculty adviser, individual student programs will be established to meet particular needs, interests and goals. A planned elective concentration in another field such as biology, chemistry, mathematics, computer science, business or general medical imaging is possible.

For further information on degree requirements, contact the program director or the head of the department of allied health sciences.

**Requirements for the certificate program**

The student must meet the Institute requirements and prerequisite course requirements. The certificate in nuclear medicine technology is available to associate and baccalaureate degree graduates and licensed or certified allied health practitioners with equivalent education and experience.

**Accreditation**

The nuclear medicine technology program is accredited through the Joint Review Commission on Educational Programs in Nuclear Medicine.

**Nuclear medicine technology, BS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
General Biology 1001-201, 202, 203	9
General Biology Lab 1001-205, 206, 207	3
General & Analytical Chemistry 1011-215, 216, 217	10
Chemistry I, II Lab 1011-205, 206	2
General & Analytical Chemistry III Lab 1011-227	2
Freshman Seminar 1026-203	1
Calculus for Management Science 1016-226	4
Computers in Medicine 1026-230	
or	
Survey of Computer Science 0602-200	4
Liberal Arts (Core) *	12
Physical Education Electives †	0
<i>Second Year</i>	
Introduction to Diagnostic Medical Imaging 1026-205	2
Medical Terminology 1026-301	3
College Physics 1017-211, 212, 213	9
College Physics Lab 1017-271, 272, 273	3
Survey of Organic Chemistry 1011-202	3
Survey of Organic Chemistry Lab 1011-207	1
Biochemistry I 1011-203	4
Physiology & Anatomy 1001-305, 306	10
Liberal Arts (Core) *	16
Physical Education Electives †	0
<i>Third Year</i>	
Radiation Physics 1017-351, 352, 353	15
Radiation Biology 1001-430	4
Data Analysis I 1016-319	4
Liberal Arts (Concentration) *	12
Program Electives	10

**Fourth Year**

Introduction to Clinical Nuclear Medicine 1025-401 ‡	4
Nuclear Medicine Procedures—Central Nervous System 1025-402	1
NM Procedures—Skeletal System 1025-502	1
NM Procedures—Respiratory System 1025-503	1
NM Procedures—Urinary System 1025-510	1
NM Procedures—Endocrine System 1025-511	2
NM Procedures—Cardiovascular System 1025-512	2
NM Procedures—Digestive System 1025-513	2
NM Procedures—Special Studies 1025-514	1
NM Procedures—Hematological & In Vitro Studies 1025-515	1
Instrumentation & Computers in Nuclear Medicine 1025-516	2
Radiochemistry & Radiopharmacology 1025-517	2
Radionuclide Therapy 1025-518	1
Radiation Health Safety 1025-519	2
Radioassay 1025-520	4
Review in Nuclear Medicine 1025-521	2
Clinical Nuclear Medicine I 1025-522 §	7
Clinical Nuclear Medicine II 1025-523 §	7
Clinical Nuclear Medicine III 1025-524 §	7

**Total Quarter Credit Hours**

194

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Students should be certified in CPR before this course is taken.

§ Clinical internships—affiliated hospitals

### Nuclear medicine technology, certificate program, typical course sequence

	<i>Quarter Credit Hours</i>
Introduction to Diagnostic Medical Imaging 1026-205	2
Data Analysis I 1016-319	4
Radiation & the Human Body 1025-310	2
Nuclear Medicine Physics & Instrumentation 1017-358	6
Introduction to Nuclear Medicine 1025-401	4
Nuclear Medicine Procedures—Central Nervous System 1025-402	1
NM Procedures—Skeletal System 1025-502	1
NM Procedures—Respiratory System 1025-503	1
NM Procedures—Urinary System 1025-510	1
NM Procedures—Endocrine System 1025-511	2
NM Procedures—Cardiovascular System 1025-512	2
NM Procedures—Digestive System 1025-513	2
NM Procedures—Special Studies 1025-514	1
NM Procedures—Hematological & In Vitro Studies 1025-515	1
Instrumentation & Computers in Nuclear Medicine 1025-516	2
Radiochemistry & Radiopharmacology 1025-517	2
Radionuclide Therapy 1025-518	1
Radiation Health Safety 1025-519	2
Radioassay 1025-520	4
Review in Nuclear Medicine 1025-521	2
Clinical Nuclear Medicine I 1025-522 *	7
Clinical Nuclear Medicine II 1025-523 *	7
Clinical Nuclear Medicine III 1025-524 *	7
<b>Total Quarter Credit Hours</b>	<b>64</b>

\* *Clinical internships—affiliated hospitals*

## Diagnostic Medical Sonography (Ultrasound)

Hamad Ghazle, MS, RDMS, Program Director

Roxanne Schon, BA, CNMT, RDMS, Clinical Coordinator

Diagnostic medical sonography, one of the fastest growing areas in diagnostic medicine, is an imaging modality that utilizes high-frequency sound waves in the diagnosis and treatment of disease and in the evaluation of the developing fetus. RIT's program is one of only four such degree programs in the nation. It offers both a bachelor of science degree and a certificate option.

The intent of the program is to prepare leaders in the field. Skills in administration and research are emphasized in addition to the development of scanning and diagnostic abilities. Upon successful completion of the program requirements, the student is eligible to take a national certifying examination for abdominal, obstetrical and gynecological ultrasound. Each candidate is also introduced to vascular examination.

The program also prepares the student for several professions in medicine and research. A preprofessional committee assists the student with the application process for graduate or medical schools. Graduates are prepared to pursue a variety of career options in medical, industrial and educational settings both nationally and internationally. Our graduates can be found in a wide range of positions, including supervisory or administrative positions in hospitals, clinics, private physician's offices, teaching, research, sales and industry. Graduates can also choose to work freelance or for mobile services.

### Requirements for the BS degree

The student must meet the minimum requirements of the Institute as described on pages 9–11 and, in addition, must complete the curriculum requirements listed here or the equivalent, as determined and approved by the department of allied health sciences. The BS degree is typically a four-year program, including clinical internship, unless the student has transfer credit from another institution. Associate degree holders may be able to complete a BS degree in two years; additional course work may be required. Contact the program director for further information on BS degree requirements.

### Requirements for the certificate option

The student must meet the Institute requirements as well as the specific requirements listed here. The certificate option is a one-year course of study that includes lectures integrated with the clinical internship. Certain prerequisite courses must be completed before entering the certificate option. Contact the program director for further information on prerequisite course work. The certificate option is available to all registered allied health practitioners, as well as to those holding a bachelor's degree in a relevant discipline.

### Clinical internship

The clinical internship provides hands-on experience in two or more medical facilities in upstate New York. All students begin the internship by attending an intensive three-week experience on the RIT campus. During this time, they learn basic pathology and how to perform complete sonographic examinations and recognize anatomy. They also become familiar with typical hospital department operations. Lectures and case reviews are a large component of the preclinical session. After completing the requirements, candidates are assigned to a medical facility for clinical experience. Each month, they return to campus for three days of lectures, presentations, projects and testing.

### Accreditation

The program is accredited by the Joint Review Committee on Education in Diagnostic Medical Sonography of the American Medical Association.

### Diagnostic medical sonography, BS degree, typical course sequence

	<i>Quarter Credit Hours</i>
<b>First Year</b>	
General Biology 1001-201, 202, 203	9
General Biology Lab 1001-205, 206, 207	3
General & Analytical Chemistry 1011-215, 216, 217	10
Chemistry I, II Lab 1011-205, 206	2
General & Analytical Chemistry III Lab 1011-227	2
Freshman Seminar 1026-203	1
Computers in Medicine 1026-230	4
Calculus for Management Science 1016-226	4
Liberal Arts (Core) *	12
Physical Education Electives †	0
<b>Second Year</b>	
College Physics 1017-211, 212, 213	9
College Physics Lab 1017-271, 272, 273	3
Introduction to Diagnostic Medical Imaging 1026-205	2
Medical Terminology 1026-301	3
Physiology & Anatomy 1001-305, 306	10
Data Analysis I 1016-319	4
Liberal Arts (Core) *	16
<b>Third Year</b>	
Cross-Sectional Anatomy 1030-412	4
Ultrasound Instrumentation 1030-413	4
Pathophysiology 1026-415	4
Medical Genetics 1004-315	2
Ultrasonic Physics 1017-361	5
Program Electives	16
Liberal Arts (Concentration) *	12
<b>Fourth Year</b>	
Introduction to Obstetrical Ultrasound 1030-552	3
Gynecologic Ultrasound 1030-553	3
Abdominal Ultrasound I 1030-556	3
Clinical Ultrasound I 1030-570	7
Advanced Obstetrical Ultrasound 1030-554	4
Abdominal Ultrasound II 1030-557	3
Ultrasound Seminar 1030-560	2
Clinical Ultrasound II 1030-571	7
Small Parts Ultrasound 1030-558	3
General Vascular Evaluation 1030-414	4
Research Seminar 1030-561	2
Clinical Ultrasound III 1030-572	7
<b>Total Quarter Credit Hours</b>	<b>189</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

**Diagnostic medical sonography, certificate program, typical course sequence***Must be completed before entering certificate program \**

Introduction to Diagnostic Medical Imaging 1026-205	2
Cross-Sectional Anatomy 1030-412	4
Ultrasound Instrumentation 1030-413	4
Pathophysiology 1026-415	4

**Internship**

Introduction to Obstetrical Ultrasound 1030-552	3
Gynecologic Ultrasound 1030-553	3
Abdominal Ultrasound I 1030-556	3
Clinical Ultrasound I 1030-570	7
Advanced Obstetrical Ultrasound 1030-554	4
Abdominal Ultrasound II 1030-557	3
Ultrasound Seminar 1030-560	2
Clinical Ultrasound II 1030-571	7
Small Parts Ultrasound 1030-558	3
General Vascular Evaluation 1030-414	4
Research Seminar 1030-561	2
Clinical Ultrasound III 1030-572	7

<b>Total Quarter Credit Hours</b>	<b>62</b>
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\* Other prerequisites may apply.

# Chester F. Carlson Center for Imaging Science

Harvey Rhody, Interim Director

Students in RIT's imaging science program study the applications of physics, computer science, chemistry and mathematics to the formation, recording, manipulation and perception of images. Design of imaging systems; evaluation of the images they produce; and the application of those systems to a broad range of careers in industry, business and government are all part of the imaging science curriculum. Concentrations include digital image processing, remote sensing, photographic chemistry and optics. In addition, a concentration in color science is offered in the Munsell Color Science Laboratory within the Center for Imaging Science. Both theoretical studies and practical application of technologies are integral parts of the program.

Imaging science is grounded in the physical and mathematical sciences. Built on this background are advanced studies in imaging principles, chemistry, optics and optical instrumentation, visual perception, color science and technology, photometry and radiometry, image microstructure, analysis and evaluation of imaging systems, digital image processing and remote sensing.

Career opportunities exist around the country in areas such as aerospace technology, office information systems, information handling, microelectronics, scientific and optical instrumentation, graphic arts, and photographic materials and systems. Graduates are employed in industrial and governmental research, marketing and technical representation.

The imaging science faculty are deeply committed professionals who divide their time between teaching and the pursuit of scientific advances.

The center provides funded research sponsored by both industry and government. This research support ensures that qualified students are exposed to the latest developments in a rapidly expanding field.

The Center for Imaging Science offers undergraduate and graduate programs in imaging science leading to BS, MS and Ph.D. degrees as well as an MS degree in color science.

A transfer program is available for the BS program in imaging science. Students with satisfactory credits in mathematics, chemistry and physics may transfer into the program beginning with the second year by taking an optional transfer program during Summer Quarter.

**Second-year entry transfer credit requirements**

Normally a minimum of 42 quarter credit hours are required to transfer into the imaging science BS program at this level. These should include: 8 credits of general chemistry (including lab), 4 credits of introductory organic chemistry, 12 credits in differential and integral calculus, 6 credits in physics and 12 credits in liberal arts.

**Four-year program: bachelor of science in imaging science**

The course content in this program is typical of science and engineering programs. The first two years contain fundamental courses in mathematics, chemistry and physics. The student simultaneously applies these fundamentals to studies in imaging science. The imaging science core program then continues with courses in radiometry; the structure of images, color and vision; and methods for analyzing imaging systems. Third- and fourth-year students select professional elective courses, and in the fourth year a research project is required.

**Imaging science, BS degree, typical course sequence**

First Year	Quarter Credit Hours
Survey of Imaging Science 1051-201	3
Introduction to Imaging Systems 1051-202	2
Introduction to Imaging Science 1051-203	2
C Programming for Imaging Science 1051-211	3
Chemical Principles I, II 1011-211, 212	6
Chemistry I, II Lab 1011-205, 206	2
Introduction to Organic Chemistry 1011-213	3
Introduction to Organic Chemistry Lab 1011-207	1
University Physics 1017-311, 312	8
Calculus I, II, III 1016-251, 252, 253	12
Liberal Arts (Core) *	12
Physical Education †	0
<b>Second Year ‡</b>	
Geometrical Optics 1051-302	4
Physical Optics 1051-303	4
Interaction Between Light & Matter 1051-313	4
Instrumental Methods of Analysis 1008-311	3
Instrumental Methods of Analysis Lab 1008-318	1
Calculus IV 1016-305	4
Differential Equations 1016-306	4
Matrix Algebra 1016-331	4
University Physics 1017-313	4
Introduction to Modern Physics 1017-314	4
Liberal Arts (Core) *	12
Physical Education †	0
<b>Third Year</b>	
Radiometry 1051-401	4
Vision, Color & Psychophysics 1051-402	4
Macroscopic Properties of Imaging Systems 1051-403	4
Statistics 1016-314	3
Applied Statistics 1016-353	4
Electronics 1017-431	4
Professional Electives	9-12
Liberal Arts (Core/Concentration) *	16
<b>Fourth Year</b>	
Research Practices & Technical Communications 1051-501	3
Senior Project 1051-502, 503	6
Imaging Systems Analysis 1051-511	3
Advanced Imaging Systems Analysis 1051-512	3
Quantum Limitations of Imaging Processes 1051-513	3
Professional Electives	credit varies
Liberal Arts (Electives) *	12
Liberal Arts (Senior Seminar) * 0520-501	2
<b>Total Quarter Credit Hours</b>	<b>194</b>

\* See page 10 for liberal arts requirements.

† See page 11 for policy on physical education.

‡ Upon successful completion of the second year, the AS in general sciences may be awarded.

# National Technical Institute for the Deaf

*Dr. James J. DeCaro, Dean*

The National Technical Institute for the Deaf (NTID), one of RIT's eight colleges, provides deaf students with educational programs that lead to meaningful employment in business, industry, government and education. NTID represents the world's first effort to educate large numbers of deaf students within a college campus planned principally for hearing students. NTID's location benefits both deaf and hearing students' academic, personal, social and communication development.

Nearly 1,100 deaf students from across the United States as well as from several U.S. territories and other countries study and reside at RIT.

NTID provides RIT's deaf students with technical and pre-professional training in more than 30 programs. An NTID education prepares students for technical careers in areas such as applied accounting, applied art and computer graphics, applied computer technology, electronic publishing and printing technology, manufacturing processes technology, office technologies, industrial technologies, construction technologies, ophthalmic optical finishing technology and imaging technology.

Traditionally, 95 percent of NTID graduates who enter the work force find employment in their fields of study.

Deaf students who take courses or matriculate into one of RIT's seven other colleges may request educational access services, which may include sign language interpreting in classrooms and laboratories and notetaking. Students also may request educational support services such as tutoring, personal and career counseling and academic advising.

For hearing students, NTID offers an associate degree in educational interpreting.

## **NTID's centers**

To serve its students, NTID is organized into seven operational units, or centers. Each center has a major programmatic focus. Through collaboration across the centers, a rich, coherent set of educational experiences is made available to students.

**Center for Technical Studies** This center is a comprehensive student-oriented academic area that serves students with declared majors and offers a variety of certificate, diploma and associate degree programs and courses in more than 30 technical areas, including applied accounting, applied art and computer graphics, applied computer technology, business occupations, electronic publishing and printing technology, manufacturing processes technology, office technologies, industrial technologies, construction technologies, ophthalmic optical finishing technology and imaging technology.

**Center for Arts and Sciences** This center is a comprehensive student-oriented academic area that offers an array of arts and science courses to a broad-based population of NTID students, including those who have matriculated into a program or are prebaccalaureate, underprepared or undecided. In addition, the center offers an associate degree in educational interpreting and provides a comprehensive sign language education program for students and faculty and staff members.

**Center for Baccalaureate and Graduate Studies** This center is a student-oriented academic and service area that provides comprehensive programs in support of students enrolled in more than 250 baccalaureate or graduate programs in RIT's seven other colleges. The educational support and access services available include academic advising, tutoring, notetaking and sign language interpreting. The center also offers prebaccalaureate discipline-related courses. In addition, the center provides access services through the department of interpreting services for deaf faculty, staff and students to be able to participate in all aspects of the RIT community. The center also offers a master of science in secondary education of students who are deaf or hard of hearing.

**Center for Research, Teaching and Learning** Activities within this center focus on understanding and enhancing the educational, social and communication opportunities for deaf individuals. The center provides services and programs that enhance teaching and learning within the NTID community and beyond via broad-based research activities, program and curriculum development, instructional design and evaluation, instructional media services, and faculty and staff professional development.

**Center for Student Resources** This center offers services that enhance learning as well as personal, social and career growth for a broad-based population of matriculated students. In conjunction with other centers, the Center for Student Resources offers such services as career development counseling and advising; personal and social counseling; learning centers; and a range of audiological, speech/language and psychological services. In addition, the center provides support for student life and athletic programs.

**Center for Outreach** This center establishes and maintains programs and linkages with external audiences, including prospective students, alumni, employers, vocational rehabilitation counselors, school personnel and media, in order to enhance opportunities for students and alumni as well as support the college in fulfilling its mission. Departments within this center include Alumni Relations, Educational Outreach, Center on Employment, Marketing Communications, and Recruitment and Admissions.

**Center for Institutional Services** All NTID administrative services are provided through this center, which coordinates comprehensive support services necessary for ensuring that access to computing and information resources meets the needs of students, faculty and staff members, and administrators. In addition, the center provides facilities management, including capital project management, space allocation, and classroom and meeting room scheduling.

### Admission requirements

To qualify for admission to RIT through NTID, students must meet standards agreed upon by RIT and the U.S. Department of Education, which include:

- **Hearing Loss** Students must have a hearing loss in the better ear (unaided) of 70 decibels (ANSI, 1969) or greater across the 500 and 2,000 Hertz range.
- **Educational Access Services Needs** Students must have a hearing loss that without educational access services seriously limits their chances for success in a regular college program. Educational access services include sign language interpreting and notetaking.
- **Educational Background** Admitted students should have an average eighth-grade achievement level or higher on a standardized achievement test that includes reading, math and language.
- **Secondary Schooling** Although most students have completed a secondary school program, some may be eligible for admission without certification if their school authorities so recommend. Age and personal/social maturity are given special consideration in such situations.

### Degrees offered through NTID

The academic programs offered through NTID lead to certificates, diplomas, associate in occupational studies degrees and associate in applied science degrees from RIT.

**Certificate:** Certification at this level requires 45–60 credit hours of technical instruction. These programs allow students to acquire a minimum level of technical skill before entering the work force. In addition to satisfactorily completing technical courses, students are required to complete a specific number of credit hours, determined by the program of study, in general education and communication courses.

**Diploma:** Certification at this level requires 40–75 credit hours of technical instruction. Students attain a maximum level of technical competency for entry-level positions and minimum exposure in the general education field. In addition to satisfactorily completing technical courses, students must complete a specific number of credit hours—determined by the program of study—in general education, communication and mathematics.

**Associate in occupational studies degree (AOS):** Certification at this level requires 60–75 credit hours of technical instruction. These programs permit students, upon completion, to enter their careers directly. In addition to satisfactorily completing technical courses, students must complete a specific number of credit hours—determined by the program of study—in English, communication, general education and mathematics.

**Associate in applied science degree (AAS):** Certification at this level requires 115–118 credit hours of technical instruction. These programs permit students, upon completion, to enter their careers directly, or, in certain cases, to transfer to upper-division programs at a college of their choice. In addition to satisfactorily completing technical courses, students must complete 20 credit hours in liberal arts courses, nine credit hours in required general education courses and approximately 32 credit hours in communication and English courses.

### Deaf students enrolled in other RIT colleges

In addition to NTID's programs, qualified deaf students also may take classes in another RIT college or may enroll as a baccalaureate or master's degree student in one of the more than 250 professional programs offered through RIT's other seven colleges: Applied Science and Technology, Business, Continuing Education, Engineering, Imaging Arts and Sciences, Liberal Arts and Science. This process is called cross registration.

Each RIT college has an affiliated NTID support department that provides services for deaf students. These services may include sign language interpreting, notetaking, tutoring and advising. The policies and procedures for requesting support services are outlined in "The Student Handbook: Your Guide to Support Services at RIT through NTID."

Students may choose to enroll in courses taught through the other seven colleges of RIT for several reasons: They may take selected courses at another RIT college as part of the elective requirements in their NTID programs; complete their programs of study at NTID, then continue their education at another RIT college; enter a program of another RIT college directly from high school; or transfer directly into a program in one of RIT's colleges from another postsecondary program.

Deaf students who wish to enroll in a program in another RIT college must meet its admission standards. Furthermore, deaf students supported by NTID also must meet NTID admission requirements listed on this page and complete both the NTID Supplemental Admission Application and standard RIT admission forms. (For admission information, see this page.)

### General education

Learning at NTID and the other colleges of RIT means more than gaining technical skills. NTID's general education courses provide students with a range of courses and experiences that help them become independent thinkers, develop personal and social skills, and better understand themselves and their places in the world. General education courses also help students develop a better understanding of their personal values and how they influence attitudes and behaviors; increase their ability for self-direction, lifelong learning and personal fulfillment; and enhance their skills in all modes of communication.

General education programs offer a variety of courses in the social sciences, humanities and performing arts that provide a sound general education experience for students completing certificates, diplomas and AOS degrees through NTID. The curriculum also provides preparatory courses for AAS and baccalaureate degree students completing their liberal arts requirements through RIT's College of Liberal Arts.

#### Required courses

All deaf students enrolled in NTID's certificate, diploma and associate degree programs are required to take three general education courses:

- **Freshman Seminar** helps students explore the academic and personal challenges of college life.
- **The Job Search Process** teaches students many skills they will need to find a job.
- **Contemporary Life Issues or Contemporary Social Issues** helps students broaden their understanding of themselves and current social issues.

Students pursuing an AOS degree are required to take one general education elective and **Human Experience I: An Individual Life; Human Experience II: The Individual and Society; and Human Experience III: The Individual and Technology**. These courses explore individual development and how the individual and society influence each other.

#### Writing program

The College of Liberal Arts, through the NTID Department of Liberal Arts Support, offers a two-course writing sequence preparatory to **English Composition** for students who meet the NTID English requirements for entry into College of Liberal Arts courses. **Written Communication I and II** provide additional experience with writing, reading and critical thinking techniques needed for success in **English Composition**. Eligible students must meet with NTID's writing coordinator before registering for these courses.

#### Liberal arts requirements

Deaf students enrolled in AAS or baccalaureate degree programs take required courses in language and literature, behavioral and social sciences, and science and humanities through the College of Liberal Arts. Students can choose between course sections taught by either NTID or College of Liberal Arts faculty members.

Liberal arts courses taught by NTID faculty members are designed especially for deaf students. Instructors use simultaneous communication and provide students with additional study guides and materials so that interpreters and notetakers are not needed.

Liberal arts courses taught by College of Liberal Arts faculty members include both deaf and hearing students. Educational access services, such as sign language interpreting and notetaking, may be requested by students. Students also may request educational support services such as tutoring and academic advising.

Deaf students are advised to earn a passing grade in **English Composition** before taking any additional liberal arts courses. Students studying in colleges other than NTID should consult with their program departments about required liberal arts courses.

Placement in **English Composition** is based on the NTID Liberal Arts Placement Test (LAPT) or upon satisfactory completion of **Written Communication II**.

Students seeking an AAS degree also are required to take courses in behavioral science, social science, and science and humanities.

Liberal arts courses taught by NTID faculty members include:

#### *Language, Literature and Communication*

Written Communication I  
Written Communication II  
English Composition  
Literature  
History  
Psychology  
Sociology  
Anthropology

#### *Criminal Justice*

Criminal Justice System  
Criminology

#### *Social Work*

Role of the Social Worker

#### Communication skills

Communication skills are critical for success in college, on the job and in the community. NTID faculty members recognize the need for efficient, effective communication and therefore have established course offerings covering a range of communication styles.

Deaf students are required to take up to 12 credit hours in communication courses, including American Sign Language, audiology, sign/simultaneous communication and speech as well as up to 20 credit hours in English. Students may demonstrate English proficiency by achieving certain test scores or completing certain courses with passing grades. These courses are designed for students who demonstrate need for additional work in English in order to achieve their degree goals.

#### Special topics courses

Students may explore topics of special interest in areas not offered through existing courses. One to five credit hours may be assigned for special topics courses.

#### Career exploration and decision making

The NTID Career Decision Making Program offers opportunities for students to collect information about RIT/NTID majors and career paths before deciding on a program of study. It also assists students who need additional academic study to prepare for their chosen major.

The program allows students the opportunity to do an intensive career search while they develop a better understanding of themselves through career and personal counseling; decision-making classes; intensive sampling of various majors at RIT/NTID; use of a computer guidance program (Discover) in the Career Resource and Testing Center; interest testing; and interpretation of aptitude, ability and achievement tests. In addition, students take courses in mathematics, English and general education as well as technical sampling courses or experiences. Some students also may take introductory courses in specific technical departments and liberal arts and be involved in extracurricular or other college-oriented activities. A career development counselor is assigned to assist students in evaluating the information and making a career decision. Students can remain in the Career Decision Making Program for one to three academic quarters. Additional quarters in the program are possible with the approval of the program coordinator.

**Career Resource and Testing Center**

The Career Resource and Testing Center (CRTC) at 1540 Johnson provides students with materials and information on careers and college programs with special services for deaf students. Services include access to the computerized guidance system; aptitude, interest and learning testing; as well as noncredit skill-building workshops on study skills, learning styles and stress management.

The CRTC is staffed by a professional counselor and is open daily with evening hours available upon request. For additional information or an appointment, call 716-475-6234 (TTY).

**College Skills Restoration Program**

There are times when students experience such serious academic difficulties that they fail to achieve the grade point average required to continue at the college. Whether a student does poorly due to an inappropriate choice of major, a lack of academic skills or an inability to balance the academic and social aspects of college life, the College Skills Restoration Program offers an option to suspension. The primary goal of the program is to help students determine the factors that contributed to academic failure and design a plan of action for gaining the skills, attitudes and habits necessary for future academic success.

To enter the program, students are required to complete a comprehensive application and participate in an interview process designed to evaluate their potential to improve. If accepted, students are required to enroll in a learning strategies course, develop an action plan that specifies goals for the

**FIXED CHARGES FOR NTID-SPONSORED STUDENTS**

	Summer Vestibule Program	Fall Quarter	All Other Quarters (per quarter)
Tuition	\$652	\$1,737	\$1,737
Room	399	1,106	1,106
Board (standard meal plan)	345	939	939
Student Fees <sup>1</sup>		153	153
Orientation Fee <sup>2</sup>		40	
SVP Accident/Sickness Insurance	18		
Accident/Sickness Insurance (not to exceed)		224	
<b>Total</b>	<b>\$1,414</b>	<b>\$4,207</b>	<b>\$3,935</b>

<sup>1</sup> Student fees are required of all full-time students and include: Student Health (\$50); Student Activities (\$42); Athletic (\$5); Student Alumni Union (\$54); and NTID Activities (\$2).

<sup>2</sup> Charge to cover cost of Fall Orientation Program for new students.

quarter, attend weekly meetings with their counselor to review journal reports describing their progress and participate in mid- and end-of-quarter progress review meetings with their counselor and chairperson. At the conclusion of the quarter, students make application to return to their original major or to be accepted into a new major. Counselors will provide an individualized report and recommendations to students' departments upon request. For more information or an application, call 716-475-6454 (voice/TTY).

### Costs of attending RIT through NTID

The total cost of attending RIT under NTID sponsorship includes tuition, room, board and fees. Charges to NTID-sponsored students are updated each year. Fixed charges for 1996–97 are listed above right.

Required laboratory fees, books and supplies will have an impact on students' costs. NTID costs for laboratory fees vary according to students' fields of study. Per-quarter laboratory fees for the 1996–97 academic year (Fall, Winter and Spring quarters) range from \$60–\$215.

The cost of books and supplies is students' responsibility. These costs also vary depending on the program of study. Annual costs for books and supplies for the 1996–97 academic year range from \$200–\$2,200.

New students accepted to the Summer Vestibule Program will be charged according to the fee schedule above.

Students on co-op are not charged tuition or fees for that particular quarter and are charged room and board and residence hall fees only if they live on campus while they work.

All students are required to carry accident and sickness insurance. Students may choose coverage through RIT at a cost of \$224 for the 1996–97 year, or they may waive this coverage if they provide evidence of other coverage. Waiver cards will be sent to all accepted students during the summer and will be available at registration.

### Transfer from another postsecondary school

Students enrolled in other postsecondary educational programs or colleges are encouraged to apply for admission to RIT through NTID if:

- they need educational access services such as interpreters and notetakers to aid them in their college studies, and these services are not available at the schools in which they are or were enrolled
- they decide to change their program of study to one that is not offered at the college they currently attend, but is offered by NTID or another RIT college
- they have completed a postsecondary program and have decided they want or need additional training; students may pursue advanced degrees by matriculating into any of RIT's other colleges.

For information about transfer credits, see page 332.

### Applying to NTID

All applications for admission to RIT's National Technical Institute for the Deaf are reviewed, and admissions notification is sent out two weeks after all application materials have been provided to NTID's Department of Recruitment and Admissions. There is no Early Decision Plan for admission to NTID.

Students applying to RIT through NTID must complete both the standard RIT application and the NTID supplemental application forms available from NTID's Department of Recruitment and Admissions. If deaf students want to enroll directly in one of RIT's other seven colleges, they still must complete both application forms. In addition to meeting NTID requirements, students also must fulfill requirements for admission to the selected program.

NTID students should submit their applications in the fall of the year before they wish to attend. The date of application is the date the application for undergraduate admission has been received by NTID's Department of Recruitment and Admissions. The NTID admission year is October 1–June 30 for applicants seeking Fall Quarter admission. Applications also are accepted for Winter and Spring quarters (see Institute calendar). NTID requires a \$100 deposit from accepted candidates.

### Application requirements

In order to complete the application process, students must submit the following:

1. a fully completed application for admission (includes RIT Part 1 and any NTID supplemental forms)
2. a nonrefundable \$40 application fee
3. NTID applicants should submit results from the Stanford Achievement Test-Advanced Level-Form J, Official Scholastic Assessment Test (SAT) or American College Test (ACT) results for freshmen applicants also are accepted.
4. an official high school transcript for all freshmen and for transfers with fewer than 30 semester hours or 45 quarter hours
5. official transcripts of all completed college course work and a listing of any courses in progress (and not on the transcript) or courses to be completed before enrolling at RIT.

### Transfer credit

Deaf students may transfer into an NTID program, or they may qualify for transfer directly into a program in another RIT college with NTID sponsorship. Deaf students accepted to the Summer Vestibule Program will have their transfer credit evaluated in the fall when they are accepted into a specific program.

### Campus visits

Deaf students who wish to enter NTID or another RIT college may write to NTID's Department of Recruitment and Admissions, Lyndon Baines Johnson Building, 52 Lomb Memorial Drive, Rochester, NY 14623-5604, or call 716-475-6273 (voice/TTY).

Deaf students may take regularly scheduled tours offered at NTID and arrange personal interviews. Both of these are optional and are not required for admission.

### Facilities

A modern academic/residential building complex on the campus is designed to meet the specific needs of deaf students. The Lyndon Baines Johnson Building, NTID's main academic facility, houses laboratories, offices, speech and hearing areas, classrooms and a 500-seat theater with closed-circuit television. All classrooms are designed to reduce distractions—these rooms have no windows; colors are soft; seats are arranged in a semicircle to allow for good vision from all parts of the room; and projection equipment is located outside the classroom to reduce unnecessary noise.

Visual emergency warning systems are present in academic buildings as well as residence halls. Rooms in Mark Ellingson Hall, Peter N. Peterson Hall and Alexander Graham Bell Hall, as well as some apartment units, also are equipped with strobe light signals.

Television, a basic part of the college's communication network, is used for both education and entertainment. NTID's television system has four viewing channels, and TV monitors are located throughout the Lyndon Baines Johnson Building. Two well-equipped studios produce class and self-instruction videotapes as well as captioning for use within the Institute and at other organizations.

### Telecommunications

Deaf, hard-of-hearing and speech-impaired students can access telephone services through the New York Relay Service provided by AT&T. The relay service operates 24 hours every day, seven days a week, and can be used to make and receive campus, local, long-distance and international calls. While there is no charge for using the N.Y. Relay Service, students are responsible for their personal phone bills.

**Hearing aid shop**

The NTID Hearing Aid Shop provides students with services related to hearing and amplification. Students may access the shop to schedule clinical appointments, obtain earmolds and other hearing aid supplies as well as hearing aid repairs, and receive information concerning hearing loss and various aspects of amplification use. The shop is located in room 3130 in the Lyndon Baines Johnson Building and can be contacted by calling 716-475-6473 (voice/TTY).

**Academic counseling/support services**

Many services are offered to all RIT students, but NTID offers deaf students additional counseling services. Career development counselors assist students in getting along better with others, adjusting to college life, gaining self-confidence, and choosing a program of study. The Career Resource and Testing Center offers educational planning and career decision-making assistance, including career assessment and computer-based guidance.

NTID also has English, mathematics and physics learning centers that provide specialized academic support. For more information about academic counseling services, see NTID Learning Consortium on page 319.

**Personal/psychological counseling**

NTID's Psychological Services Department is part of a continuum of personal and social counseling services at RIT. Mental-health emergency services and crisis intervention are provided by psychological services faculty on a 24-hour basis in collaboration with other campus service providers.

Psychological Services faculty members also provide psychodiagnostic assessments for students and collaborate with other counselors and faculty members to interpret results of these assessments and implement strategies for more effective psychosocial functioning and academic performance.

Direct counseling and psychotherapy are provided for students on a walk-in or referral basis. Examples of concerns students may need help with include depression, anxiety, family conflicts, interpersonal and intimate relationships, and personal identity.

Psychological Services also provides consultations with and outside the RIT community and shares expertise about mental health and deafness on campus, locally, nationally and internationally.

**Cooperative work experience**

A feature of most RIT academic programs, including those offered through NTID, is cooperative (co-op) work education that stresses "learning by doing." Most NTID programs require a co-op work experience, which introduces students to the world of work. Co-op experiences usually occur during the summer so that students' courses of study are uninterrupted during the school year. The number of co-ops required varies from program to program within NTID.

**Placement**

Employment of RIT's deaf graduates is a high priority. To help ensure that graduates obtain program-related employment, NTID's Center on Employment (NCE) assigns to each new student an adviser experienced in employment assistance in the different academic concentrations. To help prepare students for obtaining cooperative work experiences and permanent employment, NCE has developed a required course, **The Job Search Process**.

NCE employment advisers are in contact daily by telephone with potential employers throughout the United States. Such services have contributed to the high employment rate of deaf RIT graduates. Last year, 95 percent of graduates entering the labor force found jobs.

**Research**

NTID faculty members conduct research to understand and help improve the education as well as communication and social skills of deaf students on campus and elsewhere. Students are invited to help in research efforts; this can mean taking tests and being part of research studies and conducting research themselves in collaboration with NTID professionals. Researchers sometimes contact graduates to see how well their education has prepared them for work and other aspects of their lives.

**TECHNICAL EDUCATION****PROGRAMS OF NTID**

(Leading to certificate, diploma or associate degrees)

**RELATED PROFESSIONAL EDUCATION PROGRAMS OF OTHER RIT COLLEGES**

(Leading to associate, bachelor's or master's degrees through cross registration into other RIT colleges; students may request educational access services such as sign language interpreting and notetaking.)

<b>NTID Programs</b>	<b>Other RIT Colleges</b>	<b>Other RIT Programs</b>	
<b>Applied Art and Computer Graphics</b>	<b>College of Imaging Arts and Sciences</b>	<ul style="list-style-type: none"> <li>• Art Education</li> <li>• Ceramics/Ceramic Sculpture</li> <li>• Computer Graphics Design</li> <li>• Fine Arts (Painting, Printmaking, Medical Illustration)</li> <li>• Glass</li> </ul>	<ul style="list-style-type: none"> <li>• Graphic Design</li> <li>• Industrial and Interior Design</li> <li>• Metalcrafts and Jewelry</li> <li>• Weaving and Textile Design</li> <li>• Woodworking and Furniture Design</li> </ul>
<b>Applied Computer Technology</b>	<b>College of Applied Science and Technology</b>	<ul style="list-style-type: none"> <li>• Computer Engineering Technology</li> <li>• Computer Science</li> <li>• Information Technology</li> </ul>	
	<b>College of Business</b>	<ul style="list-style-type: none"> <li>• Business Administration—Information Systems</li> </ul>	
<b>Applied Science/Allied Health</b> • Ophthalmic Optical Finishing Technology	<b>College of Science</b>	<ul style="list-style-type: none"> <li>• Biology</li> <li>• Biomedical Computing</li> <li>• Biotechnology</li> <li>• Chemistry</li> </ul>	<ul style="list-style-type: none"> <li>• Clinical Chemistry</li> <li>• Diagnostic Medical Sonography</li> <li>• Medical Technology</li> <li>• Nuclear Medicine Technology</li> </ul>
<b>Business Occupations</b> • Applied Accounting • Business Technology • Office Technologies	<b>College of Business</b>	<ul style="list-style-type: none"> <li>• Business Administration—Accounting</li> <li>• Business Administration—Finance</li> <li>• Business Administration—Marketing</li> <li>• Business Administration—Management</li> </ul>	
<b>Construction Technologies</b> • Architectural Drafting • Architectural Technology • Civil Technology	<b>College of Applied Science and Technology</b>	<ul style="list-style-type: none"> <li>• Civil Engineering Technology</li> </ul>	
	<b>College of Imaging Arts and Sciences</b>	<ul style="list-style-type: none"> <li>• Industrial and Interior Design</li> </ul>	
<b>Educational Interpreting</b> • Educational Interpreting			
<b>Electronic Publishing and Printing Technology</b>	<b>College of Imaging Arts and Sciences</b>	<ul style="list-style-type: none"> <li>• Newspaper Production Management</li> <li>• Printing</li> <li>• Printing and Applied Computer Science</li> </ul>	<ul style="list-style-type: none"> <li>• Printing Systems</li> <li>• Printing Technology</li> </ul>
<b>General Education</b> (Programs available through cross registration into the College of Liberal Arts)	<b>College of Liberal Arts</b>	<ul style="list-style-type: none"> <li>• Criminal Justice</li> <li>• Economics</li> <li>• Social Work</li> </ul>	<ul style="list-style-type: none"> <li>• Professional and Technical Communication</li> <li>• School Psychology</li> </ul>
<b>Imaging Technology</b>	<b>College of Imaging Arts and Sciences</b>	<ul style="list-style-type: none"> <li>• Biomedical Photographic Communication</li> <li>• Film and Video</li> <li>• Imaging and Photographic Technology</li> <li>• Imaging Arts</li> </ul>	<ul style="list-style-type: none"> <li>• Photographic Processing and Finishing Management</li> <li>• Professional Photographic Illustration</li> </ul>
<b>Industrial Technologies</b> • Electromechanical Technology • Industrial Drafting • Industrial Drafting Technology	<b>College of Applied Science and Technology</b>	<ul style="list-style-type: none"> <li>• Computer Engineering Technology</li> <li>• Electrical Engineering Technology</li> <li>• Manufacturing Engineering Technology</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical Engineering Technology</li> <li>• Packaging Science</li> <li>• Telecommunications Technology</li> </ul>
	<b>College of Engineering</b>	<ul style="list-style-type: none"> <li>• Electrical Engineering—AAS Transfer Program</li> <li>• Industrial Engineering</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical Engineering</li> <li>• Microelectronic Engineering</li> </ul>
<b>Manufacturing Processes Technology</b> • Manufacturing Processes • Manufacturing Processes Technology	<b>College of Applied Science and Technology</b>	<ul style="list-style-type: none"> <li>• Manufacturing Engineering Technology</li> </ul>	
	<b>College of Engineering</b>	<ul style="list-style-type: none"> <li>• Industrial Engineering</li> <li>• Mechanical Engineering</li> </ul>	
<b>Prebaccalaureate Studies</b> (Available as a bridge to students accepted by NTID and interested in enrolling in another RIT college, but not yet ready to enter a baccalaureate-level program.)	<b>College of Engineering</b>	<ul style="list-style-type: none"> <li>• All College of Engineering programs</li> </ul>	
	<b>College of Liberal Arts</b>	<ul style="list-style-type: none"> <li>• Criminal Justice</li> <li>• Social Work</li> </ul>	
	<b>College of Science</b>	<ul style="list-style-type: none"> <li>• All College of Science programs</li> </ul>	

# Applied Art and Computer Graphics

Dr. John W. Cox, Chairperson

Becoming a professional artist requires various kinds of computer-based and traditional art skills. The applied art and computer graphics department offers programs for students who wish to develop these skills and enter the field directly or continue on for further studies.

## Pretechnical courses

Some students who want to enter the applied art and computer graphics program may require additional prerequisite course work before entering the major. Students can usually complete this prerequisite work and take first-year courses in the major at the same time.

## First-year courses

Major courses in the first year provide basic skills in both computer-based and traditional media. These courses prepare the student for either advanced courses in applied art and computer graphics or continued study toward a bachelor's degree in the School of Art and Design or the School for American Crafts within the College of Imaging Arts and Sciences.

## Work experience

All NTID applied art and computer graphics students gain work experience through a required external co-op. In addition, two advanced courses provide experience in completing real work assignments for various on-campus and off-campus clients.

## AOS and AAS degree programs\*

*\* Pending final approval by Institute curriculum governing bodies and the New York State Department of Education*

NTID applied art and computer graphics programs prepare students for careers in the art field. Students may choose from AOS or AAS programs. The AOS degree is designed for students who wish to pursue employment after graduation. The AAS degree is for students who intend to continue their education toward a bachelor's degree.

Students who qualify for the AAS degree program may select a concentration in electronic publishing and imaging, which includes related technology courses from NTID's electronic publishing and printing technology and imaging technology departments.

## On-the-job responsibilities

Use computer-based and traditional methods to produce drawings, layouts and mechanical art for advertising, sales promotion, public relations and corporate communications; create visual materials for brochures, pamphlets, instructional media, magazines, newspapers, newsletters and posters; prepare artwork for printing; use computer hardware and software and other applied art studio equipment.

## Places of employment

Advertising agencies; art studios; computer graphics studios; newspapers; large department stores; manufacturing, printing and publishing firms; educational institutions; and government agencies

## Positions for which graduates qualify

Computer graphics artist, desktop publishing artist, layout artist and mechanical artist

## Prerequisites

Successful completion of a sampling experience in art, either through the Summer Vestibule Program or the Career Exploration course offered through the department during the academic year

Students must demonstrate basic skills in the following areas: two-dimensional design, computer graphics, freehand drawing, technical media, measurement, mathematics and program/career information. Skills are demonstrated by completing a series of projects. Students' work is assessed by faculty members who use a checklist of specific requirements provided by the department.

## Approximate time

Seven to eight quarters

**Applied art and computer graphics, AOS degree,  
typical course sequence\***

<i>First Year</i>	<i>Quarter Credit Hours</i>
Visual Idea Development 0825-105	2
Introduction Computer Graphics 0825-110	2
Freshman Art Seminar 0825-115 †	2
Studio Techniques 0825-201	2
Perspective Drawing 0825-204	2
Figure Drawing 0825-206	2
Drawing Composition 0825-208	2
Intermediate Computer Graphics 0825-210	2
Introduction to Design 0825-211	2
Color in Design 0825-212	2
Art Career Seminar 0825-215 †	2
Introduction to Typography 0825-221	2
Electronic Layout Programs 0825-230	2
Co-op Preparation 0825-245 †	2
Art Electives ‡	4
Communication	6
English	12
Physical Education	0
<i>Second Year</i>	
Computer Illustration Methods 0825-310	2
Art History I, II 0825-315, 316	6
History of Graphic Design 0825-317	3
Type in Design 0825-321	2
Layout for Graphics 0825-331	3
Publication Design 0825-332	3
Introduction to Production 0825-341	2
Production Applications 0825-342	2
Cooperative Education	Co-op
Employment Seminar 0825-345 †	2
Graphic Applications 0825-351	6
Graphic Applications/Portfolio Review 0825-352	6
Art Electives ‡	4
Communication	6
English	8
Human Experience I, II, III	12
Physical Education	0
<b>Total Quarter Credit Hours</b>	<b>117</b>

\* Pending final approval by Institute curriculum governing bodies and the New York State Department of Education

† Freshman Art Seminar, Art Career Seminar, Co-op Preparation and Employment Seminar are substitutes for Freshman Seminar, Job Search and Life after College.

‡ Eight or more art elective credits are required for the degree.

**Applied art and computer graphics, AAS degree,  
typical course sequence \***

<i>First Year</i>	<i>Quarter Credit Hours</i>
Visual Idea Development 0825-105	2
Introduction Computer Graphics 0825-110	2
Freshman Art Seminar 0825-115 †	2
Studio Techniques 0825-201	2
Perspective Drawing 0825-204	2
Figure Drawing 0825-206	2
Drawing Composition 0825-208	2
Intermediate Computer Graphics 0825-210	2
Introduction to Design 0825-211	2
Color in Design 0825-212	2
Art Career Seminar 0825-215 †	2
Introduction to Typography 0825-221	2
Electronic Layout Programs 0825-230	2
Co-op Preparation 0825-245 †	2
Art Electives ‡	4
Communication	6
English	12
Physical Education	0
<i>Second Year</i>	
Computer Illustration Methods 0825-310	2
Art History I, II 0825-315, 316	6
History of Graphic Design 0825-317	3
Type in Design 0825-321	2
Layout for Graphics 0825-331	3
Publication Design 0825-332	3
Introduction to Production 0825-341	2
Production Applications 0825-342	2
Cooperative Education	Co-op
Employment Seminar 0825-345 †	2
Graphic Applications 0825-351	6
Graphic Applications/Portfolio Review 0825-352	6
Art Electives ‡	4
Communication	6
English	8
Liberal Arts	20
Physical Education	0
<b>Total Quarter Credit Hours</b>	<b>125</b>

\* Pending final approval by Institute curriculum governing bodies and the New York State Department of Education

† Freshman Art Seminar, Art Career Seminar, Co-op Preparation and Employment Seminar are substitutes for Freshman Seminar, Job Search and Life after College.

‡ Eight or more art elective credits are required for the degree.

# Applied Computer Technology

Donna Lange, Interim Chairperson

Careers that involve work with computers increase daily. Computers are an important part of business, industry and other parts of the economy. Computer careers involve operating computers, writing programs that direct computers to solve problems and networking computers so that they can communicate with one another.

Students may choose from certificate, diploma or AAS degree programs in applied computer technology.

## On-the-job responsibilities

Certificate and diploma: Work in either the computer operations area controlling computers, in a variety of operations-related support areas or in hardware and networking.

AAS degree: Operate mainframe computer systems or remote computers or program at the entry level. Major concentration is possible in either large mainframe computer operations or networking personal computers.

## Places of employment

Banks, insurance companies, large stores, manufacturing companies, public utilities, government agencies and other data processing centers

## Prerequisite

Grade of C or better in all required technical courses

## Certificate Program

### Positions for which graduates qualify

Computer operations support positions such as data control, librarian or peripheral equipment operator

### Prerequisites

Successful completion of a sampling experience in the applied computer technology area, either through the Summer Vestibule Program or a departmental sampling program

Students with Michigan Test scores lower than 55 or with low mathematics skills may have difficulty in this program.

### Approximate time

Five quarters, including one cooperative work experience

## Diploma Program

### Positions for which graduates qualify

Computer operator trainee and peripheral equipment operator

### Prerequisites

Successful completion of a sampling experience in the applied computer technology area, either through the Summer Vestibule Program or a departmental sampling program

Students with Michigan Test scores lower than 55 or with low mathematics skills may have difficulty in this program.

### Approximate time

Seven quarters, including one cooperative work experience

## Applied computer technology, certificate, typical course sequence

First Year	Quarter Credit Hours
Beginning Computer Operations 0802-157	2
Beginning Computer Operations Lab 0802-158	1
Utilities/CL for Computers 0802-170	2
Utilities/CL Lab 0802-172	1
Applications Software 0802-213	3
Computer Hardware I 0802-220	3
Multiprogramming/Spooling for Operations 0802-250	2
Multiprogramming/Spooling Lab 0802-251	1
Orientation to Business 0804-101	3
Fundamentals of College Mathematics I, II, III 0817-140, 141, 142	9
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	4
English	12
Cooperative Education	Co-op
<b>Second Year</b>	
Introduction to Business Programming 0802-101	4
Software & Operating Systems I 0802-222	3
Contemporary Life Issues 0847-102	2
Business Elective	3
Communication	2
English	4
<b>Total Quarter Credit Hours</b>	<b>64</b>

## Applied computer technology, diploma, typical course sequence

First Year	Quarter Credit Hours
Beginning Computer Operations 0802-157	2
Beginning Computer Operations Lab 0802-158	1
Utilities/CL for Computers 0802-170	2
Utilities/CL Lab 0802-172	1
Applications Software 0802-213	3
Computer Hardware I 0802-220	3
Multiprogramming/Spooling for Operations 0802-250	2
Multiprogramming/Spooling Lab 0802-251	1
Orientation to Business 0804-101	3
Fundamentals of College Mathematics I, II, III 0817-140, 141, 142	9
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	6
English	12
Physical Education	0
Cooperative Education	Co-op
<b>Second Year</b>	
Logic & Problem Solving 0802-100	3
Software & Operating Systems I 0802-222	3
Networking I 0802-224	3
Computer Hardware II 0802-221	3
Microcomputer Database 0802-215	3
Software & Operating Systems II 0802-300	3
Technical Elective	3
Integrated Mathematics I, II 0817-150, 151	6
Contemporary Life Issues 0847-102	2
Business Elective	6
Communication	4
English	8
Physical Education	0
<b>Total Quarter Credit Hours</b>	<b>95</b>

## AAS Degree Program

### Positions for which graduates qualify

Computer operator and entry-level business programmer trainee or network and personal computer specialist

### Prerequisites

Successful completion of a sampling experience in the applied computer technology area, either through the Summer Vestibule Program or a departmental sampling program

Students with Michigan Test scores lower than 55 or with low mathematics skills may have difficulty meeting liberal arts requirements and third-year technical course requirements.

### Approximate time

Eleven quarters, including two cooperative work experiences

### Applied computer technology, AAS degree, typical course sequence

First Year	Quarter	Credit Hours
Beginning Computer Operations	0802-157	2
Beginning Computer Operations Lab	0802-158	1
Utilities/CL for Computers	0802-170	2
Utilities/CL Lab	0802-172	1
Applications Software	0802-213	3
Computer Hardware I	0802-220	3
Multiprogramming/Spooling for Operations	0802-250	2
Multiprogramming/Spooling Lab	0802-251	1
Orientation to Business	0804-101	3
Fundamentals of College Mathematics I, II, III	0817-140,141,142	9
Freshman Seminar	0847-100	2
Job Search Process	0847-101	1
Communication		6
English		12
Physical Education		0
Cooperative Education		Co-op
<b>Second Year</b>		
Logic & Problem Solving	0802-100	3
Introduction to Business Programming	0802-101	4
Software & Operating Systems I	0802-222	3
Networking I	0802-224	3
Computer Hardware II	0802-221	3
Spreadsheet Software	0802-214	3
Integrated Mathematics I, II	0817-150, 151	6
Data Processing Mathematics	0817-163	3
Business Elective		3
Communication		6
English		8
Liberal Arts		4
Physical Education		0
Cooperative Education		Co-op
<b>Third Year</b>		
Networking	0802-225	3
Microcomputer Database	0802-215	3
Programming I Elective	0802-201 or 0802-231 or 0802-232	3
Programming II Elective	0802-202 or 0802-232 or 0802-233	3
Contemporary Social Issues	0847-202	2
Business Elective		6
Technical Education		6
Liberal Arts		16
<b>Total Quarter Credit Hours</b>		<b>142</b>

# Applied Science/ Allied Health

Frederic R. Hamil, Chairperson

Students interested in science and helping people can combine both interests in an applied science/allied health career. These careers prepare students for employment in medical or health service settings or in research.

Students may choose programs in ophthalmic optical finishing technology.

## Ophthalmic Optical Finishing Technology

Douglas Wachter, Director

An ophthalmic optical finishing technologist makes eyeglasses prescribed by physicians and optometrists. Technologists refine lenses to prescription specifications as ordered by vision care specialists.

Students may choose from certificate, diploma, AOS and AAS degree programs.

The ophthalmic optical finishing technology programs include an optical laboratory affiliation in Rochester during one of the academic quarters. A cooperative work experience is taken in students' home areas during the Summer Quarter between the first and second years in the program. Students are responsible for obtaining their own transportation to these practice sites.

### Pretechnical program

More than 90 percent of those applying for the ophthalmic optical finishing technology programs need to enroll in a pretechnical program. The program generally is three quarters long and provides course work in communication, English, mathematics and physical education.

### Accreditation

Ophthalmic optical finishing technology programs are accredited by the Commission on Opticianry Accreditation. This accreditation recognizes the high standards of program quality provided to NTID students.

## Certificate Program

### On-the-job responsibilities

Follow vision care specialists' instructions as written on prescriptions, perform procedures requested by laboratory supervisors to prepare eyeglasses for use, and maintain laboratory and equipment according to industry (American National Standards Institute [ANSI]) standards.

### Places of employment

Wholesale and retail optical laboratories and offices of ophthalmologists, optometrists and dispensing opticians

### Graduates qualify for positions requiring these skills

Vertometric evaluation, single vision layout, automatic edging, hand beveling, lens heat treatment

### Prerequisites

Fundamentals of College Mathematics

Introduction to Optical Finishing Technology I, II, III

Successful completion of a sampling experience in ophthalmic optical finishing technology, either through the Summer Vestibule Program or a departmental sampling program

**Approximate time**

Seven quarters, including pretechnical program and one cooperative work experience

Four quarters, including one cooperative work experience, but without pretechnical program

**Ophthalmic optical finishing technology, certificate, typical course sequence**

<i>Pretechnical Requirements</i>	<i>Quarter Credit Hours</i>
Basic Mathematics 0817-120	3
Fundamentals of College Mathematics I, II 0817-140, 141	6
Introduction to OFT I, II, III 0827-105, 106, 107	6
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	6
English	12
General Education	2
<i>First Year</i>	
OFT Mathematics I, II 0827-111, 112	6
Prescription Analysis 0827-115, 116	6
Optical Finishing Techniques I, II, III 0827-121, 122, 123	16
Optical Finishing Terminology I, II, III 0827-161, 162, 163	9
Independent Study Surfacing 0827-399	2
Job Search Process 0847-101	1
Contemporary Life Issues 0847-102	1
Communication	4
English	8
Cooperative Education	Co-op
<i>Total Quarter Credit Hours</i>	91

**Diploma Program****On-the-job responsibilities**

Follow vision care specialists' instructions as written on prescriptions, perform procedures requested by laboratory supervisors to prepare eyeglasses for use and maintain laboratory and equipment according to industry (ANSI) standards.

**Places of employment**

Wholesale and retail optical laboratories and offices of ophthalmologists, optometrists and dispensing opticians

**Graduates qualify for positions requiring these skills**

Vertometric evaluation, single vision/multifocal layout, lens blocking, automatic edging, hand beveling, lens heat treatment, rimless/notching/drilling, lens dyeing, final inspection and evaluation

**Prerequisites**

Fundamentals of College Mathematics I, II

Introduction to Optical Finishing Technology, I, II, III

Successful completion of a sampling experience in ophthalmic optical finishing technology, either through the Summer Vestibule Program or a departmental sampling program

**Approximate time**

Ten quarters, including pretechnical program and one summer cooperative work experience

Seven quarters, including one cooperative work experience, but without pretechnical program

**Ophthalmic optical finishing technology, diploma, typical course sequence**

<i>Pretechnical Requirements</i>	<i>Quarter Credit Hours</i>
Basic Mathematics 0817-120	3
Fundamentals of College Mathematics I, II 0817-140, 141	6
Introduction to OFT I, II, III 0827-105, 106, 107	6
Freshman Seminar 0847-100	2
Communication	6
English	12
General Education	4
<i>First Year</i>	
OFT Mathematics I, II 0827-111, 112	6
Prescription Analysis I, II 0827-115, 116	6
Lens Design 0827-117	3
Optical Finishing Techniques I, II, III 0827-121, 122, 123	16
Optical Finishing Terminology I, II, III 0827-161, 162, 163	9
Independent Study Surfacing 0827-399	2
Job Search Process 0847-101	1
Communication	2
English	4
Cooperative Education	Co-op
<i>Second Year</i>	
Optical Finishing Techniques IV 0827-224	5
Lab Simulation I, II 0827-225, 226	10
Management of Optical Stockroom Procedures 0827-241	4
Optical Finishing Inspection/Correction 0827-243	3
Optical Finishing Technology Seminar 0827-251	2
Optical Finishing Technology Physics 0818-168	3
Contemporary Life Issues 0847-102	2
Communication	4
English	4
General Education	2
<i>Total Quarter Credit Hours</i>	127

**AOS Degree Program****On-the-job responsibilities**

Follow vision care specialists' instructions as written on prescriptions, perform procedures requested by laboratory supervisors to prepare eyeglasses for use and maintain laboratory equipment according to industry (ANSI) standards.

**Places of employment**

Wholesale and retail optical laboratories and offices of ophthalmologists, optometrists and dispensing opticians

**Graduates qualify for positions requiring these skills**

Vertometric evaluation, single vision/multifocal layout, lens blocking, automatic edging, hand beveling, lens heat treatment, rimless/notching/drilling, lens dyeing, final inspection and evaluation

**Prerequisites**

Fundamentals of College Mathematics I, II

Introduction to Optical Finishing Technology I, II, III

Successful completion of a sampling experience in ophthalmic optical finishing technology, either through the Summer Vestibule Program or a departmental sampling program

Completion of NTID English course requirements, California Reading Test score higher than 7.0, and Michigan Test score higher than 55

**Approximate time**

Ten quarters, including pretechnical program and one summer cooperative work experience

Seven quarters, including one cooperative work experience, but without pretechnical program

**Ophthalmic optical finishing technology, AOS degree, typical course sequence**

<i>Pretechnical Requirements</i>	<i>Quarter Credit Hours</i>
Basic Mathematics 0817-120	3
Fundamentals of College Mathematics I, II 0817-140, 141	6
Introduction to OFT I, II, III 0827-105, 106, 107	6
Freshman Seminar 0847-100	2
Communication	6
English	12
General Education	4
Physical Education	0
<i>Second Year</i>	
OFT Mathematics I, II 0827-111, 112	6
Prescription Analysis I, II 0827-115, 116	6
Lens Design 0827-117	3
Optical Finishing Techniques I, II, III 0827-121, 122, 123	16
Optical Finishing Terminology I, II, III 0827-161, 162, 163	9
Independent Study Surfacing 0827-399	2
Job Search Process 0847-101	1
Communication	2
English	8
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Optical Finishing Techniques IV 0827-224	5
Lab Simulation I, II 0827-225, 226	10
Management of Optical Stockroom Procedures 0827-241	4
Optical Finishing Inspection/Correction 0827-243	3
Optical Finishing Technology Seminar 0827-251	2
Optical Finishing Technology Physics 0818-168	3
Contemporary Life Issues 0847-102	2
Human Experience I, II, III 0847-166, 167, 168	12
Communication	4
<i>Total Quarter Credit Hours</i>	<u>137</u>

## AAS Degree Program

### On-the-job responsibilities

Follow vision care specialists' instructions as written on prescriptions, perform procedures requested by laboratory supervisors to prepare eyeglasses for use and maintain laboratory equipment according to industry (ANSI) standards.

### Places of employment

Wholesale and retail optical laboratories and offices of ophthalmologists, optometrists and dispensing opticians

### Graduates qualify for positions requiring these skills

Vertometric evaluation, single vision/multifocal layout, lens blocking, automatic edging, hand beveling, lens heat treatment, rimless/notching/drilling, lens dyeing, final inspection and evaluation

### Prerequisites

Fundamentals of College Mathematics I, II  
Introduction to Optical Finishing Technology I, II, III

Successful completion of a sampling experience in ophthalmic optical finishing technology, either through the Summer Vestibule Program or a departmental sampling program

Completion of NTID English course requirements, California Reading Test score higher than 7.0, and Michigan Test score higher than 55

### Approximate time

Ten quarters, including pretechnical program and one cooperative work experience

Seven quarters, including one cooperative work experience, but without pretechnical program

### Ophthalmic optical finishing technology, AAS degree, typical course sequence

<i>Pretechnical Requirements</i>	<i>Quarter</i>	<i>Credit Hours</i>
Basic Mathematics	0817-120	3
Fundamentals of College Mathematics I, II	0817-140, 141	6
Introduction to OFT I, II, III	0827-105, 106, 107	6
Freshman Seminar	0847-100	2
Communication		6
English		12
General Education		4
Physical Education		0
<i>First Year</i>		
OFT Mathematics I, II	0827-111, 112	6
Prescription Analysis I, II	0827-115, 116	6
Lens Design	0827-117	3
Optical Finishing Techniques I, II, III	0827-121, 122, 123	16
Optical Finishing Terminology	0827-161, 162, 163	9
Individual Study Surfacing	0827-399	2
Job Search Process	0847-101	1
Communication		2
English or Liberal Arts		8
Physical Education		0
Cooperative Education		Co-op
<i>Second Year</i>		
Optical Finishing Techniques IV	0827-224	5
Lab Simulation I, II	0827-225, 226	10
Management of Stockroom Procedures	0827-241	4
Optical Finishing Inspection/Correction	0827-243	3
Optical Finishing Technology Seminar	0827-251	2
Optical Finishing Technology Physics	0818-168	3
Contemporary Social Issues	0847-202	2
Communication		4
Liberal Arts		12
<i>Total Quarter Credit Hours</i>		137

# Business Occupations

Dr. William J. Rudnicki, Chairperson

Employment opportunities in business and industry increase daily. Business occupations programs respond to industry's need for people skilled in operating office equipment, keeping financial records, performing clerical duties and using computers.

Students may choose a certificate program in business occupations and an AOS program in business technology as well as diploma and AAS degree programs in applied accounting and office technologies.

### Pretechnical program

None

## Applied Accounting

This program offers a diploma and an AAS degree and provides graduates with a basic knowledge of office technologies and general and cost accounting systems. Job experience projects familiarize students with computer applications as they relate to management decisions.

### On-the-job responsibilities

Use computers to maintain and reconcile various financial records, verify business records, and perform other clerical and administrative duties.

### Places of employment

Business, industry, government and self-employment

## Diploma Program

### Positions for which graduates qualify

Accounts receivable/payable clerk, payroll clerk, general office clerk, file clerk, recordkeeping clerk and data-entry clerk

### Prerequisite

Successful completion of certificate in business occupations

### Approximate time

Seven quarters, including one cooperative work experience

## AAS Degree Program

### Positions for which graduates qualify

Junior accounting technician, cost accounting clerk, accounts receivable/payable clerk, payroll clerk, general accounting clerk and microcomputer accounting clerk

### Prerequisite

Successful completion of diploma in applied accounting

### Approximate time

Eleven quarters, including two cooperative work experiences

**Applied accounting, diploma, typical course sequence**

<i>First year</i>	<i>Quarter Credit Hours</i>
Principles of Accounting I, II 0801-201, 202	6
Orientation to Business 0804-101	3
Business English 0804-110	3
Keyboarding 0804-111	2
OAS Formatting 0804-112	2
OAS Document Production I 0804-113	2
Records Management/Business Calculations 0804-211	3
Payroll/Spreadsheet Applications 0804-212	3
Basic Mathematics 0817-120	3
Fundamentals of College Mathematics I, II 0817-140, 141	6
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	4
English	12
Cooperative Education	Co-op
<i>Second Year</i>	
Principles of Accounting III 0801-203	4
Cost Accounting 0801-252	4
Data Processing for Business Occupations 0802-210	3
OAS Document Production II 0804-221	3
Fundamentals of Management 0804-284	3
Fundamentals of Marketing 0804-286	3
Contemporary Life Issues 0847-102	2
Law and Society 0847-147	2
Communication	8
English	8
English Elective	4
General Education (optional)	2 (2)
<b>Total Quarter Credit Hours</b>	<b>98-100</b>

**Applied accounting, AAS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Principles of Accounting I, II 0801-201, 202	6
Orientation to Business 0804-101	3
Business English 0804-110	3
Keyboarding 0804-111	2
OAS Formatting 0804-112	2
OAS Document Production I 0804-113	2
Records Management/Business Calculations 0804-211	3
Payroll/Spreadsheet Applications 0804-212	3
Basic Mathematics 0817-120	3
Fundamentals of College Mathematics I, II 0817-140, 141	6
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	6
English	12
Physical Education	0
Cooperative Education	Co-op
<i>Second Year</i>	
Principles of Accounting III 0801-203	4
Cost Accounting I, II 0801-252, 253	8
Data Processing for Business Occupations 0802-210	3
OAS Document Production II 0804-221	3
Fundamentals of Management 0804-284	3
Fundamentals of Marketing 0804-286	3
Fundamentals of College Mathematics III 0817-142	3
Communication	6
English	8
Liberal Arts	4
Physical Education	0
Cooperative Education	Co-op
<i>Third year</i>	
Economics I, II 0801-231, 232	6
Principles of Accounting IV 0801-204	4
Applied Accounting Techniques 0801-260	2
Law & Society 0847-147	2
Contemporary Social Issues 0847-202	2
General Education Elective	4
Liberal Arts	16
<b>Total Quarter Credit Hours</b>	<b>135</b>

**Business Occupations****Certificate Program**

This certificate program combines basic business office skills with an introduction to data-entry concepts.

**Places of employment**

Business, industry, government and schools

**On-the-job responsibilities**

Type business communications, operate electronic calculators, maintain files, keep basic payroll records, enter and retrieve data on computer terminals, and use electronic mail and basic word processing skills on a personal computer.

**Positions for which graduates qualify**

General office clerk, records management clerk, data-entry clerk and payroll records clerk

**Approximate time**

Six quarters, including one cooperative work experience

**Business occupations, certificate, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Orientation to Business 0804-101	3
Business English 0804-110	3
Keyboarding 0804-111	2
OAS Formatting 0804-112	2
OAS Document Production I 0804-113	2
Records Management/Business Calculations 0804-211	3
Payroll/Spreadsheet Applications 0804-212	3
Basic Mathematics 0817-120	3
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	6
English	12
General Education Elective	2
Cooperative Education	Co-op
<i>Second Year</i>	
OAS Document Production II 0804-221	3
Applied Business Techniques 0804-291	3
Contemporary Life Issues 0847-102	2
Law & Society 0847-147	2
Communication	4
English	8
General Education	2
Business Elective	3
<b>Total Quarter Credit Hours</b>	<b>71</b>

## Business Technology

### AOS Degree Program

This AOS degree program includes technical course work in accounting, computers, payroll, general office skills and word processing/information processing skills.

This is a nontransfer occupational program with primary emphasis on preparation for immediate employment.

#### Places of employment

Business, industry, government and schools

#### On-the-job responsibilities

Input, manipulate and retrieve data; use interactive software, electronic mail and information processing skills; and use computers to maintain and reconcile various financial records

#### Positions for which graduates qualify

General office clerk, accounts receivable/payable clerk, payroll records clerk, word processing technician, cost accounting clerk and microcomputer accounting clerk

#### Prerequisite

Appropriate English language ability as defined by AOS guidelines

#### Approximate time

Eight quarters, including two cooperative work experiences

#### Business technology, AOS degree, typical course sequence

<i>First year</i>	<i>Quarter Credit Hours</i>
Principles of Accounting I, II 0801-201, 202	6
Orientation to Business 0804-101	3
Business English 0804-110	3
Keyboarding 0804-111	2
OAS Formatting 0804-112	2
OAS Document Production I 0804-113	2
Records Management/Business Calculations 0804-211	3
Payroll/Spreadsheet Applications 0804-212	3
Basic Mathematics 0817-120	3
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	6
English	12
Physical Education	0
Cooperative Education	Co-op
<i>Second Year</i>	
Principles of Accounting III 0801-203	4
Cost Accounting I, II 0801-252, 253	8
OAS Document Production II 0804-221	3
Fundamentals of Management 0804-284	3
Fundamentals of Marketing 0804-286	3
Word Processing I, II 0804-301, 302	8
Clear Thinking & Writing 0862-144	6
Professional/Practical Writing 0862-189	3
Fundamentals of College Mathematics I, II 0817-140, 141	6
Human Experience I 0847-166	4
Communication	2
English	4
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Applied Accounting Techniques 0801-260	2
Data Processing for Business Occupations 0802-210	3
Applied Business Techniques 0804-291	2
Contemporary Life Issues 0847-102	2
Law & Society 0847-147	2
The Human Experience II, III 0847-167, 168	8
Communication	4
General Education Elective	2
<hr/> <i>Total Quarter Credit Hours</i>	<hr/> 127

## Office Technologies

This program offers a diploma and an AAS degree. It provides students with opportunities for developing keyboarding skills and experience in producing documents found in typical business offices. The program focuses on up-to-date word processing procedures using a variety of computer hardware and software.

#### On-the-job responsibilities

Input, manipulate and retrieve data; use interactive software, electronic mail and information processing skills such as word processing, records processing and database; and perform other office duties.

#### Places of employment

Business, industry, government and schools

### Diploma Program

#### Positions for which graduates qualify

General office clerk, accounts receivable/payable clerk, records management clerk and payroll records clerk

#### Prerequisite

Successful completion of certificate in Business Occupations

#### Approximate time

Seven quarters, including one cooperative work experience

### AAS Degree Program

#### Positions for which graduates qualify

Word processing technician, accounts receivable/payable clerk, general office clerk, records management clerk and payroll records clerk

**Prerequisite**

Successful completion of diploma in office technologies

**Approximate time**

Eleven quarters, including two cooperative work experiences

**Office technologies, diploma, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Orientation to Business 0804-101	3
Business English 0804-110	3
Keyboarding 0804-111	2
OAS Formatting 0804-112	2
OAS Document Production I 0804-113	2
Records Management/Business Calculations 0804-211	3
Payroll/Spreadsheet Applications 0804-212	3
Basic Mathematics 0817-120	3
Fundamentals of College Mathematics I 0817-140	3
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	4
English	12
Cooperative Education	Co-op
<i>Second Year</i>	
Principles of Accounting I, II 0801-201, 202	6
Data Processing for Business Occupations 0802-210	3
OAS Document Production II 0804-221	3
Office Technologies Seminar 0804-230	2
Fundamentals of Management 0804-284	3
Applied Business Techniques 0804-291	3
Word Processing I 0804-301	4
Fundamentals of Marketing 0804-286	3
or	
Law & Society 0847-147	(2)
Contemporary Life Issues 0847-102	2
Communication	6
English	8
General Education (optional)	(2)
<b>Total Quarter Credit Hours</b>	<b>86-90</b>

**Office technologies, AAS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Orientation to Business 0804-101	3
Business English 0804-110	3
Keyboarding 0804-111	2
OAS Formatting 0804-112	2
OAS Document Production I 0804-113	2
Records Management/Business Calculations 0804-211	3
Payroll/Spreadsheet Applications 0804-212	3
Basic Mathematics 0817-120	3
Fundamentals of College Mathematics I, II 0817-140, 141	6
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	4
English	12
Physical Education	0
Cooperative Education	Co-op
<i>Second Year</i>	
Principles of Accounting I, II 0801-201, 202	6
Data Processing for Business Occupations 0802-210	3
OAS Document Production II 0804-221	3
Office Technologies Seminar 0804-230	2
Fundamentals of Management 0804-284	3
Word Processing I, II 0804-301, 302	8
Communication	6
English	8
Liberal Arts	4
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Fundamentals of Marketing 0804-286	3
Applied Business Techniques 0804-291	2
Word Processing III, IV 0804-303, 304	8
Desktop Publishing Concepts and Applications 0804-310	3
Contemporary Social Issues 0847-202	2
Law & Society 0847-147	2
General Education	4
Liberal Arts	16
<b>Total Quarter Credit Hours</b>	<b>129</b>

# Construction Technologies

Ronald Till, Interim Chairperson

Construction technologies programs teach students the skills related to the design and construction of architectural (buildings) and civil (roads, bridges, etc.) projects.

Students may choose programs in architectural drafting (diploma), architectural technology (AAS) or civil technology (AAS)

**Accreditation**

The AAS programs in architectural technology and civil technology are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.

## Architectural Drafting

### Diploma Program

**On-the-job responsibilities**

Draw detailed plans of buildings and other structures working from architects' and designers' notes and sketches; operate a computer-aided drafting (CAD) system; do lettering; make models; and know construction methods and materials.

**Places of employment**

Architectural and engineering firms, building materials suppliers, construction companies and government agencies

**Position for which graduates qualify**

Architectural drafter, CAD operator

**Prerequisites**

Fundamentals of College Mathematics II

English level: Marginally qualified

**Approximate time**

Six quarters

**Architectural drafting, diploma, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Construction Terminology 0808-110	4
Construction Drafting I, II, III 0808-111, 112, 113	6
Construction Methods I, II 0808-201, 202	6
Fundamentals of College Mathematics III 0817-142	3
Integrated College Mathematics I, II 0817-150, 151	8
Physics I 0818-201	4
Advanced Topics in Mechanics 0818-203	4
Freshman Seminar 0847-100	2
Communication	6
English	8
<i>Second Year</i>	
Architectural Materials I, II 0808-211, 212	6
Principles of Structural Systems 0808-220	4
Architectural Design Drafting I, II, III 0808-221, 222, 223	12
Construction Computations 0808-224	2
Architectural History 0808-375	2
Building Estimating 0808-376	2
Building Equipment 0808-377	3
Architectural Technology Seminar 0808-390	2
Mapping I 0809-241	2
Physics II 0818-202	4
Job Search Process 0847-101	1
Contemporary Life Issues 0847-102	2
General Education	2
<b>Total Quarter Credit Hours</b>	<b>95</b>

## Architectural Technology

### AAS Degree Program

#### On-the-job responsibilities

Work with architects and engineers to plan construction and remodeling of buildings and other structures using CAD systems, preliminary drawings, design development drawings, working drawings, presentation graphics, model making, cost estimating, structural planning and knowledge of construction methods and materials.

#### Places of employment

Architectural, engineering and construction companies; government agencies and corporate design offices

#### Positions for which graduates qualify

Architectural drafter, architectural technician, CAD operator, construction engineering drafter and planning aide

#### Prerequisites

Fundamentals of College Mathematics III

English level: Marginally qualified

#### Approximate time

Ten quarters, including one cooperative work experience

### Architectural technology, AAS degree, typical course sequence

	<i>Quarter Credit Hours</i>
<i>First Year</i>	
Construction Terminology 0808-110	4
Construction Drafting I, II, III 0808-111, 112, 113	6
Construction Methods I, II 0808-201, 202	6
Integrated College Mathematics I, II, III 0817-150, 151, 152	12
Physics I 0818-201	4
Advanced Topics in Mechanics 0818-203	4
Freshman Seminar 0847-100	2
Communication	6
English	8
Physical Education	0
<i>Second Year</i>	
Architectural Materials I, II 0808-211, 212	6
Principles of Structural Systems 0808-220	4
Architectural Design Drafting I, II, III 0808-221, 222, 223	12
Mapping I 0809-241	2
Advanced Mathematics I, II 0817-210, 211	6
Physics II 0818-202	4
Job Search Process 0847-101	1
Liberal Arts	8
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Planning Project 0808-340	5
Architectural Project I, II 0808-351, 352	10
Architectural History 0808-375	2
Building Estimating 0808-376	2
Building Equipment 0808-377	3
Statics 0809-250	4
Strength of Materials 0809-260	4
Contemporary Social Issues 0847-202	2
Liberal Arts	12
Technical Elective	1-3
<i>Total Quarter Credit Hours</i>	<u>136-137</u>

## Civil Technology

### AAS Degree Program

#### On-the-job responsibilities

Use a variety of skills such as drafting, CAD operation, surveying, materials testing and measuring, construction, inspection, report writing and knowledge of construction materials and methods.

#### Places of employment

Government agencies; construction companies; engineering, surveying and architectural firms; oil and steel industries; transportation agencies; and materials testing laboratories

#### Positions for which graduates qualify

Design assistant, materials laboratory technician, construction inspector, civil drafter, assistant surveyor, CAD operator and structural drafter

#### Prerequisites

Fundamentals of College Mathematics III  
English level: Marginally qualified

#### Approximate time

Ten quarters, including one cooperative work experience

#### Civil technology, AAS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Construction Terminology 0808-110	4
Construction Drafting I, II, III 0808-111, 112, 113	6
Construction Methods I, II 0808-201, 202	6
Integrated College Mathematics I, II, III 0817-150, 151, 152	12
Physics I 0818-201	4
Advanced Topics in Mechanics 0818-203	4
Freshman Seminar 0847-100	2
Communication	6
English	8
Physical Education	0
<i>Second Year</i>	
Surveying & Mapping 0809-211	6
Statics 0809-250	4
Strength of Materials 0809-260	4
Soil Mechanics 0809-283	4
Engineering Materials 0809-284	4
Civil Technology Seminar 0809-285	2
Programming for Civil Technicians 0809-290	3
Advanced Mathematics I, II 0818-210, 211	6
Physics II 0818-202	4
Job Search Process 0847-101	1
Liberal Arts	8
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Surveying Projects 0809-311	3
Mapping & Site Design 0809-312	2
Structural Design Drafting I, II, III 0809-321, 322, 323	12
Fundamentals of Fluid Mechanics 0809-340	4
Highway Design & Construction 0809-350	4
Principles of Environmental Technology 0809-385	4
Contemporary Social Issues 0847-202	2
Liberal Arts	12
Technical Elective	1-3
<b>Total Quarter Credit Hours</b>	<b>136-138</b>

## Educational Interpreting

Marilyn Mitchell, Interim Chairperson

### AAS Degree Program

#### On-the-job responsibilities

Work in educational and similar settings where deaf people can use interpreting and other support services such as tutoring and notetaking.

#### Places of employment

Elementary, secondary and postsecondary educational institutions; community service organizations; vocational rehabilitation agencies; business/industry; and government agencies

#### Special entrance requirements

Applicants are required to have at least a high school diploma. College experience with at least a 2.5 grade point average is highly desirable.

Applicants are required to take entrance examinations as described in the admissions section of this bulletin. They must have strong knowledge, skills and experience in English, as documented by high school and/or college transcripts. Applicants also must have knowledge, skills and experience in American Sign Language. Candidates may be required to demonstrate solid performance during the pre-AAS program offered in the summer for six weeks before the fall quarter of entrance. The pre-AAS program consists of the following courses: **Introduction to Sign Language, Sign Language I and II and Introduction to the Deaf Community.**

#### Approximate time

Six quarters, may be taken over a three-year period

#### Educational interpreting, AAS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
American Sign Language (ASL) I, II 0870-110, 120	6
Aspects & Issues of Deafness I, II 0870-112, 122	6
Intercultural Communication 0870-114	3
Processing Skills 0870-123	3
Introduction to Interpreting 0870-124	3
Fingerspelling & Numbers 0870-131	3
Interpreting I 0870-133	3
Practical & Ethical Applications 0870-134	3
Voice Interpreting I 0870-135	3
English Composition	4
Liberal Arts: Literature	4
Mathematics	4
Science	4
Physical Education	0
<i>Second Year</i>	
Principles & Practices of Tutoring & Notetaking 0870-127	3
Professional Interpreter 0870-214	3
Voice Interpreting II, III 0870-215, 225	6
Transliteration I, II 0870-216, 226	6
Oral Transliteration 0870-217	3
Mainstreaming: Programs & Alternatives 0870-222	3
Support Service Professional 0870-232	3
Practicum I, II 0870-311, 321	10
Seminar I, II 0870-313, 323	2
Liberal Arts: Humanities	4
Liberal Arts: Social Science	8
Physical Education	0
<b>Total Quarter Credit Hours</b>	<b>100</b>

# Electronic Publishing and Printing Technology

Kenneth F. Hoffmann, Chairperson

Printing offers a variety of challenging and rewarding career options. All people in the printing industry are part of a team and contribute to the production of magazines, books, brochures, catalogs, packages, newspapers, greeting cards and more. Because of the size and national impact of the printing industry—currently the fastest growing of all manufacturing industries in the country—printing graduates have excellent employment opportunities. Current and projected career opportunities include computer operator positions in electronic publishing and prepress, craft positions in conventional prepress and manufacturing positions in printing press operation.

## Certificate, Diploma, AOS and AAS Degree Programs

Students may choose from certificate, diploma, AOS and AAS degree programs. All four degree options require students to complete basic courses in four areas of printing technology: computer publishing, photographic and digital image capture/editing, image assembly and platemaking, and offset press and finishing. Upon completion of the required fundamental courses, diploma, AOS and AAS students are expected to complete the advanced course sequence in at least one of the above four technical areas. Significant program flexibility is available for each student to elect courses based on career interest and aptitude. A 10-week cooperative work experience is required for students in the diploma, AOS and AAS degree programs.

Students who qualify for the AAS degree may select a concentration in electronic publishing and imaging, which also includes required related-technology courses from the applied art and computer graphics and photo/media technologies areas.

### On-the-job responsibilities

Prepare documents for reproduction using desktop publishing systems, prepare illustrations and photographic single- and full-color images for reproduction by using electronic methods, operate imagesetters, operate process cameras, make contact films and proofs, operate film processors, assemble films for platemaking, image plates, operate offset presses, operate electronic document printing and publishing systems, operate simple bindery and finishing equipment

### Places of employment

Commercial printing plants; prepress and color trade shop companies; in-plant printing departments; book and magazine printers; newspapers; local, state and national government printing facilities

### Positions for which graduates qualify

Desktop publishing technician; electronic prepress technician; scanner operator; imagesetter operator; line and halftone photographer; film assembly technician; contact film, proof and platemaking technician; electronic printing and publishing system operator; offset process operator; small bindery/finishing technician

### Prerequisite

Successful completion of an orientation/sampling experience offered during the Summer Vestibule Program and also during each academic quarter; the sampling activities provide opportunities for students to learn about the printing industry, identify career opportunities, and evaluate their interest and aptitude for the printing field.

### Approximate time

Five quarters for the certificate. Eight quarters for the diploma, including one co-op work experience. Ten quarters for the AOS and AAS degrees, including one co-op work experience

### Electronic publishing and printing technology, certificate, typical course sequence

<i>First Year</i>	<i>Quarter</i>	<i>Credit Hours</i>
Keyboarding 0804-114		2
Introduction to Printing Processes 0822-101		2
Page Creation Methods 0822-110		2
Fundamentals of Reproduction Photography 0822-120		2
Film Contacting, Proofing & Platemaking 0822-125		2
Offset Duplicator Operation I 0822-140		2
Mathematics		3
Freshman Seminar 0847-100		2
Communication		8
English		12
<i>Second Year</i>		
Fundamentals of Desktop Publishing 0822-115		2
Fundamentals of Offset Film Assembly 0822-130		2
Offset Duplicator Operation II 0822-145		2
Production Procedures & Quality Control 0822-200		2
Job Search Process 0847-101		1
Contemporary Life Issues 0847-102		2
Communication		4
English		8
Printing Elective (200-level)		2
<b>Total Quarter Credit Hours</b>		<b>62</b>

### Electronic publishing and printing technology, diploma, typical course sequence

<i>First Year</i>	<i>Quarter</i>	<i>Credit Hours</i>
Keyboarding 0804-114		2
Introduction to Printing Processes 0822-101		2
Page Creation Methods 0822-110		2
Fundamentals of Reproduction Photography 0822-120		2
Film Contacting, Proofing & Platemaking 0822-125		2
Offset Duplicator Operation I 0822-140		2
Mathematics		3
Freshman Seminar 0847-100		2
Communication		6
Elective		2
English		12
<i>Second Year</i>		
Fundamentals of Desktop Publishing 0822-115		2
Fundamentals of Offset Film Assembly 0822-130		2
Offset Duplicator Operation II 0822-145		2
Production Procedures & Quality Control 0822-200		2
Production Printing I 0822-241		2
Job Search Process 0847-101		1
Communication		6
Elective		2
English		8
Printing Elective (200-level)		10
Cooperative Education		Co-op
<i>Third Year</i>		
Production Printing II, III 0822-242		2
Employment Seminar 0822-298		2
Contemporary Life Issues 0847-102		2
Printing Elective (200-level)		6
<b>Total Quarter Credit Hours</b>		<b>86</b>

**Electronic publishing and printing technology,  
AOS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Keyboarding 0804-114	2
Introduction to Printing Processes 0822-101	2
Page Creation Methods 0822-110	2
Fundamentals of Reproduction Photography 0822-120	2
Film Contacting, Proofing & Platemaking 0822-125	2
Offset Duplicator Operation I 0822-140	2
Mathematics	3
Freshman Seminar 0847-100	2
Communication	6
Elective	2
English	12
Physical Education	0
<i>Second Year</i>	
Fundamentals of Desktop Publishing 0822-115	2
Fundamentals of Offset Film Assembly 0822-130	2
Offset Duplicator Operation II 0822-145	2
Production Procedures & Quality Control 0822-200	2
Production Printing I 0822-241	2
Job Search Process 0847-101	1
Communication	6
Elective	4
English	8
Printing Elective (200-level)	8
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Production Printing II 0822-242	2
Production Printing III 0822-243	2
Production Printing IV 0822-244	2
Employment Seminar 0822-298	2
Contemporary Life Issues 0847-102	2
Human Life Experience I, II, III 0847-166, 167, 168	12
Elective	2
Printing Elective (200-level)	12
<b>Total Quarter Credit Hours</b>	<b>110</b>

**Electronic publishing and printing technology,  
AAS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Keyboarding 0804-114	2
Introduction to Printing Processes 0822-101	2
Page Creation Methods 0822-110	2
Fundamentals of Reproduction Photography 0822-120	2
Film Contacting, Proofing & Platemaking 0822-125	2
Offset Duplicator Operation I 0822-140	2
Mathematics	3
Freshman Seminar 0847-100	2
Communication	8
English	12
Physical Education	0
<i>Second Year</i>	
Fundamentals of Desktop Publishing 0822-115	2
Fundamentals of Offset Film Assembly 0822-130	2
Offset Duplicator Operation II 0822-145	2
Production Procedures & Quality Control 0822-200	2
Production Printing I 0822-241	2
Job Search Process 0847-101	1
Communication	4
Elective	2
English	8
Liberal Arts	4
Printing Elective (200-level)	8
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Production Printing II, III, IV 0822-242, 243, 244	6
Employment Seminar 0822-298	2
Contemporary Life Issues 0847-102	2
Elective	2
Liberal Arts	16
Printing Elective (200-level)	12
<b>Total Quarter Credit Hours</b>	<b>114</b>

# Industrial Technologies

Ronald Till, Chairperson

Students may choose programs in electromechanical technology (AAS), industrial drafting (diploma) or industrial drafting technology (AOS, AAS).

## Accreditation

The AAS programs in electromechanical technology and industrial drafting technology are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.

## Electromechanical Technology

A variety of career options are offered through the Electromechanical Technology Program. Graduates of this program work with systems and equipment used in many different industries throughout the country.

## AAS Degree Program

### On-the-job responsibilities

Construct and maintain equipment; apply knowledge of mechanical, electronic and computer principles; service test equipment; and test complex electromechanical equipment.

### Places of employment

Engineering and manufacturing industries, government agencies and military laboratories

### Positions for which graduates qualify

Research aide, engineering technician, quality control technician, service technician, engineering aide, automated equipment technician and field service representative

### Prerequisites

Fundamentals of College Mathematics III  
English level: Marginally qualified

## Approximate time

Ten quarters, including cooperative work experience and assuming above prerequisites are satisfied at time of admission

## Electromechanical technology, AAS degree, typical course sequence

<i>First Year</i>	<i>Quarter</i>	<i>Credit Hours</i>
Basic Drafting I 0811-101		2
C++ Programming I 0811-201		4
C++ Programming II 0811-202		4
Mechanical Components 0811-211		4
DC Circuits 0811-213		5
Tool Skills 0811-241		2
Integrated College Mathematics I, II, III 0817-150, 151, 152		12
Physics I, II 0818-201, 202		8
Freshman Seminar 0847-100		2
Communication		4
English		8
Physical Education		0
<i>Second Year</i>		
Digital Systems 0811-171		4
Technical Graphics 0811-209		2
AC Circuits 0811-304		5
Kinematics 0811-317		4
Fluid Power 0811-321		4
Electronics I, II 0811-368, 369		9
Advanced Mathematics I, II 0817-210, 211		6
Concepts of Calculus 0817-212		3
Job Search Process 0847-101		1
Communication		2
Liberal Arts		8
Physical Education		0
Cooperative Education		Co-op
<i>Third Year</i>		
Optical Systems 0811-234		4
Electrical Power Systems 0811-322		4
Transducers 0811-324		4
Control Systems 0811-325		4
Microprocessor Control Systems I, II 0811-327, 328		4
Electronics III 0811-370		4
Contemporary Social Issues 0847-202		2
Liberal Arts		12
Technical Elective		8
<i>Total Quarter Credit Hours</i>		149

## Industrial Drafting

### Diploma Program

#### On-the-job responsibilities

From sketches, drawings and specifications prepared by others, prepare detailed production drawings (manually and using computer-aided drafting equipment) for manufactured products

#### Places of employment

Manufacturing industries, engineering firms, metal-working industries, drafting shops, government agencies and engineering research firms

#### Positions for which graduates qualify

Mechanical, electrical and electromechanical drafter; detailer; and CAD operator

#### Prerequisites

Fundamentals of College Mathematics III  
English level: Marginally qualified

#### Approximate time

Seven quarters, including one cooperative work experience

#### Industrial drafting, diploma, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Manufacturing Processes I, II 0810-131, 132	2
Basic Technical Drafting I, II, III 0810-141, 142, 143	9
Integrated College Mathematics I, II, III 0817-150, 151, 152	12
Physics I, II 0818-201, 202	8
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	6
English	12
Cooperative Education	Co-op
<i>Second Year</i>	
Materials & Processes I, II 0810-151, 152	6
General Tolerancing I 0810-230	2
Geometric Tolerancing I, II 0810-231, 232	4
Technical Mechanical Drafting I, II, III 0810-241, 242, 243	9
Technical Electrical Drafting I, II, III 0810-251, 252, 253	9
Contemporary Life Issues 0847-102	2
Communication	4
English	4
<b>Total Quarter Credit Hours</b>	<b>92</b>

## Industrial Drafting Technology

### AOS Degree Program

#### On-the-job responsibilities

Handle normal drafting assignments using drafting standards and engineering terms; gather data and information for engineers; draw layouts of design concepts for new machines, products and for drafters' use in drawing parts; and use computer-aided drafting equipment

#### Places of employment

Manufacturing industries, engineering firms, drafting shops, government agencies, metal-working industries and engineering research firms

#### Positions for which graduates qualify

Mechanical, electrical and electromechanical drafter; mechanical designer; CAD operator; and electromechanical designer

#### Prerequisites

Fundamentals of College Mathematics III  
English level: Marginally qualified

#### Approximate time

Eleven quarters, including two cooperative work experiences

#### Industrial drafting technology, AOS degree, typical course sequence

<i>First Year</i>	<i>Quarter Credit Hours</i>
Manufacturing Processes I, II 0810-131, 132	2
Basic Technical Drafting I, II, III 0810-141, 142, 143	9
Integrated College Mathematics I, II, III 0817-150, 151, 152	12
Physics I, II 0818-201, 202	8
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	6
English	12
Physical Education	0
Cooperative Education	Co-op
<i>Second Year</i>	
Materials and Processes I, II 0810-151, 152	6
General Tolerancing 0810-230	2
Geometric Tolerancing I, II 0810-231, 232	4
Technical Mechanical Drafting I, II, III 0810-241, 242, 243	9
Technical Electrical Drafting, I, II, III 0810-251, 252, 253	9
Advanced Mathematics I, II 0817-210, 211	6
Concepts of Calculus 0817-212	3
Communication	6
English	4
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Technical Drafting IV, V, VI 0810-204, 205, 206	11
Statics 0810-213	5
Strength of Materials 0810-214	5
Mechanisms 0810-215	4
Machine Design I, II 0810-221, 222	8
Contemporary Life Issues 0847-102	2
Human Experience I, II, III 0847-166, 167, 168	12
Technical Elective (with department approval)	3
<b>Total Quarter Credit Hours</b>	<b>151</b>

**AAS Degree Program**

An AAS degree prepares students for the same responsibilities as an AOS degree except that the required liberal arts courses prepare students to continue toward a bachelor's degree if they so desire.

**On-the-job responsibilities**

Handle normal drafting assignments using drafting standards and engineering terms; gather data and information for engineers; draw layouts of design concepts for new machines, products and for drafters' use in drawing parts; and use computer-aided drafting equipment

**Places of employment**

Manufacturing industries, engineering firms, metal-working industries, drafting shops, government agencies and engineering research firms

**Positions for which graduates qualify**

Mechanical, electrical and electromechanical drafter; mechanical or electromechanical designer; CAD operator

**Prerequisites**

Fundamentals of College Mathematics III  
English level: Marginally qualified

**Approximate time**

Eleven quarters, including two cooperative work experiences

**Industrial drafting technology, AAS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Manufacturing Processes I, II 0810-131, 132	2
Basic Technical Drafting I, II, III 0810-141, 142, 143	9
Integrated College Mathematics I, II, III 0817-150, 151, 152	12
Physics I, II 0818-201, 202	8
Freshman Seminar 0847-100	2
Job Search Process 0847-101	1
Communication	6
English	12
Physical Education	0
Cooperative Education	Co-op
<i>Second Year</i>	
Materials & Processes I, II 0810-151, 152	6
General Tolerancing 0810-230	2
Geometric Tolerancing I, II 0810-231, 232	4
Technical Mechanical Drafting I, II, III 0810-241, 242, 243	9
Technical Electrical Drafting I, II, III 0810-251, 252, 253	9
Advanced Mathematics I, II 0817-210, 211	6
Concepts of Calculus 0817-212	3
Communication	2
English	4
Liberal Arts	8
Physical Education	0
Cooperative Education	Co-op
<i>Third Year</i>	
Technical Drafting IV, V, VI 0810-204, 205, 206	11
Statics 0810-213	5
Strength of Materials 0810-214	5
Mechanisms 0810-215	4
Machine Design I, II 0810-221, 222	8
Contemporary Social Issues 0847-202	2
Liberal Arts	12
Technical Elective (with departmental approval)	3
<hr/> <i>Total Quarter Credit Hours</i>	<hr/> 155

# Manufacturing Processes Technology

Frederic R. Hamil, Chairperson

Manufacturing processes technology (MPT) students prepare for employment in precision machining occupations. These include tool and die making, mold making, instrument making and computer-numerical-control machining. MPT graduates are successfully employed in both large manufacturing corporations and small contract manufacturing shops. In addition, MPT graduates can continue their education in manufacturing and engineering technology programs.

## Manufacturing Processes

### Diploma Program

#### On-the-job responsibilities

Set up and operate such machine tools as lathes and milling machines, shape metal into precision parts by conventional and nonconventional processes, follow blueprints and use special instruments to inspect work

#### Places of employment

Manufacturing industries, metal-working industries, engineering firms and engineering research firms

#### Positions for which graduates qualify

Entry-level and apprenticeship programs: tool and die maker, instrument maker, mold maker, pattern maker, model maker, machinist, CNC operator

#### Prerequisites

Complete Summer Vestibule Program sampling or equivalent Career Exploration course; demonstrate required English skills (Michigan Test score higher than 50, and California Reading Test score higher than 7.0); and be prepared for Fundamentals of College Mathematics I

#### Approximate time

Six quarters and one summer cooperative work experience

#### Manufacturing processes, diploma, typical course sequence

First Year	Quarter	Credit Hours
Manufacturing Processes I, II, III	0813-131, 132, 133	12
Blueprint Reading I, II	0813-139, 140	4
Precision Measurement	0813-154	2
Fundamentals of College Mathematics I, II, III	0817-140, 141, 142	9
Freshman Seminar	0847-100	2
Job Search Process	0847-101	1
Communication		6
English		12
Cooperative Education		Co-op
<b>Second Year</b>		
Introduction to Numerical Control	0812-150	2
Basic Drafting I, II	0813-101, 102	4
Manufacturing Processes IV, V, VI	0813-134, 135, 136	12
Industrial Materials	0813-151	3
Manufacturing Analysis	0813-152	3
Integrated College Mathematics I, II, III	0817-150, 151, 152	12
Contemporary Life Issues	0847-102	2
Communication		6
English		8
<b>Total Quarter Credit Hours</b>		<b>100</b>

## Manufacturing Processes Technology

### AOS Degree Program

#### On-the-job responsibilities

Set up and operate such machine tools as lathes and milling machines, set up and operate computer-numerical-controlled machine tools, shape material into precision parts by conventional and nonconventional processes, follow blueprints and use advanced measuring techniques to inspect work

#### Places of employment

Manufacturing industries, metal-working industries, engineering firms and engineering research firms

#### Positions for which graduates qualify

Entry-level and apprenticeship programs: tool and die maker, instrument maker, mold maker, pattern maker, model maker, machinist, CNC operator and CNC programmer trainee

#### Prerequisites

Complete Summer Vestibule Program sampling or equivalent Career Exploration course; demonstrate required English skills (Michigan Test score higher than 50, and California Reading Test score higher than 7.0); and be prepared for Fundamentals of College Mathematics I

#### Approximate time

Nine quarters and two summer cooperative work experiences

#### Manufacturing processes technology, AOS degree, typical course sequence

First Year	Quarter	Credit Hours
Manufacturing Processes I, II, III	0813-131, 132	12
Blueprint Reading I, II	0813-139, 140	4
Precision Measurement	0813-154	2
Fundamentals of College Mathematics I, II, III	0817-140, 141, 142	9
Freshman Seminar	0847-100	2
Job Search Process	0847-101	1
Communication		6
English		12
Physical Education		0
Cooperative Education		Co-op
<b>Second Year</b>		
Introduction to Computer Numerical Control	0812-150	2
Basic Drafting I, II	0813-101, 102	4
Manufacturing Processes IV, V, VI	0813-134, 135, 136	12
Industrial Materials	0813-151	3
Manufacturing Analysis	0813-152	3
Integrated College Mathematics I, II, III	0817-150, 151, 152	12
Contemporary Life Issues	0847-102	2
Communication		6
English		8
Physical Education		0
Cooperative Education		Co-op
<b>Third Year</b>		
Computer Numerical Control I, II, III	0812-151, 152, 153	12
Welding I	0813-153	2
Advanced Machining & Processes	0813-237	4
Advanced Precision Measurement	0813-256	3
Senior Seminar	0813-260	1
Human Experience I, II, III	0847-166, 167, 168	12
General Education Elective		3
Technical Elective *		9
<b>Total Quarter Credit Hours</b>		<b>146</b>

\* Technical electives with department approval; suggested areas include mathematics, physics, drafting and Welding II.

# Imaging Technology

Jean-Guy Naud, Chairperson

Numerous organizations in business, industry, education and government that use photography, television and computers as ways to communicate need support from custom photo lab services and imaging production services. Imaging technology involves jobs such as developing film, making prints and display materials, assisting in video production, making special-effects slides and preparing presentation graphics using computers.

Students may choose from diploma and AOS and AAS degree programs in imaging technology.

## Pretechnical program

The imaging technology department does not have a pretechnical program at this time. Instead, it offers a common core of imaging courses in each of the three program options (diploma, AOS and AAS degrees) that provides the necessary foundation for careers in the imaging industry.

## Diploma, AOS and AAS Degree Programs

Students may choose from diploma, AOS and AAS degree programs. All three program options require students to complete a common core of imaging courses in basic photography, imaging labs, computer technology, image design and image manipulation in addition to presentation media. Upon completion of the required fundamental courses, students can graduate with a diploma or continue their studies toward AOS and AAS degrees. AOS and AAS students are expected to complete advanced courses in one or more technical areas such as multimedia and advanced imaging techniques. AAS students are offered the added flexibility to transfer to a BS program in imaging systems management in the School of Photographic Arts and Sciences or acquire additional skills in

electronic publishing and imaging. Some of the required courses leading to the electronic publishing and imaging option are provided by NTID's applied art and computer graphics department as well as the electronic publishing and printing technology department. A 10-week cooperative work experience is required for students in the AOS and AAS degree programs.

## On-the-job responsibilities

Prepare layouts and mechanical art work for projection and television; set type with imagesetting equipment; operate a variety of computer peripherals; produce presentation graphics with personal computers; operate a variety of 35mm copy stands in photo lab; produce special-effects slides and filmstrips from flat art or transparencies; operate 35mm photo equipment in the studio and on location; process and print black-and-white and color film; work in video; operate ENG and studio cameras and U-Matic and VHS videocassette recorders; produce programs; dub 1/2-inch and 3/4-inch tape; operate 3/4-inch editing equipment; operate film and paper processors; produce color print (enlargers) and color copy work (slides and negatives); make internegatives, slide duplicates and use various display materials; monitor processing and printing using several computer-assisted systems

## Places of employment

Custom or commercial photographic labs, in-house industrial photographic labs, industrial training or media departments, imaging production houses, school or university media centers

## Positions for which graduates qualify

Advanced custom color printer technician, custom copy technician, custom color printer, custom color print inspector/evaluator, film processing technician, media production technician, photographic laboratory technician, presentation graphics technician, television production technician

**Prerequisite**

Successful completion of an orientation/sampling experience offered during the Summer Vestibule Program and also during Winter and Spring quarters. The sampling activities provide opportunities for students to learn about the imaging industry, identify career opportunities and evaluate their interest in and aptitude for the imaging field.

**Approximate time**

Six quarters for the diploma. Ten quarters for the AOS and AAS degrees, including one co-op work experience

**Imaging technology, diploma, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar—Photo/Media I, II, III 0872-101, 102, 103	3
Computers in Visual Communication 0872-121	2
Image Sources I 0872-122	3
Image Manipulation I 0872-123	3
Imaging Lab I, II, III 0872-141, 142, 143	9
Basic Imaging Design 0872-181	2
Image Design 0872-182	2
Presentation Media I 0872-183	3
Introduction to College Mathematics 0817-120	3
Communications	6
English	12
<i>Second Year</i>	
Image Manipulation II, III 0872-224, 225	6
Imaging Lab IV, V, VI 0872-244, 245, 246	9
Presentation Media II, III 0872-284, 286	6
Image Sources II 0847-285	3
Technical Elective	2-4
Job Search Process 0847-101	1
Contemporary Life Issues 0847-102	2
Communications	6
English	8
<b>Total Quarter Credit Hours</b>	<b>91-93</b>

**Imaging technology, AOS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar—Photo/Media I, II, III 0872-101, 102, 103	3
Computers in Visual Communication 0872-121	2
Image Sources I 0872-122	3
Image Manipulation I 0872-123	3
Imaging Lab I, II, III 0872-141, 142, 143	9
Basic Imaging Design 0872-181	2
Image Design 0872-182	2
Presentation Media I 0872-183	3
Introduction to College Mathematics 0817-120	3
Communications	6
English	12
Physical Education	0
<i>Second Year</i>	
Image Manipulation II, III 0872-224, 225	6
Imaging Lab IV, V, VI 0872-244, 245, 246	9
Presentation Media II, III 0872-284, 286	6
Image Sources II 0872-285	3
Technical Elective	2-4
Job Search Process 0847-101	1
Communications	6
English	8
Human Experience I 0847-166	4
Physical Education	0
Cooperative Education 0872-299	Co-op
<i>Third Year</i>	
Display Imaging 0872-347	3
Composite Imaging 0872-348	3
Retouch/Restore 0872-349	3
Multimedia 0872-388	3
Presentation Media IV 0872-387	3
Multimedia Interactive 0872-389	3
Open Electives (3 credits from Gen Ed)	18
Contemporary Life Issues 0847-102	2
or	
Contemporary Social Issues 0847-202	2
Human Experience II, III 0847-167, 168	8
<b>Total Quarter Credit Hours</b>	<b>139-141</b>

**Imaging technology, AAS degree, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar—Photo/Media I, II, III 0872-101, 102, 103	3
Computers in Visual Communication 0872-121	2
Image Sources I 0872-122	3
Image Manipulation I 0872-123	3
Imaging Lab I, II, III 0872-141, 142, 143	9
Basic Imaging Design 0872-181	2
Image Design 0872-182	2
Presentation Media I 0872-183	3
Introduction to College Mathematics 0817-120	3
Communications	6
English	12
Physical Education	0
<i>Second Year</i>	
Image Manipulation II, III 0872-224, 225	6
Imaging Lab IV, V, VI 0872-244, 245, 246	9
Presentation Media II, III 0872-284, 286	6
Image Sources II 0847-285	3
Technical Elective	2-4
Job Search Process 0847-101	1
Communications	6
English	8
Liberal Arts	4
Physical Education	0
Cooperative Education 0872-299	Co-op
<i>Third Year</i>	
Presentation Media IV 0872-387	3
Multimedia 0872-388	3
Multimedia Interactive 0872-389	3
or	
Display Imaging 0872-347	3
Composite Imaging 0872-348	3
Retouch/Restore 0872-349	3
Contemporary Social Issues 0847-202	2
Technical Electives	9-12
Open Electives (3 credits for Gen Ed)	9-12
Liberal Arts	16
<b>Total Quarter Credit Hours</b>	<b>138-146</b>

**Imaging technology, AAS degree, concentration in electronic publishing and imaging, typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar—Photo/Media I, II, III 0872-101, 102, 103	3
Computers in Visual Communication 0872-121	2
Image Sources I 0872-122	3
Image Manipulation I 0872-123	3
Imaging Lab I, II, III 0872-141, 142, 143	9
Basic Imaging Design 0872-181	2
Image Design 0872-182	2
Presentation Media I 0872-183	3
Introduction to College Mathematics 0817-120	3
Communications	6
English	12
Physical Education	0
<i>Second Year</i>	
Image Manipulation II, III 0872-224, 225	6
Imaging Lab IV, V, VI 0872-244, 245, 246	9
Presentation Media II, III 0872-284, 286	6
Image Sources II 0847-285	3
Survey of Image Reproduction 0822-268	2
Job Search Process 0847-101	1
Communication	6
English	8
Liberal Arts	4
Physical Education	0
Cooperative Education 0872-299	Co-op

<i>Third Year</i>	
Presentation Media IV 0872-387	3
Multimedia 0872-388	3
Multimedia Interactive 0872-389	3
Survey of Electronic Layout 0849-268	2
Advanced Desktop Publishing 0822-215	2
Output Devices & QC 0822-220	2
Basic Design II 0849-112	2
Elec. Half-tone & Ill. Produc. 0822-225	2
Color Separation Methods 0872-260	2
Advanced Computer III. Techniques 0849-398	2
Open Electives	4
Contemporary Social Issues 0847-202	2
Liberal Arts	16
<hr/> <i>Total Quarter Credit Hours</i>	<hr/> 138

**Imaging technology, AAS degree, concentration leading toward a BS in imaging systems management (SPAS), typical course sequence**

<i>First Year</i>	<i>Quarter Credit Hours</i>
Freshman Seminar—Photo/Media I, II, III 0872-101, 102, 103	3
Computers in Visual Communication 0872-121	2
Image Sources I 0872-122	3
Image Manipulation 0872-123	3
Imaging Lab I, II, III 0872-141, 142, 143	9
Basic Imaging Design 0872-181	2
Image Design 0872-182	2
Presentation Media I 0872-183	3
Introduction to College Mathematics 0817-120	3
Communications	6
English	12
Physical Education	0
 <i>Second Year</i>	
Image Manipulation II, III 0872-224, 225	6
Imaging Lab IV, V, VI 0872-244, 245, 246	9
Presentation Media II, III 0872-284, 286	6
Image Sources II 0872-285	3
Algebra for Management Science 1016-225	4
Job Search Process 0847-101	1
Communications	6
English	8
Liberal Arts	4
Physical Education	0
Cooperative Education 0872-299	Co-op
 <i>Third Year</i>	
Display Imaging 0872-347	3
Composite Imaging 0872-348	3
Retouch/Restore 0872-349	3
Materials & Processes of Photography 2076-211, 212, 213	9
Financial Accounting 0101-301	4
Managerial Accounting 0101-302	4
Technical Writing I, II 2080-312, 313	4
Contemporary Social Issues 0847-202	2
Liberal Arts	16
<hr/> <i>Total Quarter Credit Hours</i>	<hr/> 143

*Note that math/science requirements may necessitate additional course work while matriculated in SPAS.*

# Prebaccalaureate Studies

## Criminal Justice, Engineering and Science, and Social Work

Dr. Linda Rubel, Chairperson, Department of Liberal Arts Support

Dr. Rosemary Saur, Chairperson, Science and Engineering Support

Dean Santos, Staff Chairperson, Social Work

Prebaccalaureate studies are available as a bridge to students accepted by NTID and interested in enrolling in another RIT college, but not yet ready to enter into a baccalaureate-level program. Students spend up to one year in these studies preparing for matriculation. Reasons for entering prebaccalaureate studies include the need to further develop either mathematics or English skills, indecision as to program of study or lack of space in the chosen baccalaureate program.

While in a prebaccalaureate studies program, students receive academic advising as well as personal and career counseling. The academic program is flexible and is set up individually for each student. Courses are chosen to address as closely as possible the strengths and needs of individual students. Regular NTID technical and developmental courses taught by support department faculty members are supplemented by courses in the colleges of Science, Engineering and Liberal Arts, including the social work and criminal justice courses indicated. This strategy enables students to develop needed skills while at the same time progressing in their chosen fields of study.

Students receive no degree in prebaccalaureate studies. Rather, at an appropriate time, they are advised to apply to the program of their choice and are assisted in doing so.

### Entry requirements

Students entering NTID during the Summer Vestibule Program must complete the prescribed sampling experience in science, engineering or social work. Students may be accepted directly into prebaccalaureate studies if so recommended by the Recruitment and Admissions Department or upon approval of the NTID department of liberal arts or department of science and engineering support. Students already matriculated in an NTID program may change to prebaccalaureate studies upon the recommendation of their current department and with the approval of a support department adviser and chairperson.

### Prerequisites

Students interested in baccalaureate-level programs must have the appropriate high school background for their area of interest. They should consult appropriate sections of the catalog for individual program requirements. High school courses should be of a level comparable to New York State Regents or college preparatory. Ideally, grades should be at the "B" level or better.

### Approximate time

Students generally take up to one academic year to matriculate into an associate- or baccalaureate-level program of study.

### Prebaccalaureate studies in criminal justice, typical course sequence

First Year	Quarter Credit Hours
Freshman Seminar 0847-100	2
Written Communication I, II 0847-218, 219	8
Fundamentals of College Mathematics I, II 0817-140, 141	6
Communication	4
Criminal Justice System	4
Introduction to Paralegals	4
English Composition	4
General Education Elective	10-18
Mathematics	3-4
Physical Education	0
<b>Total Quarter Credit Hours</b>	<b>45-54</b>

### Prebaccalaureate studies in engineering, typical course sequence

First Year	Quarter Credit Hours
Freshman Seminar 0853-100	2
Learning Strategies 0853-105	3
Reading & Thinking in Science & Technology 0853-200 *	3
Written Communication I, II 0847-218, 219 †	8
Calculus I, II, III	12
Chemistry	4
Communication	4
English Composition	4
Physical Education	0
University Physics I, II	6
University Physics Lab I, II	2
<b>Total Quarter Credit Hours</b>	<b>48</b>

\* Chemistry 1011-209 may be included in students' schedules if they are deferred from Reading & Thinking in Science & Technology during the Spring Quarter.

† Students judged as proficient—those having a Michigan Test score higher than 80 and a 10th grade California Achievement Test score—start the English Composition series assigned by the NTID Liberal Arts Placement Test (LAPT). Students judged as provisionally qualified take at least one quarter of NTID English.

### Prebaccalaureate studies in science, typical course sequence

First Year	Quarter Credit Hours
Freshman Seminar 0853-100	2
Learning Strategies 0853-105	3
Reading & Thinking in Science & Technology 0853-220	3
Integrated Mathematics I, II, III 0817-150, 151, 152	9
Written Communication I, II 0847-218, 219 *	8
College Algebra & Trigonometry †	(4)
Introduction to Calculus I, II	(8)
or	
Calculus I, II, III	(12)
General Chemistry	9
or	
General Biology	(9)
and	
General Biology Lab	(3)
or	
Physics Orientation	(2)
University Physics I, II	(6)
and	
University Physics Lab I, II	(2)
Communication	4
English Composition	4
Physical Education	0
<b>Total Quarter Credit Hours</b>	<b>42</b>

\* Students judged as proficient—those having a Michigan Test score higher than 80 and a 10th-grade California Achievement Test score—start the English Composition series assigned by the NTID Liberal Arts Placement Test (LAPT). Students judged as provisionally qualified take at least one quarter of NTID English.

† Credits shown in parentheses ( ) are substituted for those above without parentheses.

### Prebaccalaureate studies in social work, typical course sequence

First Year	Quarter Credit Hours
Professional Social Work Role 0516-210	4
Self-Awareness in the Helping Role 0516-212	4
Fundamentals of College	
Mathematics I, II, III 0817-140, 141, 142	9
Freshman Seminar 0847-100	2
Written Communication I, II 0847-218, 219	8
English Composition	4
Communication	4
General Education	2-3
General Education Bridging Course	6
Introduction to Psychology	4
Physical Education	0
<b>Total Quarter Credit Hours</b>	<b>47-48</b>

# Course Number Index

*RIIT course numbering: Throughout this bulletin and in registration materials that are published quarterly, courses are generally referred to by their seven-digit registration number. The first two digits refer to the college offering the course. The third and fourth digits identify the discipline within the college. The final three digits are unique to each course and identify whether the course is noncredit (less than 099); lower division (100–300); upper division (400–699); or graduate level (700 and above).*

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(Program offered jointly by computer science and computer engineering departments.)

# Course Descriptions

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

## College of Applied Science and Technology

### Information Technology

Information technology courses are normally offered at least once annually.

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.

**0602-200** **Survey of Computer Science**  
Survey of computers and problem solving by using general-purpose application software. Students 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 utilize packages individually and in an integrated fashion. **Class 4, Credit 4**

**0602-201** **Freshman Seminar**  
An orientation seminar taken by first-year students in information technology. Topics covered include a curriculum overview, co-op and career alternatives in information technology, and orientation to RIT and college life.

**0602-202** **Computing Tools and Environments**  
An introduction to key computing environments in the information technology program. These environments vary in computing platform, user interface, and the collection of tools and applications available. Course objectives are to build skills that will enhance success in later courses, to emphasize common computing paradigms at the operating system level, to teach students how to perform common operations on multiple platforms and to make the student a knowledgeable network citizen. Emphasis is placed on the use of the Internet as an information source. Each topic is taught on more than one computing platform, and topics are covered at an accelerated pace. (Computer literacy or 0602-200)

**0602-203** **Introduction to Scripting**  
An introduction to computer scripting and high-level programming languages. These "English-like" languages introduce students to programming concepts and enable them to design simple computer applications. Computer laboratory work is required. (0602-202 or permission of instructor)

**0602-204** **Programming with Components**  
The use of packaged components to develop computer applications quickly. A programming environment that supports the use of component technology is used, and the student learns to use components in the construction of event-driven programs. Finite state machines, as a model for the control of such systems, are studied. Programming projects are required. (0602-203) **Class 3, Lab 2, Credit 4**

**0602-205** **Computer Techniques—FORTRAN Language**  
Students are 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 are required. (Pre-calculus) **Class 3, Credit 3**

**0602-207** **Computer Techniques—C Language**  
Students are 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 are required. (Pre-calculus) **Class 3, Credit 3-4**

**0602-208** **Introduction to Programming**  
A first course in programming using C++ in writing modular, well-documented programs. Topics include an overview of problem-solving methods, C++ control structures and their uses, procedures and functions with parameters, elementary data types, arrays, records and modular programming. Weekly programming assignments stress features of structured programming and C++. (0602-200 or 0602-202) **Class 3, Lab 2, Credit 4**

**0602-210** **Program Design and Validation**  
A second course in programming and data structures, where students use C++ 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 is stressed. Programming projects are required. (0602-208) **Class 3, Lab 2, Credit 4**

**0602-212** **Abstractions in Programming**  
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 are required. (0602-210) **Class 2, Lab 4, Credit 4**

**0602-300** **Business Applications Using COBOL**  
A study of elementary COBOL programming, using structured design and programming concepts developed in 0601-210. Emphasizes 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 write programs that adhere to specific programming and documentation standards. (0602-210) **Class 4, Credit 4**

**0602-303** **Advanced Business Applications**  
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 write programs that adhere to specific programming and documentation standards. (0602-300) **Class 4, Credit 4**

**0602-310** **Computer-Human Interface Design**  
A rapidly expanding and evolving community of computer users has inspired exciting research into the design of computer-human interfaces. Students 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 includes the design, implementation and evaluation of interfaces. (0602-203, 425) **Class 4, Credit 4**

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

0602-350

**Technology Transfer**

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. 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. **Class 4, Credit 4**

0602-410

**Computer Concepts and Software Systems**

An introduction to the overall organization of digital computers and operating systems for nonmajors. Topics include basic machine organization, an overview of machine and assembly language, properties of common I/O devices, synchronization and scheduling of processes, physical and virtual memory management techniques, resource allocation and protection, and user interface issues. (0602-202 or 0602-208) **Class 4, Credit 4**

0602-411

**Data Communications and Computer Networks**

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. (0602-203 or 0602-208) **Class 4, Credit 4**

0602-412

**Internetworking Lab**

A laboratory-based course on the interconnection of digital devices for the purpose of enabling data communication. The focus is on the hardware for peripheral communication and network communication, with a substantial laboratory component. Accessing computers and networks from a remote site are also studied. Students are required to construct cables, install network cards, configure modems and establish a working connection between digital devices. Problems are introduced into working systems and students are required to use diagnostic tools (both software and hardware) to determine and repair the problem. The use of remote access techniques to control and diagnose computers and networks are introduced. (0602-411) **Class 3, Lab 2, Credit 4**

0602-420

**Artificial Intelligence: Expert Systems**

A survey of the mechanisms of intelligence and all supporting technologies that provide the infrastructure for the study of cognitive science. Requires the study of expert systems, including the knowledge base and inference engine required in an expert system. Students develop an expert system. (0602-203 or 0602-208) **Class 4, Credit 4**

0602-425

**Human Factors in Information Processing**

Exploration of the nature of the mind, exploring the foundational concepts of cognitive psychology, sensation, perception, attention, knowledge, problem solving and memory. Cognitive theories are discussed and related to computer-human interactions and the representation of knowledge and information in the computing environment. **Class 4, Credit 4**

0602-455

**Needs Assessment**

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 builds student skills in two different—yet interacting—areas: needs assessment (requirements analysis) and group problem solving. Students use interviewing and problem-solving techniques to uncover the constraints that surround problem areas. Students learn the questions to ask during needs assessment, along with developing the interpersonal skills to conduct these meetings. Emphasis is on the steps in creative problem solving, the basics of meeting planning to maximize group effectiveness and helping a client to focus concerns into a clearly defined problem. **Class 4, Credit 4**

0602-475

**Image and Voice Communications**

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. (0602-202, 411) **Class 3, Lab 2, Credit 4**

0602-483

**Applied Database Management**

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. (0602-208 or permission of instructor) **Class 4, Credit 4**

0602-510

**Fundamentals of Instructional Technology**

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 apply the model to a selected topic and develop and validate a unit of instruction for end users. **Class 4, Credit 4**

0602-512

**Interactive Courseware**

A specialized educational change strategy involves the design of microcomputer courseware (educational software for personal computers). This will be an area of expertise for information technologists who will likely work as part of a design team with instructional designers. Students develop branching computer tutorials, as well as simple instructional interactive video disk programs. The process of systematic instructional design is emphasized. Students also are encouraged to consider adaptive systems and the design benefits and constraints of nonhuman delivery systems. (0602-203, 510) **Class 4, Credit 4**

0602-515

**The Internet: Network Transport**

A laboratory-based course on the establishment of a data stream across the Internet. The focus is on providing a TCP/IP or AppleTalk data stream for higher level services to operate over. It is primarily concerned with the transport layer and below. TCP/IP and AppleTalk are the predominant protocols studied. Others (such as Novell Netware) are studied to learn how to implement TCP/IP in concert with, or over the top of other protocols. Students learn how to connect together computers in a network, and then how to connect the separate networks together to form an internetwork. Monitoring and diagnosis of an operational network, plus administration of the infrastructure are studied. (0602-411) **Class 3, Lab 2, Credit 4**

0602-516

**The Internet: Service Provision**

An investigation of the tasks of selecting, configuring and administering services in an internetworking environment. Topics include service administration, user administration, and security and privacy issues. Students completing this course have experience in administering an internetwork of computers with a variety of services, including file service, print service, application service, name service, anonymous ftp service, Web service and others. (0602-411) **Class 3, Lab 2, Credit A**

0602-519

**Principles of Education for Dietetics**

Dietetics and nutrition professionals are expected to communicate effectively with people. That translates into the ability to give presentations—to instruct, to inform and to persuade. At the completion of this course, students should be able to create and effectively implement instructional, informational and persuasive presentations related to nutrition or dietetics, for a specified audience, using at least one medium. Additional topics include training, media design and message design.

0602-525

**Performance Support System Design**

The modern work place 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 on-line job aids, expert systems, databases 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 gained in previous courses. It enables the learner to create, implement and evaluate an integrated performance support system that meets specific needs within an organization. (0602-203, 510) **Class 4, Credit 4**

## Computer Science

## Computer Science

*Computer science courses are normally offered at least once annually and may be taken as computer science electives except as noted.*

**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) depends on 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, and 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**

**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 are required. (0603-334, 0603-352) **Class 4, Credit 4**

**0601-309****C Programming**

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. (0601-352) Cannot be taken for credit if credit has been given for 0601-306. **Class 1, Credit 1**

**0602-532****Electronic Prototyping and Participatory Design**

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 apply techniques for rapid prototyping and evaluation to a problem requiring the design of an interactive interface. They 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 are required to critique assignments and evaluate prototypes developed by other class members. (0602-202, 203) **Class 4, Credit 4**

**0602-534****Dynamic Graphics and Animation**

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 surveys 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 are introduced, and student projects are required. (0602-202, 203) **Class 4, Credit 4**

**0602-536****Electronic Media Management**

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. (0602-203) **Class 4, Credit 4**

**0602-570****Windows Programming**

The theme is Windows 3.1 programming using C++. Students learn how to write stand-alone applications with Windows dialog boxes, radio buttons, menus and so on; how to use built-in Windows DLL (dynamic link libraries) such as USER, KERNEL and GDI; how to design custom DLLs; and how to use API (application program interface). They also experiment with DDE (dynamic data exchange) and OLE (object linking and embedding). Students are expected to design and implement several small applications. (0602-208, 210)

**0602-572****Macintosh Programming**

Students learn to create stand-alone applications for the Macintosh featuring dialog boxes; radio buttons; pull-down, pop-up and hierarchical menus; scroll bars; and other interface elements typical of the Macintosh environment. Topics include the Macintosh Toolbox (the library of routines that underlies the Macintosh graphical user interface), Resources (the data that a program uses to make library calls to routines within Toolbox), and ResEdit (the editor that enables programmers to create, modify and delete resources within programs). Students are expected to design and implement several small applications. (0602-208, 210)

**0602-574****Advanced Applications Programming**

In this capstone course, students build a substantial Windows application. They explore advanced topics in areas of interest and can expand upon concepts introduced in the earlier courses in the concentration. Additional topics include a comparative analysis of event-driven programming in the Windows environment, the limits of development tools such as Visual Basic and porting applications between platforms. (0602-570, 572)

**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**

**0602-595****Senior Seminar in Information Technology**

Capstone seminar to be taken by graduating students in the information technology curriculum. Topics include recent advances and future impacts in information technology. (Fourth-year standing) **Class 1, Credit 1**

**0601-319** **Scientific Applications Programming**  
An introduction to classical algorithms used in the solution of numerical problems encountered in science and engineering. The FORTRAN and APL languages are 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 are required. (0603-233) **Class 4, Credit 4**

**0601-450** **Programming Language Concepts**  
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. Emphasizes the concepts underpinning modern languages, rather than the mastery of particular language details. Programming projects are required. (0603-334) **Class 4, Credit 4**

**0603-101** **Freshman Seminar**  
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 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 become more knowledgeable about the computer science curriculum, career options and ethical issues. **Credit 1**

**0603-231** **Computer Science 1**  
An introduction to computing and problem solving, emphasizing the development and documentation of modular computer-based, object-oriented systems. An object-oriented programming language, Eiffel, is used to demonstrate modern programming principles. Topics include variables, expressions and assignment, control structures (sequencing, selection and repetition) and modularity via classes and methods. Instruction on many of the essential tools of the laboratory's computing environment are covered, both textual and graphical. Programming assignments are an integral part of the course. **Class 3, Lab 2, Credit 4**

**0603-232** **Computer Science 2**  
An introduction to the basic data types used in computer applications. Both abstract concepts and implementation details are discussed, including comparisons of alternative implementations. Topics include dynamic storage allocation and containers commonly known as arrays, linked lists, stacks, queues and trees. Students work individually and in small groups on programming assignments, which are an integral part of the course. (0603-231) **Class 3, Lab 2, Credit 4**

**0603-233** **Computer Science 3**  
Examines internal and external sorting and searching techniques and introduces the analysis of efficiency and space/time trade-offs. Some analysis of sorting and searching algorithms is included. C++ is introduced and provides an alternate object-oriented programming language with which these topics are covered. An introduction is given to alternate paradigms: procedural and parallel programming. Students work individually and in small groups on programming assignments, which are an integral part of the course. (0603-232) **Class 3, Lab 2, Credit 4**

**0603-263** **Computer Science for Transfer Students**  
Introduction to the object-oriented programming paradigm, the computer science workstation environment and the C++ language. Also examines internal and external sorting and searching techniques and introduces the analysis of efficiency and space/time trade-offs. An introduction is given to an alternate paradigm: parallel programming. Students work individually and in small groups on programming assignments, which are an integral part of the course.

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 0603-252; not to be taken as a computer science elective. **Class 4, Lab 2, Credit 5**

**0603-334** **Computer Science 4**  
The implementation of both transient and persistent data structures. Topics include several implementation strategies for internal data structures, efficiency, file organization (sequential, indexed and direct access), and secondary storage devices. Students work individually and in small groups on programming assignments, which are an integral part of the course. The C++ language is used. (0603-233 or 0603-263) **Class 3, Lab 2, Credit 4**

**0603-341** **Professional Communication for Computer Science and Software Engineering**  
An introduction to the types of communication that are part of the life of a computing professional. Topics include analysis of purpose of a document or report and writing effectively for the expertise and interests of the intended audience. Writing assignments cover reports, specifications and user documentation. Oral reports and presentation skills also are emphasized. Small- and large-group activities are used to simulate a wide range of work and communications environments. (Corequisite 0603-233 or 0603-263) **Class 4, Credit 4**

**0603-351** **Introduction to Digital Design**  
An introduction to computer architecture and implementation. Topics include number systems, boolean algebra, combinatorial and sequential circuit design, flip-flops and adders, and storage mechanisms and their organization. Laboratory experiments introduce elementary integrated circuit building blocks, including gates, flip-flops, registers, counters and elementary sequential circuits. (0603-232 and 1016-265) **Class 3, Credit 3**

**0603-352** **Computer Organization**  
A continuation of 0603-351. Topics include instruction fetching, decoding and execution; CPU specification through a descriptive language; bus structures; microprogramming; interrupts; architectural differences; the assembly process; addressing; storage allocation; subroutines; parameter passing; looping; address modification; floating point representation; and simple I/O. (0603-351) **Class 3, Credit 3**

**0603-355** **The Human Side of Computers**  
The impact of computer systems on society is studied via class discussion, lectures and films. Current topics include 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 develop several short discussion papers and a major study in one of the course topics. **Class 4, Credit 4**

**0603-361** **Software Engineering**  
An introductory course in software engineering, emphasizing the organizational aspects of software development and software design and implementation by individuals and small teams within a process/product framework. Topics include the software life cycle, software design, user interface issues, specification and implementation of components, assessing design quality, design reviews and code inspections, software testing, basic support tools, technical communication and system documentation, team-based development. Typically two moderate-size projects are required: one done by individuals, the other by small teams (2-4 persons). Projects are performed in C++ using specifications and existing systems provided by instructors. Oral presentations and written documentation are required. (0603-233 or 0603-263) **Class 3, Lab 2, Credit 4**

**0603-380** **Introduction to Computer Science Theory**  
A survey of important topic areas in theory of computer science. Topics may include regular expressions; deterministic and nondeterministic 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 1016-266 or 1016-467; 1016-265) **Class 4, Credit 4**

**0603-400** **Logical Design**  
An in-depth study of the logical design of digital circuits. Topics include combinatorial 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 include testing, CAD tools such as logic simulators and logic reduction programs, integrated circuit technologies and an introduction to VLSI design. Lab experiments required. (0601-351) **Class 3, Lab 2, Credit 4**

**0603-420** **Data Communication Systems**  
An introduction to the concepts and principles of computer communication subsystems. Examines the effects of communications media and software protocols on network performance, cost and reliability. Covers the physical interconnection of machines, first-level software considerations of the hierarchical model for computer network design and local-area networks. (1016-351 and third-year standing in computer science) **Class 4, Credit 4**

**0603-430 Numerical Methods**  
Topics include introductory error analysis, roots of an equation, solution of systems of linear and nonlinear equations, interpolation, power series calculation of functions, numerical integration, and first-order ordinary differential equations. The computational aspects, rather than mathematical development, are emphasized. Programming projects are required. (Either 1016-252 or 1016-215 and a high-level scientific programming language) **Class 4, Credit 4**

**0603-440 Operating Systems**  
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlock, multiprogramming and multiprocessing, 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. (0603-252, 334) **Class 4, Credit 4**

**0603-455 Artificial Intelligence**  
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. (0601-450) **Class 4, Credit 4**

**0603-456 Expert Systems**  
An introduction to the issues and techniques employed in expert systems. Topics include a consideration of successful existing systems, control strategies, expert system building tools and environments, knowledge acquisition and uses of expert systems technology. Students participate in a group project involving both the creation of an expert system and explorations of ways to effectively use such systems. (0603-455) **Class 4, Credit 4**

**0603-480 Formal Languages**  
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. (0603-380) **Class 4, Credit 4**

**0603-485 Database Concepts**  
A broad introduction to database management systems (DBMS) and the design, implementation and applications of databases. Topics include an overview of DBMS architectures; concepts and implementations of the relational model; database 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 databases, database machines, and database interfaces and languages. A database programming project is required. (0603-334) **Class 4, Credit 4**

**0603-499 Cooperative Education**  
One quarter of appropriate work experience in industry. **Credit 1**

**0603-510 Software Specification and Design**  
An introduction to software specification methods and the transformation of specifications into modular designs suitable for implementation. Qualitative and quantitative measures of good design are coupled with discussions of specific design methodologies. The role of design in the larger software life cycle is 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. (0603-361, 1016-266) **Class 4, Credit 4**

**0603-511 Software Testing and Quality Assurance**  
An introduction to software quality assurance and its relationship to testing, leading to the production of acceptable software products. Software inspections and testing techniques are discussed in detail, and their roles in software quality assurance are stressed. (0603-361) **Class 4, Credit 4**

**0603-515 Analysis of Algorithms**  
A course covering the techniques and mathematics needed to analyze the computational complexity of algorithms. Several classic algorithm paradigms are studied to determine their applicability and space/time efficiency. (0603-334, 380) **Class 4, Credit 4**

**0603-520 Computer Architecture**  
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 also are presented, along with an analysis of their performance relative to nonparallel machines. Programming projects are required. (0603-440) **Class 4, Credit 4**

**0603-521 Introduction to Microprocessor Systems**  
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 0603-545 cannot receive credit for this course. Programming projects are required. (0603-351) **Class 3, Lab 2, Credit 4**

**0603-530 Fundamentals of Discrete Simulation**  
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 are required. (1016-309 or 1016-352 and third-year standing in computer science) **Class 4, Credit 4**

**0603-531 Introduction to Parallel Computing**  
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 are required. (0601-450, 0603-440) **Class 4, Credit 4**

**0603-532 Parallel Algorithms and Program Design**  
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 are highlighted. The course investigates the interplay between architecture and algorithmic structure and discusses the effect that these issues have on the complexity and efficiency of parallel algorithms. Each student is required to research an area of parallel program design and then implement a parallel computing project for an application within that area. Programming projects are required. (0603-531) **Class 4, Credit 4**

**0603-540 Operating Systems Laboratory**  
Application of operating system concepts. Laboratory work includes development of a small multitasking 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. (0601-306, 0603-440) **Class 4, Credit 4**

**0603-541 Introduction to Computer Networks**  
The concepts and principles of the higher-level protocols of the ISO reference model, as introduced in 0603-420 Data Communication Systems. Topics include the investigation of network topologies, delay analysis, routing techniques, interconnection of networks, security issues and user-level services. (0603-420) **Class 4, Credit 4**

**0603-542 Distributed Systems Laboratory**  
This course builds on topics developed in 0603-420 Data Communication Systems and 0603-541 Introduction to Computer Networks in a lab setting. Students are 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. (0603-540, 541) **Class 4, Credit 4**

0603-545

**Computer Architecture Laboratory**

Application of hardware and software concepts learned from logic design, computer architecture, data communications and operating systems. Laboratory work includes the design, implementation, debugging and documentation of major hardware-software projects. Topics 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 also are covered. (0603-400, 420 and 520) **Class 3, Lab 2, Credit 4**

0603-555

**Software Engineering Project Laboratory**

Practical experience in software engineering in a team project setting. Given the specifications for a substantial software system, student teams design, code and test the system, using modern software engineering methods and software quality assurance techniques. Computer-aided software engineering (CASE) tools are emphasized, including design, testing and configuration management tools. Software inspections are emphasized as a means for achieving high-quality software. (0603-510, 511) **Class 4, Credit 4**

0603-560

**Compiler Construction Laboratory**

A course in the design and implementation of high-level language compilers. Laboratory projects are assigned in the areas of parsing, code generation, code optimization and language design. (0603-580) **Class 4, Credit 4**

0603-565

**Computer Systems Selection**

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. (0603-334, 351) **Class 4, Credit 4**

0603-570

**Introduction to Computer Graphics**

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 noninteractive techniques, raster graphics fundamentals, 3-D fundamentals, graphics packages and graphics systems. Students use and develop a graphics software system based on an accepted graphics standard. Programming projects are required. (Third-year standing in computer science) **Class 4, Credit 4**

0603-571

**Computer Graphics Laboratory**

This project-oriented course builds on topics developed in 0603-570. Expanded topics 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 are required to design and implement an interactive system for an application that incorporates several of the above areas. Programming projects are required. (0603-570) **Class 4, Credit 4**

0603-580

**Language Processors**

Exposes students to issues in the design of a variety of language processors and translators. The basic concepts are presented in conjunction with the design of several such programs (e.g., assemblers, compilers, linkage editors and processors). Programming projects are required. (0601-450 and 0601-306 or 309) **Class 4, Credit 4**

0603-590

**Seminar in Computer Science**

Current advances in computer science (Prerequisites set by instructor) **Class 2-4, Credit 2-4**

0603-599

**Independent Study**

Faculty-directed study of appropriate topics on a tutorial basis. Generally used to enable an individual to study particular computer science topics in greater depth. (Faculty and departmental approval are required prior to registration. A maximum of two independent study courses is allowed) **Class 4, Credit 4**

0603-690

**Seminar in Computer Science**

Current advances in computer science. Open to graduate students and fourth- and fifth-year undergraduates. (Prerequisites set by instructor) **Class 1-4, Credit 1-4**

## Software Engineering

3010-101

**Software Engineering Seminar**

Provides first-year students with the skills necessary to succeed at RIT and in the software engineering program. Small group sessions are used to help new students make friends, create a stronger bond with RIT and their program and become acquainted with the campus and its facilities. Activities focus on communication and small-group skills useful throughout students' academic careers. In addition, students are introduced to ethical issues they will face in both academia and professional engineering. **Class 1, Credit 1**

3010-362

**Engineering of Software Subsystems**

Continuation of 0603-361, with a more in-depth treatment of design and redesign, resource estimation and testing of non-trivial software subsystems. Topics include personal process improvement (with an emphasis on professional team-building strategies); common subsystem design patterns; maintenance; testing techniques. Students engage in active participation in the software process through a term-long team-based project. (0603-361) **Class 3, Lab 2, Credit 4**

3010-420

**Formal Methods for Specification and Design**

Introduction to the use of mathematical models of sequential software systems and the refinement of these models to designs and implementations. Topics include finite state machine models and regular expressions; state machine and regular expression equivalence; language syntax and semantics; formal specification, design, implementation and verification. (0603-266, 3010-362) **Class 4, Credit 4**

3010-440

**Principles of Software Architecture and Design**

Examination of the fundamental building blocks and patterns for construction of software systems. Examines the fundamental elements of software systems in the context of a sound design process, forming the foundation for subsequent courses in the principles of concurrent, distributed and information systems. All courses are structured around exploration of design, patterns of construction, case studies and standards. Topics include structuring computation, patterns of design, graphical user interfaces, documenting design and functional design. Class lectures are reinforced by laboratory exercises and projects. (3010-362) **Class 3, Lab 2, Credit 4**

3010-441

**Principles of Concurrent Software Systems**

Issues and structures common in the construction of concurrent software systems. Emphasis is on fundamentals repeated in the design and development of closely coupled systems. Topics include the basics of concurrent hardware architectures, synchronization and coordination techniques and common models of software systems. Other issues include scheduling, reliability and problem decompositions. (3010-440) **Class 3, Lab 2, Credit 4**

3010-442

**Principles of Distributed Software Systems**

Issues and structures common in the construction of distributed software systems. Emphasis is on fundamentals repeated in most systems of this type. Topics include the basics of data communication and networking, as well as higher-level issues encountered in the design of distributed systems. (3010-440) **Class 3, Lab 2, Credit 4**

3010-443

**Principles of Information Systems Design**

Issues and structures common in the construction of information systems., Emphasis is on fundamentals repeated in most systems of this type. Topics include historical review of methods of organizing and accessing information, high-level modeling techniques, performance and security concerns, implications of storing new data types (e.g., sound, pictures) and new dimensions (e.g., time) on information systems architectures. Emphasizes support information systems provided for specific software engineering activities. Team projects are required. (3010-440) **Class 3, Lab 2, Credit 4**

3010-450

**Software Process and Product Metrics**

Software metrics help a software organization on two main fronts: quality assessment of its process and products and assessment of its progress toward its main goal: the production of software artifacts. Students are exposed to metrics used in industry to control large software processes. Topics include product and process metrics, personal metrics portfolio, metrics attributes, and resource and time estimation metrics. (3010-440) **Class 4, Credit 4**

3010-452

**Software Verification and Validation**

Introduction to a set of principles and techniques that represent the foundation for improving software products. Topics include verification and validation, unit level testing, system level testing, software quality assurance, and software reliability. Team projects are emphasized. (3010-440) **Class 4, Credit 4**

**3010-455** **Software Requirements and Specification**  
In-depth coverage of the early phases of the software development life cycle commonly called software requirements analysis and specification. Topics include requirements elicitation and definition, requirements prototyping, functional and nonfunctional requirements specification, and legacy systems. Team projects are emphasized. (3010-420, 3010-440) **Class 4, Credit 4**

**3010-456** **Software Engineering Process**  
Introduction to software engineering process and related project management issues. Topics include software maturity framework, software process assessment, software process and the software life cycle, issues in software project management and control, and measurements related to the software process. (3010-440) **Class 4, Credit 4**

**3010-561** **Software Engineering Project I**  
The first course in a two-course, senior-level, capstone project experience. Students work as part of a team to develop solutions to problems posed by either internal or external customers. Problems may require considerable software development or evolution and maintenance of existing software products. Culminates with the completion and presentation of the first major increment of the project solution. Class time is divided among lectures on contemporary issues in software engineering, guest lectures by industry practitioners and time devoted to team-based activities. (Senior-level standing in software engineering) **Class 4, Credit 4**

**3010-562** **Software Engineering Project II**  
The second course in a two-course, senior-level, capstone project experience. Students submit one or more additional increments that build upon the solution submitted at the end of the first course. Students make major presentations for both customers as well as technical-oriented audiences, turn over a complete portfolio of project-related artifacts and offer an evaluation of the project and team experience. (3010-561) **Class 4, Credit 4**

## Packaging Science

**0607-200** **New Student Seminar**  
An introduction to RIT and the department of packaging science. Course covers the basics of the packaging profession. **Class 1, Credit 1**

**0607-201** **Principles of Packaging**  
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 are presented, along with information about economic importance, social implications and packaging as a profession. **Class 4, Credit 4**

**0607-210** **TM&D Skills Seminar**  
A beginning course for students interested in pursuing a career in technical sales. The student is introduced to seasoned technical sales professionals, traditional and TQM sales organizations, and different styles of selling. Students learn what strategies are important for a successful career in technical sales. **Class 2, Credit 2**

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

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

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

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

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

**0607-321** **Rigid Containers**  
A detailed study of primary packages. History, manufacturing processes, characteristics and applications for containers in direct contact with the product. Structural design, chemical compatibility and suitability of container for intended use are analyzed for basic container types. Students practice structural design and testing of prototype containers. Primary emphasis is on rigid paperboard, glass, plastic and metal containers. (0607-301, 311, 312) **Class 2, Recitation 1, Lab 2, Credit 4**

**0607-322** **Flexible Containers**  
Corollary course for 0607-321. Primary emphasis is on flexible paper, foil, plastic and laminated materials and on selected processing techniques. (0607-301, 311, 312) **Class 2, Recitation 1, Lab 2, Credit 4**

**0607-341** **Computer Applications**  
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**

**0607-401** **Career Seminar**  
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**

**0607-420** **Technical Communication**  
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. Open only to packaging majors and required as part of the writing skills certification process under the RIT policy. (0607-321, 322) **Class 4, Credit 4**

**0607-431** **Packaging Production Systems**  
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 are considered. Students gain practice in setting up complete production lines for packaging various products. (0607-321, 322) **Class 2, Lab 4, Credit 4**

**0607-432** **Packaging for Distribution**  
An exploration of different shipping, storage and use environments common to various products and packages. Structural design of shipping containers for product physical protection and methods for testing and predicting package performance are studied. (0607-301, 321, 322) **Class 2, Lab 4, Credit 4**

**0607-433 Packaging for Marketing**  
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a marketing tool. Concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market. Advertising, marketing demographics and the impact of color upon packaging are considered. Students gain practice in the development of a complete package system. (0607-431, 432) **Class 2, Lab 4, Credit 4**

**0607-462 Packaging Regulations**  
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 and 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**

**0607-485 Principles of Shock and Vibration**  
A study of the factors involved in analyzing potential damage to packaged items resulting from impact or vibration forces. Students are expected to master basic mathematical and physical concepts and to use various pieces of testing equipment. (0607-432) **Class 2, Lab 4, Credit 4**

**0607-499 Packaging Co-op**  
One quarter of appropriate work experience in industry. Two quarters of co-op experience are required. (0607-321, 322) **Credit 0**

**0607-510 Introduction to Electrostatics**  
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 are taught, as well as equipment operation and evaluation procedures. (0607-322, 1017-211; professional elective) **Class 4, Credit 4**

**0607-520 Packaging Management**  
A study of packaging organization in the contemporary corporation and project management techniques available to the packaging manager. Organization theory is discussed and compared with typical industry practice. Other topics include PERT, value analysis and the impact of regulatory agencies upon packaging from a management standpoint. (Professional elective) **Class 3, Recitation 1, Credit 4**

**0607-524 Packaging Economics**  
A study of firm behavior with concentration on production costs and revenues. Market structures are analyzed in order to develop an understanding of how packaging fits into the general economy. Students are instructed in the use of basic economic reference materials for research purposes. A paper is required. (Professional elective) **Class 4, Credit 4**

**0607-530 Packaging and the Environment**  
Consideration of packaging in a social context. Factors that enhance secondary use, recycling, recovery of resources and proper disposal are discussed. Package design in relation to solid waste disposal and materials and energy shortages is considered. Other topics of current social interest are discussed. Primarily a discussion class for senior students. Open to nonmajors. (Professional elective) **Class 4, Credit 4**

**0607-531 Packaging Process Control**  
An advanced course designed to give packaging students instruction in design, process and quality control techniques for packaging applications. Topics include the concepts of zero defects, computer applications for control charts and acceptance sampling. (0607-431, 1016-309; or equivalent; professional elective) **Class 3, Recitation 1, Credit 4**

**0607-536 Medical Products Packaging**  
Study of unique requirements for packaging materials and containers for sterilized medical devices. Current sterilization techniques, impacts on materials properties and distribution requirements are considered for this specialized product group. (0607-433; professional elective) **Class 2, Recitation 1, Lab 2, Credit 4**

**0607-555 Military and Export Packaging**  
Study of the particular forms and requirements for packaging for the military and export environments. Preservation techniques, military specifications, crates and large export containers, construction techniques, the export handling and transportation environment, and related topics. (0607-432; professional elective) **Class 3, Lab 2, Credit 4**

**0607-568 Food Preservation and Packaging**  
Study of food products, common methods of processing and preservation, impact on quality and nutritional value of the product, and the relationships with common packaging methods and distribution practices. (0607-432; professional elective) **Class 3, Lab 2, Credit 4**

**0607-570 Point of Purchase Displays**  
An interdisciplinary course considering the unique requirements for display packaging at the retail point of purchase. The retail store environment, display techniques, customer motivation, product tie-ins, construction techniques, production and distribution requirements, product promotion and point-of-purchase support materials and activities, design and printing of point-of-purchase displays. (An interdisciplinary, senior elective for students in packaging, packaging design, marketing, retailing and printing.) (Professional elective) **Class 2, Lab 4, Credit 4**

**0607-575 Technical Skills for Professional Sales**  
Introduction to a systematic problem-solving methodology in the sales profession. The core of the course explains the systematic 13 steps that lead to professional sales success. The rationale for each step is thoroughly explained, as are the procedures for implementing it. This course is required for all entering TM&D students.

**0607-577 Packaging Internship**  
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 adviser, subject to approval of the department. **Credit variable 1-8**

**0607-590 Senior Thesis**  
An in-depth study—of a selected phase of packaging—that enables the student to make use of the knowledge and skills acquired during the course of the program. **Arranged, Credit 4**

**0607-598, 599 Independent Study**  
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) **Credit variable 1-4**

## Engineering Technology

### Civil Engineering Technology

**0608-198 Introduction to Civil Engineering Technology, Freshman**  
Introduces students 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**

**0608-199 Introduction to Civil Engineering Technology, Transfer**  
Introduces 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**

**0608-210 Engineering Graphics**  
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. Designed for students with no knowledge of engineering drawing. **Class 2, Lab 4, Credit 4**

0608-220

**Civil Engineering Graphics**

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. Builds upon the fundamentals of graphics learned in 0608-210, 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. **Class 2, Lab 4, Credit 4**

0608-320

**Plane Surveying**

An introduction to plane surveying. Topics include note keeping, line and grade measurement, leveling, vertical and horizontal measurement, care of instruments and stadia. 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**

0608-330

**Materials of Construction**

A study of the materials used in Portland cement and asphalt cement concrete. Laboratory work includes mix design and the testing of concrete mixes and materials by ASTM and AASHTO Standard Methods. **Class 3, Lab 2, Credit 4**

0608-340

**Route Surveying**

Introduction to route surveying and earth work. Topics include simple horizontal curves, reverse and compound curves, transitional 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**

0608-360

**Elementary Soil Mechanics**

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. (0610-302, 303 or equivalent) **Class 3, Lab 2, Credit 4**

0608-380

**Elementary Structures**

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 is also practice in the use of AISC and ACI specifications. (0610-302, 303) **Class 4, Credit 4**

0608-404

**Applied Mechanics of Materials**

Basic strength of materials 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. (0610-302, 303) **Class 3, Recitation 2, Credit 4**

0608-420

**Hydraulics**

Study of principal physical and mechanical properties of liquids, hydrostatic pressure and forces; pressure-measuring devices; buoyancy and flotation; principles of kinematics and dynamics; Bernoulli law; concept of momentum. 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, 0610-302, 303) **Class 3, Credit 3**

0608-421

**Hydraulics Laboratory**

Experimental study of principal properties of liquids and major laws of fluid mechanics. Operating various laboratory equipment and devices while concurrently taking 0608-420, Hydraulics, for principal theoretical studies of physical and mechanical properties of liquids, hydrostatics, fluid kinematics and dynamics, hydraulic machinery and its operation. **Lab 3, Credit 1**

0608-422

**Elements of Building Construction**

Elements and details of building construction, both residential and commercial. Foundations of wood, steel, concrete, masonry, glass, roofing, curtain wall systems and interior finishes are covered. The role of building codes in design and construction is introduced. **Class 4, Credit 4**

0608-432

**Water and Wastewater Transport Systems**

Discussion of surface and groundwater sources. The hydraulic design of sanitary and storm sewer systems and water distribution systems, including pump systems and storage. (0608-420, 421) **Class 1, Recitation 2, Credit 2**

0608-438

**Principles of the Treatment of Water and Sewage**

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. (1011-272, 276) **Class 3, Lab 2, Credit 4**

**0608-444** **Mechanical Equipment for Buildings**  
Presentation of mechanical and electrical equipment used in building construction. The codes applicable to plumbing, heating, air conditioning, and operation and control are studied. **Class 2, Credit 2**

**0608-460** **Construction Equipment**  
The fundamentals of equipment characteristics, uses and productivity are explored. Equipment selection using owning costs, operating costs and earth-moving productivity is examined. **Class 2, Credit 2**

**0608-470** **Timber Design and Construction**  
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 American Forest and Paper Association is followed. (0608-404) **Class 4, Credit 4**

**0608-480** **Groundwater Hydraulics**  
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. (0608-420 and 527 or permission of instructor) **Class 4, Credit 4**

**0608-482** **Hydrology**  
Presents major theoretical and practical considerations of hydrology in application to study of groundwater hydraulics, hydraulic structures, water transportation systems and transportation engineering. (0608-420) **Class 4, Credit 4**

**0608-485** **Hydraulic Structures**  
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 structures also are studied. (0608-432) **Class 4, Credit 4**

**0608-490** **Structural Analysis**  
Introduction to the analysis of statically determinate and indeterminate structures by classical and modern techniques. The types of structures include beams, trusses and frames that are loaded in the plane of the structure and three-dimensional trusses. 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. (0608-404) **Class 4, Credit 4**

**0608-496** **Reinforced Concrete Design**  
Design of members and frames of reinforced concrete. Topics include principles of structural design; loads; properties of concrete and reinforcement; and design of slabs, beams, columns and footings. Emphasis is on use of the ACI code. (0608-404, 490) **Class 4, Credit 4**

**0608-497** **Structural Steel Design**  
Design of members and frames of structural steel and their connections. Topics include principles of structural design, loads, types of steels, tension members, high-strength bolts, welding, compression members and beams. Practice in the use of the AISC LRFD specifications is emphasized. (0608-404, 490) **Class 4, Credit 4**

**0608-499** **Cooperative Education**  
One quarter of appropriate work experience in industry. (0606-099) **Credit 0**

**0608-500** **Labor Relations**  
Introduction to the fundamentals of labor law and its application 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, prehire agreements, strikes and Open Shop construction. Several guest speakers representing government, private industry and organized labor also lecture. **Class 2, Credit 2**

**0608-505** **Construction Safety**  
General safe practices in construction operations are covered. The OSHA regulations that explain both employer and employee responsibilities are explored in detail. A portion of the course is audiovisual. **Class 2, Credit 2**

**0608-509** **Construction Cost Estimating**  
An introduction to direct cost estimating for construction projects. The estimating techniques covered include quantity take-off, labor productivity, and pricing (labor and material). Estimating costs for site work, concrete, masonry, steel and carpentry is emphasized. Students gain experience using Timerline Co.'s "Precision Estimating," an application software package used as a tool in the development of cost estimates. (0608-422) **Class 4, Credit 4**

**0608-510** **Design of Water Treatment Facilities**  
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. (0608-420, 421, 438) **Class 2, Credit 2**

**0608-513** **Computer Techniques in Civil Engineering Technology**  
Classes are held in the Engineering Technology Personal Computer Laboratory, were students work with IBM-compatible machines. Course topics include Microsoft Windows; Microsoft Office applications for word processing (Word); spreadsheets and graph creation (Excel); and an introduction to the Algor finite-element-analysis program (0602-205) **Class 1, Lab 2, Credit 2**

**0608-514** **Land Planning**  
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 0608-432) **Class 4, Credit 4**

**0608-520** **Design of Wastewater Treatment Facilities**  
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 phosphorous removal, are discussed. Processes, plant design and construction elements are stressed. (0608-438) **Class 3, Lab 2, Credit 4**

**0608-525** **Hazardous Waste**  
Identification, classification and legal aspects of hazardous waste are studied. Topics include generation, transport, storage and disposal of hazardous waste with emphasis on chemical landfill and incineration of hazardous and toxic wastes. Waste minimization and pollution prevention are discussed. (0608-438) **Class 4, Credit 4**

**0608-527** **Soil Mechanics and Foundations**  
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. (0608-360, 404) (0608-528 Soil Mechanics Laboratory must be taken concurrently) **Class 3, Credit 3**

**0608-528** **Soil Mechanics Laboratory**  
The Soil Mechanics Laboratory is to be taken concurrently with 0608-527. Exercises include tests in internal friction by direct shear, unconfined compression, triaxial compression, consolidation and compaction. **Lab 2, Credit 1**

**0608-530** **Transportation Engineering**  
Exposes students 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. Ample field exposure to all elements is part of the formal structured program. (Route Surveying) **Class 4, Credit 4**

**0608-535** **Pavement Design**  
Expands on the background of the Transportation Engineering core course, providing additional detailed engineering knowledge on pavement design. Included with the theoretical knowledge are the development of and practice in the necessary design skills. 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. (0608-330, 530) **Class 3, Lab 2, Credit 4**

**0608-544** **Contracts and Specifications**  
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**

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

**0608-550** **Construction Practices**  
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 other than Civil Engineering Technology students. **Class 4, Credit 4**

**0608-556, 557** **Wastewater Treatment Plants Operation and Control I and II**  
A self-paced, audiovisual course. Emphasis on the functional aspects of wastewater treatment plant operation. Discussion of the significance of the results of laboratory analysis and interpretation and application to the control of treatment processes. (0608-438 and permission of instructor) **Credit variable 1-4**

**0608-560** **Construction Project Management**  
An introduction to basic construction management and organization. Topics include project planning, project organization, bonds, insurance, change orders and contract documents. CPM scheduling is covered in detail. Students gain experience using Primavera "Project Planner," a Windows-based application software package used for construction project planning and scheduling. (0608-509) **Class 4, Credit 4**

**0608-570** **Principles of Dynamics in Civil Engineering Technology**  
Study of basic principles of dynamics and their application for the analysis of typical problems inherent in various fields of civil engineering technology such as water transportation systems, hydraulic engineering, structural systems and geotechnical engineering. Principal topics include kinematics of particles and rigid bodies, concepts of work and energy, force-impulse and momentum, introduction to vibration. Civil engineering technology application topics include wave propagation and hydraulic shocks, effects of moving loads, cycle loading and impacts, phenomenon of fatigue, earthquake effects and soil liquefaction conditions. (0608-420, 490, 527) **Class 4, Credit 4**

**0608-599** **Independent Study**  
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 4 quarter credit hours of independent study projects and 2 sections in any quarter, plus a maximum of 8 quarter credit hours of independent study credits earned toward degree requirements. **Credit variable 1-4**

## Electrical Engineering Technology

**0609-201** **DC Circuits**  
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; Thevenin's and Norton's Theorem; Mesh and Nodal Analysis; and Superposition. (Corequisite 1016-204) **Class 3, Credit 3**

**0609-202** **AC Circuits**  
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. (0609-201; corequisite 1019-420) **Class 3, Credit 3**

**0609-203** **Electronics I**  
An introduction to semiconductor theory covering the basics of semiconductor materials and the structure of P and N type semiconductors. Emphasis is on diode and bipolar transistor characteristics, specifications, modeling and applications. (0609-202, 1019-420) **Class 3, Lab 3, Credit 4**

**0609-207** **EET First-Year Orientation**  
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**

**0609-221** **DC Circuits Laboratory**  
This course complements the lecture material of 0609-201, DC Circuits. It introduces students to d-c measurements, data recording, technical report writing and to modern schematic capture and simulation tools. **Lec. 1, Lab 2, Credit 2**

**0609-222** **AC Circuits Laboratory**  
This course complements the lecture material of 0609-202, AC Circuits. It introduces students to a-c measurements, data recording, technical report writing and to modern schematic capture and simulation tools. **Lec. 1, Lab 2, Credit 2**

**0609-337** **Electric Machines/Transformers**  
Topics include 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. (0609-201, 202, 203) **Class 3, Lab 2, Credit 4**

**0609-361** **Electronics II**  
A continuing course in the analysis and design of electronic circuits. Emphasis is 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. (0609-203) **Class 3, Lab 2, Credit 4**

**0609-362** **Electronics III**  
A continuation of the analysis and design of electronic circuits for students who have completed the introductory course sequence in transistor amplifiers. Included are Class A and B power amplifiers and the differential amplifier. The operational amplifier is introduced, and a wide range of its applications is explored. (0609-361) **Class 3, Lab 2, Credit 4**

**0609-363** **Electronics IV**  
The concepts of circuits and electronics as applied 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 (0609-362) **Class 3, Lab 2, Credit 4**

**0609-403** **Advanced Circuit Theory**  
An introduction to advanced circuit analysis techniques, including signal decomposition by Fourier Series and transient analysis using the LaPlace Transform. (1019-422 and 0609-202) **Class 3, Lab 2, Credit 4**

**0609-404** **Control Systems I**  
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. (0609-403, 1019-422) **Class 3, Lab 2, Credit 4**

**0609-408** **Transmission Lines**  
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. (1019-422, 0609-202) **Lecture 3, Lab 2, Credit 4**

**0609-411** **Electrical Principles for Design I**  
A service course offered to nonelectrical 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**

**0609-412** **Electrical Principles for Design II**  
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. (0609-411) **Class 3, Lab 2, Credit 4**

**0609-413** **Applied Microprocessors**  
Applications of microprocessors for manufacturing engineering technology students. Application of the INTEL 8085 microprocessor, with emphasis on the interface to SDK-85 microcomputers. Microcomputers as applied to robotics and numerically controlled machinery. (0609-411) **Class 3, Lab 2, Credit 4**

**0609-414** **Basic Electrical Principles**  
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. (1019-421) **Class 3, Lab 2, Credit 4**

**0609-439** **Microcontrollers**  
An advanced course in microprocessors emphasizing the 68HC11 Microcontroller. Topics include the architecture, the instruction set, input/output operations, timer operations, A/D conversion and serial communications. (0618-301 and 0618-303 or equivalent) **Class 3, Lab 2, Credit 4**

**0609-442** **Advanced Electronics**  
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. (0609-403) **Class 3, Lab 2, Credit 4**

**0609-499** **Cooperative Education**  
One quarter of appropriate work experience in industry. (0606-099) **Credit 0**

**0609-534** **Communication Systems I**  
Analog Modulation schemes and systems and the Fourier Series are reviewed. The Fourier Transform is introduced. The noise figure, noise temperature and signal-to-noise ratio of a system are introduced. Phase-locked loop concepts and applications to communications systems and an introduction to digital communication signals and systems are presented. **Class 3, Lab 2, Credit 4**

**0609-535** **Communication Systems II**  
The study of various types of digital and data communication systems and their components are continued. 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, satellite communication and fiber optic systems concepts are studied. Applications including cellular and wireless communications are introduced. **Class 3, Lab 2, Credit 4**

**0609-547** **Digital Processing of Signals**  
Basic concepts of linear systems are covered, followed by an introduction to digital signal processing. Emphasis is on digital filter design and digital spectral analysis. (1019-423) **Class 4, Credit 4**

**0609-550** **Power Systems I**  
Basic elements of a power system, energy sources, substation configuration, load cycles, balanced and unbalanced three-phase circuits, power factor correction, transmission line configurations and impedance, voltage regulation of transformers and the per unit system are studied. Load flow and economic operation are introduced. (0609-337, 411 or 414) **Class 3, Recitation 2, Credit 4**

**0609-552** **Power Systems II**  
The symmetrical component method of three-phase circuit analysis is used for fault analysis. Power system relay protection, supervisory control, power quality and system stability are introduced. (0609-550, 0609-403 or permission of instructor) **Class 3, Recitation 2, Credit 4**

**0609-580** **Senior Project**  
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

**0610-101** **Freshman Seminar**  
A seminar course for incoming freshmen in the mechanical engineering technology and manufacturing engineering technology programs. Course includes discussions, presentations, field trips and student activities that help students become familiar with RIT resources, adjust to college and college-level course work, and identify career interests. Students practice communication skills, work in teams, and discuss issues such as values, diversity of cultures and stress. **Class 1.5, Credit 1**

**0610-102** **Sophomore Seminar**  
A seminar course for sophomores in the mechanical engineering technology and manufacturing engineering technology programs. Consists of panel discussions with professionals in career areas such as manufacturing, design, construction, facilities and technical sales. There are field trips and panel discussions with 5th-year students about co-op and career opportunities. Students become more familiar with career paths open to them and are able to visit potential work environments and develop co-op interests. **Class 1.5, Credit 1**

- 0610-211 Introduction to Materials Technology**  
A survey of engineering materials and how they are matched to the service requirements of the component. Emphasis is on metals—their structure, properties and applications. (0610-304 concurrently) **Class 3, Credit 3**
- 0610-212 Metrology**  
Precision measurements as applied to the manufacturing processes. The student is introduced to team concept and laboratory writing using the tools of precision measurement (0608-220) **Class 1, Lab 2, Credit 2**
- 0610-220 Mechanical Design Drawing**  
Deals with the preparation of working drawings and their relation to actual production. Emphasis is on dimensioning and tolerancing, both conventional and geometric, along with sectional views and threads and fasteners. (0608-210) **Class 2, Lab 4, Credit 4**
- 0610-302 Introduction to Statics**  
An introduction to statics covering forces, moments, vectors, equilibrium, friction, areas, volumes and masses. (1017-211) **Class 4, Credit 4**
- 0610-303 Strength of Materials**  
The study of strength of materials and the effect of external forces on the internal stresses and deformation of elastic solids. Normal and shear stress and also deformations are determined for axial, torsional and bending loads. Combined stresses using the Mohr's circle technique are studied. Tension test and the relationship between stress and strain are examined. (0610-302) **Class 4, Credit 4**
- 0610-304 Materials Testing**  
A laboratory course dealing with standard physical tests of various materials, instrumentation used in these tests and the preparation of laboratory reports. (0610-211 concurrently) **Class 0, Lab 2, Credit 1**
- 0610-305 Pneumatic and Hydraulic Systems**  
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 are studied. (0610-302) **Class 3, Lab 2, Credit 4**
- 0610-308 Kinematics**  
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. (0610-303) **Class 3, Lab 2, Credit 4**
- 0610-315 Principles of Mechanical Design I**  
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. (0610-303) **Class 4, Credit 4**
- 0610-316 Principles of Mechanical Design II**  
Mechanical design of machine components—clutches, brakes, lubrication, ball and roller bearings, spur gears. (0610-315) **Class 4, Credit 4**
- 0610-330 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. (0610-303, 1017-212) **Class 3, Lab 2, Credit 4**
- 0610-351 Electro-Mechanical Systems Design**  
Concepts, principles and analysis of components used in the design of control systems. Includes electrical, mechanical, thermo and fluid system components. The analysis of control types and stability of various control systems also are presented. (0609-337, 0610-303) **Class 3, Lab 2, Credit 4**
- 0610-399 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**

- 0610-404 Applied Mechanics of Materials**  
The basic concepts of strength of materials as applied to mechanical design are reviewed in depth. 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. (0610-303, 1019-420 concurrently) **Class 3, Recitation 2, Credit 4**
- 0610-405 Applied Dynamics**  
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, energy methods, impulse and momentum. (0610-404, 1019-421 or concurrently) **Class 3, Recitation 2, Credit 4**
- 0610-406 Dynamics of Machinery**  
A study of the kinematics and kinetics of machine elements. Applications in robotics mechanisms are studied. Both graphical and computer methods are used. (0610-405 and 432) **Class 3, Lab 2, Credit 4**
- 0610-407 Mechanical Engineering Technology Laboratory I**  
A course in mechanical laboratory techniques and the preparation of laboratory reports; experimental work in statics, strength of materials, experimental stress analysis and dynamics. Instruction in the preparation of laboratory reports. (0610-405 and 432 concurrently) **Class 1, Lab 2, Credit 2**
- 0610-408 Applied Mechanics I**  
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 and electrical/mechanical technology students. (1017-211) **Class 3, Recitation 2, Credit 4**
- 0610-409 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 is conducted with special emphasis on plastics technology. (1011-273; 0610-416 concurrently) **Class 1, Lab 2, Credit 2**
- 0610-410 Applied Mechanics II**  
The basic concepts of statics and strength of materials are briefly reviewed. Additional strength of materials topics are introduced with the view of developing basic analytical procedures for the preliminary design of engineering structures and machine components. Topics include combined stress, transformation of plane stress, principal stresses and maximum shear stress, Mohr's circle, thin-walled pressure vessels, columns and structure stability. The fundamentals and kinematics and kinetics of particle motion are developed, including the study of Newton's Laws of Motion, energy methods, and impulse and momentum. Rigid body analysis is previewed. Offered as a service course to electrical engineering technology and electrical/mechanical technology students. (0610-408, 1016-421 concurrently) **Class 3, Recitation 2, Credit 4**
- 0610-416 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. (1011-273, 0610-211) **Class 3, Recitation 2, Credit 4**
- 0610-432 Computers in Mechanical Technology**  
The use of computers to solve problems encountered in mechanical engineering technology is emphasized. Includes an introduction to the RIT academic computing system and introduction to the use of personal computers. Instruction is provided in word processing, spread sheet programming, plotting and other applications programs. Assignments are based on problems encountered in mechanics of materials, dynamics, materials testing, energy analysis, etc. (0610-330) **Class 1, Lab 2, Credit 2**
- 0610-440 Applied Thermodynamics I**  
The first and second laws of thermodynamics and their applications in mechanical engineering technology. Thermodynamic properties of fluids including ideal gasses and pure substances are studied. Thermodynamic processes and applications of thermodynamic principles to steam cycles and refrigeration cycles. (1019-421 or permission of adviser) **Class 3, Recitation 2, Credit 4**

**0610-441** **Thermodynamics and Heat Transfer**  
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. (1019-421 or permission of adviser) **Class 3, Recitation 2, Credit 4**

**0610-442** **Heat Transfer**  
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. (0610-440, corequisite 0610-460) **Class 3, Lab/Recitation 2, Credit 4**

**0610-451** **Vibration and Noise**  
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 are demonstrated. (1019-422, 0610-405) **Class 4, Credit 4**

**0610-460** **Applied Fluid Mechanics**  
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. (1019-422 or permission of adviser) **Class 3, Recitation 2, Credit 4**

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

**0610-499** **Cooperative Education**  
One quarter of appropriate work experience in industry. (0606-099) **Credit 0**

**0610-506** **Machine Design I**  
The study of static and fatigue failure of machine elements and the design and analysis of fasteners, springs and spur gears. Finite element analysis (FEA) is introduced as a vital tool for analysis of mechanical designs. (0610-404, 432) **Class 3, Lab/Recitation 2, Credit 4**

**0610-508** **Machine Design II**  
The study of selected topics such as bearings, helical, bevel and worm gears, belts, chains, clutches and brakes. The concepts of concurrent engineering (CE) and design for manufacturing and assembly (DFMA) are introduced. Design teams are formed and group projects are emphasized. (0610-405, 506) **Class 3, Lab/Recitation 2, Credit 4**

**0610-509** **Product Design**  
Integrates the product development and design process with establishing a need for the product; developing concepts; generating and evaluating the product concepts; developing specifications and design reviews; considering production, service and retirement. Special emphasis is placed on team work (concurrent engineering), determining customer requirements (quality function deployment), design for manufacturing and assembly (DFMA) and quality/reliability. Students learn how to reduce material and part costs, assembly time and the number of parts in the product. (0610-506) **Class 4, Credit 4**

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

**0610-515** **Plastics Processing Technology**  
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**

**0610-516** **Plastics Product Design and Material Selection**  
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. (0610-515 or permission of the adviser) **Class 4, Credit 4**

**0610-530** **Mechanical Measurement**  
The design and use of force, torque, pressure, flow, temperature, acceleration, velocity and displacement instrument transducers. Laboratory experiments demonstrate calibration and set-up techniques and analysis of data. Principles of uncertainty, dynamic response, signal conditioning and computerized data acquisition are examined. (0609-411, 460, 1019-422) **Class 4, Credit 4**

**0610-540** **Applied Thermodynamics II**  
Application of thermodynamics to vapor power cycles, internal combustion engines, compressors, refrigeration, air conditioning, psychometrics and combustion processes. Field trips are taken to representative energy facilities. (0610-440, 460) **Class 4, Credit 4**

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

**0610-543** **Energy Management**  
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. (0610-542 or permission of instructor) **Class 4, Credit 4**

**0610-545** **Solar Thermal Applications**  
Study of analytical methods to model and predict the performance of solar energy systems. Emphasis is 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. (0610-440) **Class 4, Credit 4**

**0610-570** **Robust Design**  
The fundamental principles of robust design are developed. The history of the robust design engineering methodology is presented. The concepts of the loss function, concept selection, parameter design and tolerance design are 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 is paid to a number of case studies to reinforce the students' conceptualization of the methods and their focus on engineering of optimized products and processes. (Fifth-year student or department approval) **Class 4, Credit 4**

## Telecommunications Engineering Technology

**0614-271** **Telecommunication Fundamentals**  
A survey of and introduction to the structure and regulation of the telecommunications industry. 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**

**0614-472** **Telecommunications Concepts**  
Introduction to digital modulation, data communications and multiplexing. Time and frequency domains are studied in the laboratory with spectrum analyzers. Data communications and protocols are reviewed and examined in the laboratory with protocol analyzers. (0609-363, 0618-301) **Class 3, Lab 2, Credit 4**

**0614-473** **Transmission Systems**  
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. (0609-363) **Class 3, Lab 2, Credit 4**

**0614-474** **Voice Communications: Principles and Technology**  
Provides an understanding of the local and interexchange carrier environments with respect to analog and digital signaling and transmission equipment. Private and public telephone systems are studied with respect to POTS, ISDN and digital loop technologies. (0609-271, 0602-200) **Class 3, Lab 2, Credit 4**

**0614-475** **Switching Technologies**  
An introduction to narrowband and broadband switching technologies used in telephone networks. The digital loop and carrier systems are reviewed, and queuing theory is introduced. Current and emerging switching technologies such as SS7 signaling system, ISDN, fast packet switching, ATM, SONET/SD4 and SMDS are studied. (0609-474, 1016-319) **Class 4, Credit 4**

**0614-476** **Local Area Network Administration**  
Students use Novell NetWare, v3.12 (and/or 4.1) to study local-area network (LAN) administration issues such as directory structures, drive mappings, security, printing, user environments, use of applications and services of network utilities. The material offered in Novell's courses, NetWare 3.1X Administrator and Advanced Administrator, are covered. (DOS proficiency; 0618-303, 0602-410 or equivalent) **Class 3, Lab 2, Credit 4**

**0614-477** **Networking Technologies**  
Provides a practical overview of the data communications environment and concepts; historical evolution of the standards organizations; the connection of mainframe, wide-area networks (WANs) and local-area network protocols; local-area networks; services and topologies of LANs and WANs. (0602-411 or 0609-472) **Class 4, Credit 4**

**0614-478** **LAN/WAN Administration**  
Uses Novell NetWare v4.1, to study network (LAN/WAN) administration issues such as directory structures, drive mappings, security, printing, user environments, use of applications and services of network utilities when the network spans a wide geographic area. The material offered in Novell's 520 course NetWare 4.1 Administration will be covered. (DOS proficiency, 0614-271, 0614-476 or equivalent)

**0614-480** **Telecommunications Policy and Issues**  
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. (0609-271) **Class 4, Credit 4**

**0614-571** **Network Engineering**  
Standard approaches to solving telecommunication network design problems. The student is introduced to communication network simulation and learns to use a simulation program. Basic principles and motivations for designs are emphasized. (0609-477, 1019-422, 1016-309) **Class 3, Lab 2, Credit 4**

**0614-572** **Network Management**  
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. (0609-474, 477) **Class 4, Credit 4**

**0614-574** **Network Planning and Design**  
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 multivendor environment. (0609-571, 572) **Class 4, Credit 4**

## Manufacturing Engineering Technology

**0617-220** **Manufacturing Processes I**  
Introduction to basic metal cutting machine tool operation, proper machining practices and cutting tool selection. Hands-on experience is emphasized through lathe, milling machine, drill press, band saw, grinder and precision layout work. Provides the student with the knowledge and the "how-to-do" skills of manufacturing. (0608-210) **Class 3, Lab 3, Credit 4**

**0617-260** **Introduction to CAD**  
This is a first course in CAD. It introduces the basic concepts in automated drafting and design and is taught with the help of PC workstations and CAD-KEY CAD system CADKEY. (0608-210) **Class 3, Lab 2, Credit 4**

**0617-261** **Introduction to CAD-A**  
This is a first course in CAD and introduces the basic concepts in automated drafting and design. It is taught with the help of PC workstations and AUTO-CAD CAD system. (0608-210) **Class 3, Lab 2, Credit 4**

**0617-330 Introduction to Computer-Integrated Manufacturing**  
An overview of the various technologies used to accomplish and integrate the manufacturing functions. 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. (0617-220, 260) **Class 3, Lab 2, Credit 4**

**0617-372 CAD Applications to Tool Design**  
The design of tools used in the manufacturing processes. Employs a CAD system for design purposes. (0617-260) **Class 3, Lab 2, Credit 4**

**0617-375 Introduction to Computer-Aided Manufacturing**  
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. (0617-260) **Class 3, Lab 2, Credit 4**

**0617-405 Materials in Manufacturing**  
The materials used in modern manufacturing processes. Topics include metals, composite, plastics and the selection of manufacturing materials from the point of view of design and manufacture. **Class 4, Credit 4**

**0617-410 Computers in Manufacturing**  
The use of computers in the manufacturing environment. Covers data acquisition and control and application of controls for manufacturing process integration. The course is taught using a high-level programming language. It also deals with the concepts of networking and distributed systems. (Any high-level language, such as BASIC, FORTRAN or C) **Class 3, Lab 2, Credit 4**

**0617-436 Engineering Economics**  
The techniques required to make economic decisions. Topics include cash-flow analysis, present worth analysis, annual worth comparisons, rate of return evaluations, benefit cost analysis, break-even analysis, replacement evaluations, bonds and the effect of taxes on cash flows. **Class 4, Credit 4**

**0617-440 Production and Operations Management I**  
Provides the student with knowledge of the basic, traditional analytical tools essential to analysis and decision making in the manufacturing environment. Topics include quality control and quality systems, work simplification and introduction to operations management. **Class 4, Credit 4**

**0617-441 Production and Operations Management II**  
Provides the student with knowledge of the latest theories and practices of operations management employed by world-class manufacturing organizations. Topics include TQM, MRP, JIT, synchronous manufacturing and theory of constraints. The theories of Goldratt, Deming, Schonberger, Suzuki, Shingo, Black and other current authors are introduced. **Class 4, Credit 4**

**0617-455 Introduction to Electronics Manufacturing**  
An overview of the technologies, equipment, design and manufacturing processes for surface-mounted electronics manufacturing. An introductory course, it provides the student with the foundation needed for advanced work on Surface-Mount Technology (SMT). Laboratory projects provide the student an orientation and familiarization with the manufacturing equipment and processes for printed circuit board assembly. **Class 2, Lab 2, Credit 3**

**0617-456 Electronics Manufacturing with Surface-Mount Technology**  
An in-depth study of materials, analytical procedures and manufacturing processes related to surface-mount electronics manufacturing. The lecture topics include design and manufacturing standards, screen printing, component placement soldering, cleaning, testing, inspection, real-time process control and CAD/CAM integration. The laboratory projects for this course include analytical analysis of raw materials, solder joint reliability and substrate inspection, as well as a detailed process study of screen printing, component placement, soldering and post-solder inspection. **Class 2, Lab 2, Credit 3**

**0617-460 Computer-Aided Design**  
An advanced drafting and design course that introduces the students to solid modeling techniques using Unigraphics CAD system. The students learn to create solids using primitives by extruding 2D profiles and by revolving 2D profiles about an axis. Boolean operations such as union, subtraction and intersection are dealt with in depth to provide a thorough understanding of constructive solid geometry (CSG) techniques. Students also learn how to extract the 2D drawings from the solid and dimension it. Emphasis is placed on laboratory work involving turn-key systems. (0617-260, 261 or equivalent) **Class 3, Lab 2, Credit 4**

**0617-470 Controls for Manufacturing Automation**  
The principles and application of programmable logic controllers. Topics include PLC hardware, programming and application of PLCs in the manufacturing environment. (0609-411) **Class 2, Lab 2, Credit 3**

**0617-471 Computer Numerical Control**  
An advanced course in the application of computer numerical control. Emphasis is on manual and computer-assisted part programming for contour 3-axis machining. Concentration is on programming CNC machines with the aid of SMARTCAM tool path creation and verification. CAD/CAM integration also is introduced. (0617-220, 260, 261) **Class 3, Lab 2, Credit 4**

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

**0617-475 Computer-Aided Manufacturing**  
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 on building mini CAM systems in the laboratory. (0617-410, 470, 471, 485) **Class 3, Lab 2, Credit 4**

**0617-485 Robots in Manufacturing**  
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 systems. The hardware aspects include the mechanical components, the power systems, the control units and the sensors. The software aspects 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. (0617-410, 470) **Class 3, Lab 2, Credit 4**

**0617-499 Manufacturing Technology Co-op**  
One quarter of appropriate work experience in industry. (0606-099) **Credit 0**

**0617-502 Nontraditional Manufacturing Processes**  
A course dealing with precision machining using nontraditional 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**

**0617-510 Process Design**  
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. (0617 core or instructor's consent) **Class 1, Recitation 4, Credit variable 3-4**

**0617-530 Special Topics in Computer Integrated Manufacturing**  
An advanced course covering various problems faced by the industry in computer-integrated manufacturing. Topics 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. (0617-485 or permission of instructor) **Class 3, Credit 3**

**0617-599 Independent Study**  
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

**0618-101 Freshman Seminar**  
A seminar course for incoming freshmen in the computer engineering technology program. Includes 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 practice communication skills, work in teams and discuss issues such as values, diversity of cultures and stress. **Class 1.5, Credit 1**

## Food, Hotel and Travel Management

### Hospitality Management

**0618-220 Electronic Fabrication Techniques**  
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, wirewrapping and soldering. The fundamentals of printed circuit board fabrication and assembly are discussed. **Class 1, Lab 2, Credit 2**

**0618-301 Digital Fundamentals**  
A first course in digital fundamentals. Topics include binary arithmetic, Boolean algebra, logic gates, Karnaugh mapping and an introduction to sequential logic. (0618-201, 220, 225) **Class 3, Lab 2, Credit 4**

**0618-303 Microcomputers**  
A first course involving the hardware and structure of a basic microprocessor-based microcomputer. Emphasis is on the hardware characteristics that dictate performance limitations, design considerations and interfacing principles. Culminates in a small system design. (0618-301, a formal programming course) **Class 3, Lab 3, Credit 4**

**0618-320 Principles of Electronic Design Automation**  
An introductory course in design, capture and validation of digital and analog circuit designs. The automation process uses Cadence's EDA software package operating on a UNIX/SUN platform. (0618-225, 301, 0609-203) **Class 2, Lab 3, Credit 4**

**0618-425 Analog Simulation Seminar**  
Analog Simulation Seminar is an introductory course in schematic entry, simulation, and simulation results interpretation of analog circuit designs. The analog simulation tools will be used to perform DC, time domain, and frequency domain analysis of both passive and active analog circuits. This course is open only to transfer students who have received transfer credit for DC and AC Circuits but have not been exposed to analog simulation. (0609-201, 0609-202)

**0618-438 Digital Systems Design I**  
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 functions of various logic gates and families are analyzed. The problems of interfacing various logic families are discussed. (0618-303, 0609-203) **Class 3, Lab 3, Credit 4**

**0618-499 Cooperative Education**  
One quarter of appropriate work experience in industry and third-year status in computer engineering technology. (0618-303, 0601-305, 0606-099) **Credit 0**

**0618-539 Digital Systems Design II**  
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 designing, building and modifying a multifunction microcomputer from individual components. Included are the hardware ramifications of software and operating system design and small system architecture problems. (0618-438 and a C programming course) **Class 3, Lab 2, Credit 4**

**0618-540 Digital Systems Design III**  
An introduction to the design of complete sampled data systems. Selection criteria for both A/D and D/A converters are covered. The design and implementation of both FIR and IIR digital filters are emphasized. (0609-442, 539) **Class 3, Lab 2, Credit 4**

**0618-571 Topics in Computer Engineering Technology**  
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) **Class 3, Lab 2, Credit 4**

**0618-580 Senior Project**  
Selected independent study design project by computer engineering technology students with the approval of the program coordinator. 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**

**0619-220 Service Management Careers in Hospitality Industries**  
Seminar designed to define career opportunities in the food, hotel and travel industries. Students receive guidance in developing career objectives. Leading industry executives participate. **Class 2, Credit 2**

**0619-410 Assessment of Service Quality**  
Excellence in customer service is the hallmark of success in service industries. But what exactly is service excellence? This course surveys the various issues related to measuring customer satisfaction. It examines those issues that cause service quality problems and what service organizations can do to solve these problems and improve service. Guidelines for developing questionnaires are discussed, with emphasis on issues of reliability and validity. The role and mechanisms associated with focus groups are addressed. **Class 4, Credit 4**

**0619-426 Technology in Service Systems**  
A survey of the technologies used in the food, nutrition, hotel and travel service industries. Technologies explored include those associated with product quality, production, raw materials handling, measurement, distribution, information, marketing, waste reduction, security, customer interface and supplies interface. Tours and guest speakers enrich the classroom learning. Student teams chart product/service systems and identify technologies that could be applied to increase quality and/or decrease cost. **Class 4, Credit 4**

**0619-480 Leadership Management in Service Cultures**  
A "hands-on" look at the leader/manager. Provides 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 styles. This course makes extensive use of lectures, laboratories and industry expertise. **Class 4, Credit 4**

**0619-490 Senior Project**  
A capstone course that explores the integration of disciplines in addressing problems and issues facing the service/hospitality industries. Students have the opportunity to identify and investigate (as individual projects) challenges to these industries. Various modes of research, problem-solving techniques and presentation styles are utilized. Students also have the opportunity to select a faculty mentor. The class culminates with a presentation made by the student to peers and faculty. **Class 4, Credit 4**

### Nutrition Management

**0620-213 Contemporary Nutrition**  
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**

**0620-402 Dietetics Environment (Coordinated Program)**  
Introductory supervised practice course. Students interact with a representative sampling of personnel in all areas of food and nutrition. Supervised observations are planned in food management systems, health care facilities and community nutrition programs. **Class 1, Credit 4, Practicum hours by arrangement**

**0620-525, 526 Advanced Nutrition and Diet Therapy I and II**  
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. **0620-525 Class 5, Credit 5; 0620-526 Class 4, Credit 4**

**0620-550** **Community Nutrition**  
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 nontraditional markets. Independent practicums involving nutrition care in community facilities are required. Assignments are arranged by the instructor. **Class 3, Credit 8, Practicum hours by arrangement**

**0620-551** **Food Systems Management II (Coordinated Program)**  
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**

**0620-554** **Nutrition in Life Cycle**  
An applied course in nutritional needs throughout the life cycle. Emphasis is given to nutrition during pregnancy, infancy, early childhood, adolescence, young and middle adulthood, and the elderly. Practicum in facilities delivering nutrition services to these age groups is required. **Class 4, Credit 5, Practicum hours by arrangement**

**0620-560, 561** **Clinical Dietetics I and II (Coordinated Program)**  
An intensive integrated study and application of advanced nutrition and diet therapy theories and principles. Primarily structured to integrate class lectures with practicum experience in a hospital setting. **0620-560: Class 4, Credit 4; 0620-561: Credit 4, Practicum hours by arrangement**

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

## Food Management

**0621-225** **Principles of Food Production**  
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. **Class 2, Lab 4, Credit 4**

**0621-310** **Commodity Market Analysis**  
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 are analyzed. Students are introduced to technical price analysis, basis analysis and the global economics of foodservice commodities. **Class 4, Credit 4**

**0621-314** **Sanitation and Safety**  
Survey of micro-organisms of importance to the food industry; emphasis on causes and prevention of food spoilage and poisoning. Responsibilities of management to provide and establish safe working conditions and policies; discussion of current problems confronting the industry as a result of recent legislative developments as they relate to safety and health. **Class 2, Credit 2**

**0621-315** **Foodservice Marketing**  
Provides students with a business-to-business perspective of the marketing of products to the foodservice industry. Also provides an understanding of distribution systems and foodservice marketing environments. Both macro and micro marketing environments and issues are explored. The class considers various marketing mix elements as they relate to segments of the foodservice industry. Case studies and readings are utilized to give students realistic opportunities to analyze and develop practical solutions. **Class 4, Credit 4**

**0621-321** **Menu Planning and Merchandising**  
The menu is the main focus of the foodservice operation, and its relationship to efficient operation, merchandising, theme and customer satisfaction is considered. "Truth in menu" issues, layout, copywriting, standardized recipes and pricing techniques are explored. A wide variety of menus are critiqued. The student plans and produces a menu for a theme restaurant and also creates a cycle or other menu for a specific customer and situation. **Class 2, Credit 2**

**0621-324** **Food Purchasing**  
Principles of foodservice purchasing; selection and procurement, distribution systems and the purchasing function and activities. Topics include measurement, foodservice purchasing terminology, organization, specifications, recipe standardization, recipe conversion, optimal purchasing practices and purchasing principles for major food commodity categories including government and industry standards. **Class 2, Credit 2**

**0621-331** **Restaurant Operations**  
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 are assigned to defined job descriptions in production and service on a rotating basis. (0621-314) **Class 3, Lab 10, Credit 6**

**0621-410** **Food Processing/Quality Assurance**  
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 is examined along with common modes of quality loss in foods. Students are introduced to industry-standard quality assurance measures. **Class 4, Credit 4**

**0621-416** **Product Development**  
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. (0621-225) **Class 2, Lab 6, Credit 6**

**0621-424** **Food and Labor Cost Control**  
Deals with industry-related problems. Combines 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**

**0621-499** **Cooperative Education**  
Career-related work experience. Employment within the food, hotel, travel industry monitored by the Center for Cooperative Education and Career Services and the food, hotel and travel management program. 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**

**0621-501** **Wines of the World**  
An introduction to wines: history, points of origin, production, handling techniques, flavor characteristics and commercial value. Includes guest speakers and sampling of products. **Class 2, Credit 2**

**0621-505** **Foodservice Market Segments and Analysis**  
Provides students with a strategic and tactical foundation for effective marketing to the specific foodservice industry market segments. Students 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 are explored. **Class 4, Credit 4**

**0621-512** **Design and Layout of Food Operations**  
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. (0621-331 or permission of instructor) **Class 2, Credit 2**

**0621-525** **Restaurant Management**  
Students develop entry-level management competence through the operation of a full-service restaurant with beverage operations. Students rotate through various management positions for exposure 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**

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

**0621-545                      Beverage Operations**  
A study of the principles, methods and practical applications of beverage management as they apply to the commercial beverage industry. Emphasis is on administrative objectives, operational procedures and internal control. **Class 2, Credit 2**

## Hotel and Resort Management

**0622-200                      Hotel Operations**  
Introduction to the distinctive nature of hotel operations through identifying the standard functions that interrelate to produce the whole hotel service. The hotel's principal product, the guest room, is 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**

**0622-205                      Hospitality Industry Real Estate**  
Provides 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 is 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 are explored. **Class 4, Credit 4**

**0622-210                      Hotel Marketing and Sales Management**  
Introduces the student to the application of the marketing concepts in hotel operations and the visitor industry. Included are conventions and visitors' bureaus, hotels and convention centers. This is 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**

**0622-221                      Orientation to Computers in Hospitality**  
Students gain experience in computer programs used in the hospitality industry, including word processing, spreadsheets, E-mail, internet access, specialized industry programs, databases and electronic presentation software. Required projects utilize packages individually and in an integrated fashion. **Class 1, Lab 2, Credit 2**

**0622-310                      Resort Development and Management**  
Gives the student an understanding of how resort and hotel properties are developed as tourist and business destinations. Focus is on the planning, development, operation, design and special needs of recreational surfaces and financing of such properties. As part of this study, students select a specific type of property and analyze the methods used to develop it. **Class 4, Credit 4**

**0622-315                      Hotel Engineering and Maintenance**  
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**

**0622-355                      Financial Management  
for the Hospitality Industry**  
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 and budgeting, and capital budgeting strategies are examined. **Class 4, Credit 4**

**0622-510                      Convention Management**  
Provides the student an opportunity to explore the function of conventions from the point of view of the convention center manager. Consideration is given to various methods used to sell a location to a planner and the servicing of large groups. Also included are 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 also are reviewed. **Class 4, Credit 4**

**0622-530                      Hotel Law**  
Policies, laws and liabilities are examined as they pertain to the innkeeper. Focus is on current management problems and on the legal responsibilities of management. The rights of innkeepers also are discussed. **Class 4, Credit 4**

**0622-540                      Risk Management for the Hotel Industry**  
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 are undertaken, and an explanation of how persons may avoid exposure to risk is made. This includes forms of insurance, hold-harmless clauses and management decisions on the importance of coverage given different degrees of risk. **Class 4, Credit 4**

**0622-560                      Tourism Concepts**  
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**

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

**0622-580                      Destination Marketing**  
The processes and techniques used to promote tourism destinations such as resorts, attractions and individual communities. Emphasis is 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 are discussed. **Class 4, Credit 4**

## Travel Management

0623-206

### Distribution Systems

A functional approach is used to describe the market distribution channels for service industry inputs and products/services. The role of retail and business travel agents, tour wholesalers and operators, and specialty channelers such as meeting planners, convention bureaus and corporate travel buyers, food processors, producers, distributors and transportation suppliers are discussed. Various economic models are examined in order to analyze the pricing structure associated with the selling and distribution of service industry inputs and outputs. The service philosophy and its application to distribution in the travel/tourism and foodservice industry are explored. **Class 4, Credit 4**

0623-210

### Introduction to A. A. SABRE Reservations

Students acquire operational proficiency with American Airlines' SABRE reservation system. Using SABRE's live and training modes, they address topics such as creating passenger name records, itinerary pricing, fare quotes, queues and flight information. This course is equally divided between lecture and Travel Lab simulations. **Class 4, Credit 4**

0623-312

### Travel Reservation Procedures

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**

0623-314

### Salesmanship Techniques for Travel

The role of personal selling as persuasive communication and part of the partnering relationship is examined. 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**

0623-410

### Meeting Management

Introduces 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 are investigated and tested, and a variety of budget strategies are examined. **Class 4, Credit 4**

0623-413

### Corporate Travel Marketing and Sales

The processes and techniques used to promote tourism attractions and communities to the corporate buyer. Emphasis is on the role that corporate travel plays in marketing the corporation. How promotional organizations can be used by the corporate meeting planning and travel manager to compare sites is discussed. **Class 4, Credit 4**

0623-420

### Corporate Travel Planning

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**

0623-520

### Exhibit Marketing

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**

0623-522

### Negotiations and Conflict Management in Hospitality/Tourism

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**

0623-526

### Travel/Tourism Policy and Law

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**

0623-530

### Intermediate SABRE Applications

Enables students to progress to the "total automation" level associated with SABRE. The focus 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**

0623-535

### SABRE Non-Air Applications

Uses SABRE's direct reference system (DRS) as a basis for information concerning non-airline-oriented information. 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**

0623-550

### Seminar in Travel/Tourism Management

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. 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

0640-201

### Master Student/Academic College Survival Skills

Designed to assist students in the survival of their first quarter at RIT as well as the ROTC program. Prepares students for academic college survival with the use of "Becoming a Master Student," by David Ellis and College Survival Inc. Students learn time management, test taking, note taking, stress management, memory, writing papers and interpersonal skills strategies to assist them in surviving the high academic standards of this institution. **Class 1, Lab 2, Credit 2**

0640-202

### Applied Military Dynamics

Gives students an introduction to some military dynamics. Topics of primary interest include the organization and purpose of the ROTC program; the organization of the U.S. Army, the National Guard, the Army Reserve; career branches; and the role of a lieutenant. Other topics of interest are military writing style, experimental small-group leadership opportunity, weapons and marksmanship training, and an introduction to evaluating and applying first aid. Students must register for lab under the department of physical education. **Class 1, Lab 2, Credit 2**

0640-203

### Military Heritage

Provides 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. Students must register for lab under the department of physical education. **Class 1, Lab 2, Credit 2**

Second Year

0640-301

### Military Geography

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 include identification of terrain features, use of grid coordinates, polar coordinates, military correspondence and first aid tasks. Stresses practical application rather than theory; leadership lab. Students must register for lab under the department of physical education. **Class 1, Lab 2, Credit 2**

0640-302

### Psychology and Leadership

Provides the student with the basic principles of leadership and management of human resources; motivation, morale and communication. Special emphasis is on applying the theories and models of the behavioral sciences and personnel management to leadership as it functions in a military environment; leadership laboratory. Students must register for lab under the department of physical education. **Class 1, Lab 2, Credit 2**

**0640-303** **The Military and American Society**  
An introduction to the principles of war and the study of their application in recent military history. Emphasis is on the Army's role today as peacekeeper and NATO partner. Other topics include Soviet Union military systems command and staff functions and the officer personnel management system. Leadership laboratory. Students must register for lab under the department of physical education. **Class 1, Lab 2, Credit 2**

Third Year

**0640-401** **Military Tactics**  
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. Students must register for lab under the department of physical education. **Class 2, Lab 2, Credit 3**

**0640-402** **Military Communications**  
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. Students must register for lab under the department of physical education. **Class 2, Lab 2, Credit 3**

**0640-403** **Military Operations**  
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. Students must register for lab under the department of physical education. **Class 2, Lab 2, Credit 3**

Fourth Year

**0640-501** **U.S. Army Training System**  
An introduction to the U.S. Army's training philosophy and training system. Students learn how to assess, develop, plan and evaluate training. Provides instruction in how to plan, conduct and assess a training meeting. Both short- and long-range training plans are developed. The importance and use of the After Action Review process is stressed, and continued refinement of proper military briefing techniques is emphasized. Students must register for lab under the department of physical education. **Class 2, Lab 2, Credit 3**

**0640-502** **Military Administration and Logistic Management**  
Includes discussions and seminars on the Army training management system, military justice, supply and property accountability, maintenance management, officer-enlisted personnel management; leadership laboratory. Students must register for lab under the department of physical education. **Class 2, Lab 2, Credit 3**

**0640-503** **Military Ethics**  
Examines the ideas and issues that define the role of the military in our larger society. Emphasis is 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. Students must register for lab under the department of physical education. **Class 2, Lab 2, Credit 3**

**0640-510** **Senior Seminar and Project**  
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 also may be required to present this material to other students in a classroom environment. Students must register for lab under the department of physical education. **Class 2, Credit 2**

Air Force

**0650-201, 202, 203** **Leadership Lab I**  
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 also are covered. Demonstrates flight movement procedures. Responsibility of base units to mission accomplishment. **Credit 1**

**0650-210, 211, 212** **The Air Force Today I, II, III**  
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**

**0650-301, 302, 303** **Leadership Lab II**  
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**

**0650-401, 402, 403, 404, 405, 406, 501, 502, 503** **Leadership Lab III, IV, V**  
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

0101-301

**Financial Accounting**

Accounting as an information system for investors and creditors making economic decisions. The accounting cycle, accounting theory and interpretation of major financial statements are discussed. Current issues in applying generally accepted accounting principles are explored through relevant cases and current corporate annual reports. **Credit 4**

0101-302

**Managerial Accounting**

Introduction to the use of accounting information by managers within a business. Explores the value of accounting information for the planning and controlling of operations, assessing the cost of a product/service, evaluating the performance of managers, measuring costs of quality and strategic decision making. (0101-301) **Credit 4**

0101-303

**Ethics and Accounting**

Introduction to major philosophies of ethical behavior and theories of justice. The focus is on developing skills for solving ethical problems facing professionals such as accountants. Several specific accounting cases, current and "classic," are analyzed. (0101-301) **Credit 2**

0101-319

**Legal Environment of Business**

An introduction to legal principles and their relationships to business organizations. Includes a review of the laws and regulations that govern their operations. Explores 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 include constitutional, antitrust, consumer protection, torts, bankruptcy and regulatory law. A substantial portion of the course deals with contract law. A legal research project is an important aspect of this course. **Credit 4**

0101-320

**Business Law**

Explores in depth the implications of the Uniform Commercial Code to business operations. Topics covered include sales, commercial paper, corporations, partnerships, joint ventures, sole proprietorships, bailments and agency. Topical cases and examples are used to help the student grasp the business implications of the law and its nomenclature. A legal research project is an important aspect of this course. (0101-319) **Credit 4**

0101-400

**International Accounting**

Deals with international dimensions of accounting and control. Policy issues of foreign currency translation, global inflation, transnational reporting and disclosure. International standards of accounting and auditing, analyzing, financial statements of multinational firms. (0101-408, junior status) **Credit 4**

0101-408

**Financial Reporting and Analysis I**

Extensive exposure to the accounting cycle with full integration of the data flow in an accounting information system. Accounting theory developed by accounting standard-setting bodies is covered in depth. Generally accepted accounting principles are discussed as they apply to the preparation of financial statements and the recognition and measurement of current assets. (0101-301, prior or concurrent registration in 0104-441, junior status) **Credit 4**

0101-409

**Financial Reporting and Analysis II**

In-depth consideration of generally accepted accounting principles and theory as they apply to the recognition and measurement of all noncurrent assets, current and noncurrent liabilities, and owner equities, including partnerships. Issues related to convertible securities and the computation of earnings per share are discussed. (0101-408, junior status) **Credit 4**

0101-410

**Taxes for Decision Making**

A basic introduction to federal taxation with an emphasis on its impact on corporations. Intended for anyone interested in an introduction to business taxation. (Junior status) **Credit 2**

0101-431

**Cost and Managerial Accounting**

An extensive introduction to the use of accounting information by managers within a business. It explores the value of accounting information in planning and controlling operations, assessing the cost of a product/service, activity-based costing, evaluating the performance of managers, measuring costs of quality and strategic decision making. (0101-301, junior status) **Credit 4**

0101-432

**Advanced Cost Accounting Issues**

Further study of issues facing accountants in industry. Cases and problems are used to cover topics, including the design of cost systems, the use of cost data in making short-term operating decisions, activity-based costing and transfer pricing. (0101-431, junior status) **Credit 2**

0101-435

**The Role of Accounting in the Organization**

Gives students an understanding of how accounting is used to help organizations achieve their goals. Students learn how to account and the reasons why we account as we do. Special emphasis is placed on the resolution of controversial accounting issues within the context of the firm's goals. Positive accounting theory and agency theory are discussed throughout. (Distance Learning course, not for College of Business majors) **Credit 4**

0101-450

**International Business Law**

Introduction to international law, its sources and scope, and analysis of the responsibilities and rights of both individuals and states. Topics include business forms in the international environment, labor, imports and exports, sales, transportation and intellectual property. Comparisons are made between the laws of foreign jurisdictions and the United States. Relevant cases are used to help the student grasp the business implications of the law in an international setting. A legal research project and class presentations are important aspects of this course. (0101-319, junior status) **Credit 4**

0101-522

**Tax Accounting I**

A basic introductory course in federal income taxation. Emphasis is on taxation of individuals and sole proprietorships. Topics include income measurement and deductibility of personal and business expenses. (0101-301, junior status) **Credit 4**

0101-523

**Tax Accounting II**

A continuation of Tax Accounting I. Emphasis is on tax treatment of property transactions and taxation of business entities. Also covers the use of technology to prepare complex returns and to research tax issues. (0101-522, junior status) **Credit 4**

0101-530

**Auditing**

A study of the legal, ethical and technical environment in which the auditor works. Current auditing theory, standards, procedures and techniques are studied. The audit process is studied to ascertain how it leads to the development of an audit opinion. (0101-409, junior status) **Credit 4**

0101-539

**Accounting for Complex Organizations**

The application of generally accepted accounting principles to corporations with investments in subsidiaries. Issues involving the preparation of consolidated financial statements under complicating factors like minority interest, intercompany transactions and international operations are considered. (0101-409, junior status) **Credit 2**

0101-541

**Analytical Skills in Accounting**

Integrates knowledge obtained in earlier accounting courses. Uses cases to consider such topics as financial reporting and managerial accounting projects with uncertainty, incomplete information and errors in the underlying data. (0101-409, senior status) **Credit 2**

0101-550

**Financial Accounting and Reporting Issues**

A study of complex issues facing preparers and users of financial statements and how these issues are resolved. Topics include revenue recognition, accounting changes, deferred taxes, pensions, post-employment benefits, leasing, cash flows, price level statements, interim reporting and segment disclosures. (0101-409, senior status) **Credit 4**

0101-560

**Not-for-Profit and Governmental Accounting**

Consideration of objectives for not-for-profit organizations and governmental agencies. Examines how these objectives affect financial accounting and reporting for these entities as specified by applicable, generally accepted accounting principles. (0101-409, junior status) **Credit 2**

## Management

**0102-011** **Freshman Seminar**  
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. **Credit 0**

**0102-225** **Effective Communications**  
Organization and structure of communications are discussed, with focus on oral presentations, meeting skills, listening strategies and summarization techniques. Research skills and library usage also are covered. **Credit 2**

**0102-231** **Quality Concepts**  
This course emphasizes the concepts of TQM as they relate to organizational structure. The Baldrige framework is introduced, and the relationship of functional areas to the process of creating goods and services is studied. Self-assessment and career goal clarifications are explored. The development of formal meeting skills is introduced. **Credit 2**

**0102-232** **Quality Applications I**  
The theme for this course is TQM and its application. Some of the gurus of quality are introduced, and the application of the concept of empowerment is studied. Students work in teams and apply the Xerox Problem Solving Model to actual problems. Many of the 7 Basic Tools are used to develop students' abilities to gather, use, understand and present data. **Credit 2**

**0102-233** **Quality Applications II**  
In this final course of the sequence, students use the Xerox Quality Improvement Process as a vehicle to study customer satisfaction, the relationship between customer requirements and supplier specifications, benchmarking and continuous improvement. Meeting skills are reinforced through practice of the skills developed in previous quarters and extended through development of a code of conduct. Tools from the 7 Management Tools are introduced as needed. Focus on the individual student's success culminates in discussion of the cooperative education process and generation of a résumé. **Credit 2**

**0102-235** **Quality Concepts for Transfers**  
Required for incoming transfer students. Exposes students to the current Total Quality Management (TQM) movement and considers its implications for personal, academic and career goals. Emphasis is on the history and underlying principles of TQM. At the completion of this course, the student should recognize those factors that have created the need for change in American business practices; be capable of identifying and articulating the underlying principles of the current TQM movement; and demonstrate an ability to analyze the impact the TQM movement may have on personal, academic and career decisions. **Credit 2**

**0102-310, 311** **Air Force Management and Leadership I, II**  
Integrated management and leadership courses emphasize the concepts and skills required of the successful young officer, manager and leader. The first course includes applied written and oral communication techniques, coordination, history of management theory, analytic methods of decision-making, strategic and tactical planning, various leadership theories and followership. The second course stresses organizing, staffing, controlling, counseling, human motivation and group dynamics, ethics, managerial power and politics, managing change, career development and performance appraisal. Actual Air Force case studies are used to enhance the learning process. (ROTC) **Credit 5 each**

NOTE: Other Air Force ROTC course listings can be found under the College of Applied Science and Technology.

**0102-350** **Principles of Managerial Leadership**  
Familiarizes printing management students with basic principles and techniques of managerial leadership and organizational behavior. Organized around the key management functions of planning, organizing, leading and controlling, with an emphasis on the human aspects of management, and achieving high productivity and total quality. Case preparation about a problem relevant to the printing industry is required. **Credit 4**

**0102-360** **Survey of International Business**  
Survey of international business issues and strategies. Subject areas include the macro issues related to the economic, political and human environments of international business; i.e., how governments intervene in global markets, business, etc. In addition, the functional operations of a global firm will be examined; i.e., international marketing, international finance. (Sophomore status) **Credit 4**

**0102-405** **Introduction to Work Organizations**  
Introduction to the concept of work organizations and how they function. Students 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 learns about the diverse work force, social issues and government regulation of work. (Distance Learning course, not for College of Business majors) **Credit 4**

**0102-406** **Management Concepts**  
Introduction to the four functions of management: planning, organizing, staffing and controlling. In addition, topics such as organizational change, stress, productivity and decision making are covered. (Distance Learning course, not for College of Business majors) **Credit 4**

**0102-430** **Organizational Behavior**  
An overview of human behavior in organizations with respect to enhancing individual and organizational effectiveness. Emphasizes individual differences, teamwork, work teams, motivation, communication, leadership, conflict resolution and organizational change. Concepts of organizational behavior such as creative problem solving are applied to total quality management. (Junior status) **Credit 4**

**0102-432 International Management**  
An analysis of international business issues facing small, medium and large firms conducting business in Europe, the Middle East, Asia, Africa, Latin America and North America. Particular emphasis is placed on the differential effect of cultures on management, individuals, groups and organizational performance. Variations in leadership styles, communication, negotiation, risk tolerance and motivation in different cultures are examined. (0102-360, junior status) **Credit 4**

**0102-438 Business Ethics**  
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. (0102-430, junior status) **Credit 4**

**0102-455 Human Resources Management**  
An overview of the human resource function in both large and small organizations. Major topics studied include employee selection, compensation, training and development, performance evaluation and managing diversity. Emphasis is on how human resources management influences and enables the achievement of total quality. The human resources section of the Malcolm Baldrige Quality award is studied, along with case analysis of Baldrige winners. (0102-430, junior status) **Credit 4**

**0102-460 Management and Leadership**  
The role of managerial leadership in guiding employee contributions to the attainment of organizational goals. The personal attributes of leaders are described, along with the leader's contributions to teamwork and achieving total quality management. Also includes an overview of management functions. (0102-430, junior status) **Credit 4**

**0102-462 Management Development**  
Emphasizes the acquisition of management skills such as communicating, delegating, motivating and coaching. Students are given feedback on their management skills. An overview of management development and training techniques also is presented, along with basic aspects of career management. Examines manager's role in achieving total quality management. (0102-430, junior status) **Credit 4**

**0102-465 Multinational Business Operations and Strategy**  
Focuses on the strategic challenges faced by the management of a corporation operating in a global environment. Specifically addresses the issues faced by planners in functional areas as they develop strategic planning to manage in a global economy. (0102-360, junior status) **Credit 4**

**0102-490 Entrepreneurship**  
Focus 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 is the development, writing and presentation of a business plan. (Junior status) **Credit 4**

**0102-507 Business, Government and Society**  
An analysis of society's changing expectations of business; the means by which business can deal with these expectations; ethical reasoning, which can be used to determine the responsibility for meeting these expectations; the manner in which public policy is formulated to impose these expectations on business; and the manner in which business can influence the formulation of public policy. (Senior status) **Credit 4**

**0102-520 Seminar in Total Quality Management**  
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. (Junior status) (May be used as a management, marketing or business elective) **Credit 4**

**0102-536 Organizational Performance and Design**  
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. (0102-430, junior status) **Credit 4**

**0102-547 Field Studies in Small Business Management**  
Students 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, project teams confer with their faculty member on an as-needed basis. (Senior status) **Credit 4**

**0102-551 Strategy and Policy**  
A capstone course drawing upon a variety of functional areas—including accounting, finance, marketing, production operations, organizational theory and international business—to provide an integrated perspective of business organizations. Focuses on how corporations can achieve superior profitability through establishment of a sustainable competitive advantage. Topics include the analysis of general environmental trends, industry attractiveness, competition and the role of quality in the value chain. Students learn how to formulate and implement effective business and corporate-level strategies. Extensive use is made of complex cases and a computer simulation of decision making in a highly competitive industry environment. (0102-430, 0105-363, 0104-441, 0106-401, senior status) **Credit 4**

**0102-554 Management Seminar**  
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 is announced in advance, along with any prerequisites or other special requirements. Seminar topics in recent years have included stress management, power and politics in organizations, new product development strategies, compensation and appraisal, and human resources planning. (Junior status) **Credit 4**

**0102-575 International Seminar**  
A variety of special-interest topics in the field of international business. Sample topics include international negotiation, regions of the world (Europe, Middle East, Japan), global technology, the role of multinational corporations, economic transformation in transnational economies and the impact of highly developed industries on home and host countries. (0102-360, junior status) **Credit 4**

## Finance

**0104-340 Personal Financial Management**  
Examines financial decisions people must make in their personal lives. Covers personal taxation, housing and mortgages, consumer credit, insurance (including life, health, property and casualty) and retirement and estate planning. Also reviews the common financial investments made by individuals, including stocks, bonds, money market instruments and mutual funds. **Credit 4**

**0104-420 Theory and Application of Basic Financial Concepts**  
Develops some of the basic principles of finance and shows some of the ways in which they can be applied to business decisions and problems. Concepts and applications include time value of money, ratio analysis, cash budgeting and pro forma forecasting, credit decisions, capital budgeting techniques, forms of borrowing and capital structure decisions. (Distance Learning course, not for College of Business majors) **Credit 4**

**0104-441 Corporate Finance**  
Basic course in financial management. Covers business organization and introduction to capital markets, time value of money, valuation of securities and real assets, financial ratios, financial planning and working capital management. (0106-319, 0101-301, 0511-301, junior status) **Credit 4**

**0104-442 Environmental Finance**  
The course begins by providing an overview of how environmental issues affect financial performance and management. A framework is developed for understanding financial markets (bond and stock valuation), corporate investment and financing using the time value of money, capital budgeting and cash flow principles. This framework serves as the basis for discussing how environmental considerations may be incorporated in a financial manager's investment decisions. Environmental regulations and pressures from environmental groups require technological or operational adjustments for compliance that affect a firm's costs, credit ratings and stock market value. Included is an examination of a method for better defining and measuring environmental costs as well as the possible financial liabilities resulting from not considering environmental issues. (0101-301) **Credit 4**

**0104-452** **Managing Corporate Assets and Liabilities**  
Advanced course in financial management. Covers project cash-flow analysis, risk, cost of capital, market efficiency, issuance of securities, debt policy and dividend policy. (0101-441, junior status) **Credit 4**

**0104-453** **Intermediate Investments**  
Focuses on the financial investment problems faced by individuals and institutions. Theoretical topics include asset pricing, hedging and arbitrage. Application topics include risk management in bond and stock portfolio context. A discussion of options, futures and swaps also is included. (0104-441, junior status) **Credit 4**

**0104-504** **International Finance**  
Discusses problems posed by the international financial environment in which corporations operate. In particular, students learn to quantify and manage risks arising from shifting exchange rates. Other topics include exchange rate systems, international trade finance, international capital budgeting, country risk analysis and long-term international financing. (0104-441, junior status) **Credit 4**

**0104-505** **Advanced Corporate Financial Planning and Analysis**  
Focuses on the strategic management of the corporation. Topics include forecasting models for critical variables such as sales; budgeting; strategic decisions such as mergers, divestitures and executive compensation; and working capital management. (0104-452, junior status) **Credit 4**

**0104-510** **Management of Financial Institutions**  
Analysis of the different kinds of financial institutions, such as commercial banks, savings institutions, insurance companies, pension funds and others. Central emphasis is on interest rate risk exposure. Special focus is on institutions' products as represented in their liability structures and the consequent asset decisions. (0104-441, junior status) **Credit 4**

**0104-554** **Seminar in Finance**  
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

**0105-363 (previously 0105-463)** **Principles of Marketing**  
An introduction to the field of marketing, stressing its role in the organization and society. Emphasis is on determining customer needs and wants and how the marketer can satisfy those needs through the controllable marketing variables of product, price, promotion and distribution. (Sophomore status) **Credit 4**

**0105-415** **Marketing for Total Customer Satisfaction**  
Review of the fundamentals of marketing: formulating marketing strategy (segmentation and positioning) and the marketing mix (price, product, promotion and distribution decisions). The mechanisms of delivering total customer satisfaction throughout the marketing mix are emphasized through applying quality management principles to the marketing function. (Distance Learning course, not for College of Business majors) **Credit 4**

**0105-505** **Buyer Behavior and Satisfaction**  
A study of the determinants of consumer and business buying behaviors. Emphasis is on identifying customer requirements and measuring customer satisfaction using a decision-making process. (0105-363, junior status) **Credit 4**

**0105-530** **Marketing Channels**  
Focuses on the problems and techniques of marketing by and through channel members (i.e., retailers, distributors, agents and independent reps). Customer satisfaction depends not only on the decisions that manufacturers make but also on what happens in the channel; therefore, this course addresses how to plan, develop and maintain effective interorganizational partnerships in distribution so that sustainable competitive advantages can be achieved. (0105-363, junior status) **Credit 4**

**0105-550** **Marketing Management Problems**  
A capstone course that gives the student an in-depth knowledge of middle- and upper-management-level marketing problems and processes. Topics include tools used by marketing managers and the role of Total Quality Management in the development, implementation and control of marketing plans. (0105-363, prior or concurrent registration with 0105-551, senior status and one completed block of co-op) **Credit 4**

**0105-551** **Marketing Research**  
A study of research methods used to understand the changing needs of customers in order to guide the decision making of marketing managers. Topics include problem formulation, sources of marketing data, research design, data collection and analysis. (0105-363, 1016-319, junior status) **Credit 4**

**0105-553** **Sales Management**  
The role, activities and tools employed by sales managers. Continuous improvement and defining and meeting the requirements of both internal and external customers are presented as the foundations of effective sales management. (0105-363, junior status) **Credit 4**

**0105-554** **Seminar in Marketing**  
Current issues in marketing are the focus of the course. Topics have included direct and database marketing, pricing, advanced marketing research and other current issues in marketing, based on student and faculty interest. (0105-363, junior status) **Credit 4**

**0105-555** **International Marketing**  
A study of the management challenges of marketing in foreign countries. Topics include the assessment of foreign markets, foreign customer requirements, entry strategies, foreign channel management, promoting internationally, transfer pricing and world-class quality. (0105-363, junior status) **Credit 4**

**0105-559** **Professional Selling**  
Selling concepts, tools, strategies and tactics are discussed as they apply to both external and internal customers. Students learn and experience some of the problems faced and rewards earned by those in professional sales. Selling in a Total Quality Management environment is emphasized. Relationship management/partnering with customers and truly seeking to meet their requirements are discussed as key to long-term success. (0105-363, junior status) **Credit 4**

**0105-560** **Marketing Communications**  
An in-depth view of tools of advertising, sales promotion and public relations. Students develop a comprehensive promotion plan, beginning with the marketing strategy and ending with implementation and evaluation. (0105-363, junior status) **Credit 4**

**0105-570** **Business Marketing**  
Students develop an understanding and application of marketing processes to business organizations. Topics include understanding business customer requirements, organization of purchasing and designing channels of distribution. (0105-363, junior status) **Credit 4**

## Decision Sciences/Information Systems

**0106-320** **Business Computer Applications**  
Information systems in organizations and the use of personal computers to enhance personal productivity. Extensive hands-on experience with PC operating system(s), spreadsheets and presentation graphics. **Credit 4**

**0106-325** **Fundamentals of Information Systems**  
Introduces students to the fundamental principles and practices important to the field of Information Systems (IS). Encompasses hands-on exposure to software designed to help people in decision making, idea development and communicating with others. Students can access the Internet and also are able to develop their own home pages on the World Wide Web. **Credit 4**

**0106-334** **Management Science**  
A survey of quantitative approaches to decision making. Topics include formulation and solution of linear programming models, decision analysis and simulation. Involves use of computer software. (1016-319 or equivalent) **Credit 4**

**0106-335** **Information Systems Theory and Practice**  
Topics from general systems theory and information systems theory are covered. Selected cognitive principles are explored as they relate to the development of information systems in general and Graphical User Interfaces (GUIs) in particular. Principles associated with the development of GUIs are also explored, and the tool Visual Basic is introduced. (0106-325) **Credit 4**

0106-355

**Information Technology  
Hardware and Applications**

Computer technology is explored in detail with lectures focusing on various computer architectures, including Complex Instruction Set Computers (CICs), Reduced Instruction Set Computers (RISC) and the Intel family of computer chips. Other aspects of hardware architecture covered are data buses, memory, data storage and peripheral technologies. Students become comfortable discussing computer technology and designing, building and implementing computer-based information systems. (0106-320, 0106-325) **Credit 4**

0106-363

**Analysis and Logical Design I**

Focusing on analysis and design concepts as they relate to business systems, students acquire knowledge of fundamentals, as well as mastery of the important tools used in the development of information systems. Methods and tools commonly used by systems analysts to model and design computer-based information systems and databases are covered in depth, along with feasibility analysis, data security and implementation issues. (Knowledge of COBOL or another programming language, 0106-335 and 0602-208 or 0602-300 and sophomore status) **Credit 4**

0106-375

**Network Technologies**

Gives students basic knowledge of the networking strategies that are utilized within the corporate IS environment. Emphasis is on the current trends in Local Area Networking as it relates to business needs. (0106-355, sophomore status) **Credit 4**

0106-401

**Operations Management**

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, international operations and strategic considerations. (1016-319, junior status) **Credit 4**

0106-405

**Statistical Methods for Quality Control**

A course in statistical quality control. Topics include statistical process control (SPC) techniques (such as control charts, process capability analysis, etc.), acceptance sampling plans and some examples of reliability and design of experiment techniques. (1016-319 or equivalent) **Credit 4**

0106-415

**Purchasing Management**

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 also are covered. (Junior status) **Credit 4**

0106-416

**Quality Planning and Improvement**

Study of total quality management (including Deming's philosophy), objectives of quality planning and improvement, quality function deployment (QFD), problem-solving methods and tools, the use of statistical methods for quality improvement, vendor relations, Malcolm Baldrige National Quality Award, international quality standards (i.e., ISO 9000) and recent developments in quality. Focus is on the management and continuous improvement of quality and productivity in manufacturing and service organizations. (1016-319 or equivalent and junior status) **Credit 4**

0106-425

**Tools for Total Quality Management**

Examines the concepts of quality and total quality. Addresses, as a theme, "What tools and techniques may be used, and in what manner, to 1) help understand and capture customer requirements accurately the first time; 2) transmit and translate the requirements faithfully to those who design products and operations; 3) control and continuously improve the production, delivery and repair or recovery of goods and services; and 4) assure that customer requirements are satisfied the first time, every time?" Perspectives include quality planning, control and improvement. The basic tools for total quality are covered, including quality function deployment (QFD), check sheets, Pareto diagrams, flow charts, histograms, run charts, statistical control charts and benchmarking. (Some background in statistics recommended) (Distance Learning course, not for College of Business majors) **Credit 4**

0106-464

**Analysis and Logical Design II**

Building on Analysis and Logical Design I, this course provides further grounding in Information Systems development. Current topics in the field will be discussed, including the role of TQM principles in IS system design, the design of Decision Support Systems and systems testing. Student teams complete a project using CASE tools, plus a quality project to broaden their expertise. (0106-363, junior status) **Credit 4**

0106-553

**Project Management and Practice**

An exploration of top-level management issues associated with information systems in all organizations. Topics include strategic uses of IS systems and computer technology; planning for organizational change; design of IS systems; organizational issues associated with IS development. Project management includes small topics such as resource scheduling, loading and allocation and project planning. (0106-464, junior or senior status) **Credit 4**

## College of Continuing Education

### Business and the Arts

#### Accounting

**0201-201**

##### **Financial Accounting**

Emphasis is placed on analyzing and recording business transactions and understanding the results of these transactions. Preparation of basic financial statements required by any business are included. **Credit 4**

**0201-203**

##### **Managerial Accounting**

The functions and uses of accounting information are presented. Emphasis is placed on the preparation and operation of dynamic budgets and the use of accounting data for control and profit planning. (0201-201) **Credit 4**

**0201-308, 309**

##### **Intermediate Accounting I and II**

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. (0201-203) **Credit 4/Qtr.**

#### Business Law

**0202-301**

##### **Business Law I**

Introductory course in business law including basic legal principles and procedures, criminal law, torts, contracts, sales and real property. **Credit 4**

**0202-302**

##### **Business Law II**

Continuation of 0202-301 includes law agency, partnerships, corporations, insurance and bankruptcy. Also presents survey of commercial paper, secured transactions and bank deposits. **Credit 4**

**0202-310**

##### **Legal Environment of Business**

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**

#### Data Processing and Systems Analysis

**0203-323**

##### **Information Resources and Network Tools**

An overview of the evolution and structure of the computing environment and information networks. Topics include the evolution of the computer; personal computers, workstations and local area networks; tools for managing information; systems design and analysis tools; electronic mail; and using the Internet. Labs explore information resources and data communication tools available on the RIT computer network and the Internet. **Credit 4**

#### Finance

**0204-204**

##### **Personal Financial Management**

Manage your personal finances more effectively: personal budgeting, protection of personal assets, consumer credit, investments and estate planning are presented. **Credit 4**

#### General Management

**0205-200, 201, 202**

##### **The Management Process**

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 communication 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)**

**0205-203**

##### **Organization and Management**

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**

**0205-298, 398** **Special Topics: Management**  
Special topics are experimental courses offered quarterly. Watch for titles in the course listing each quarter. **Credit Variable**

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

**0205-353** **Management Science**  
Foundation course, which introduces mathematical model building and the use of management science in the decision-making process. Mathematical techniques include linear programming, the assignment model, the transportation model, inventory control models, critical-path models (PERT/CPM) and computer simulation. Homework assignments include running "canned" computer application programs. (0208-201, 202, 351, 352 and 0203-321) **Credit 4**

### Small Business Management

**0205-221** **New Venture Development**  
Course presents factors to be considered by those interested in the ownership and management of small business enterprises. Includes who should be an entrepreneur, guidelines for starting a new business, basic legal consideration, and approaches for obtaining capital and credit. **Credit 4**

**0205-222** **Small Business Management and Finance**  
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**

**0205-223** **Small Business 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**

### Health Care Management

**0206-310** **Survey of Health Care Systems**  
An overview of the development, structure and current forces transforming the health care system. Topics 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 course work in health care and permission of chair) **Credit 4**

**0206-320** **Health Systems Administration**  
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 are discussed. (0206-310 or previous experience or course work in health care and permission of chair) **Credit 4**

**0206-351** **Health Care Economics and Finance**  
Introduction to the efficiency, effectiveness and equity of the new economics of health care; 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. (0206-310 or 320) **Credit 4**

**0206-421** **Legal Aspects of Health Care Administration**  
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. (0206-310 or 320) **Credit 4**

**0206-431** **Health Care Quality Assurance**  
An introduction to quality assurance in health care. Course explores past and current definitions of quality and competing concepts of quality assurance; reviews existing quality assurance requirements and accrediting organizations, federal and state agencies, and third-party payers; describes and explains quality assurance methods and tools and their application in various settings. (0206-310 or 320) **Credit 4**

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

### Marketing

**0207-210** **Effective Selling**  
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**

**0207-213** **Advertising Principles**  
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 lecturers discuss corporate campaigns. **Credit 4**

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

**0207-361** **Marketing**  
An introductory course in marketing that provides 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**

**0207-362** **Marketing Practices for the Service Economy**  
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 2**

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

### Mathematics and Statistics for Business

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

NOTE: Entering students who want to register for 0208-201 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 adviser.

**0208-351, 352** **Business Statistics**  
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. (0208-202) **Credit 4/Qt.**

## Personnel Administration

**0209-224 Interviewing Techniques**  
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**

**0209-225 Recruiting, Training and Supervising Service Industry Personnel**  
Problems and solutions related to establishing realistic and attractive wages and career paths for employees in service sector businesses are examined. In addition, motivation, training and communication techniques that lead to the kind of quality performance required in service industries and organizations to optimize customer satisfaction are explored. **Credit 2**

**0209-229 Personnel Administration**  
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**

## Production Management and Industrial Engineering

**0210-209 Production Management**  
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**

**0210-305 Fundamentals of Industrial Engineering**  
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**

**0210-306 Industrial Engineering Economy**  
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**

**0210-332 International Standards**  
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. The emerging developments of international standards in terminology and quality standards are addressed. Manufacturing standardization in such industries as telecommunications and electronics is considered. Elective for the international business and culture certificate. **Credit 2**

## Logistics and Transportation Management

**0212-234 Introduction to Logistics and Transportation**  
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**

**0212-239 Traffic and Transportation Law, Rates, Accounting and Control**  
Introduces the role of government in the transportation industry. The evolution of past and current regulatory and promotional policies is explored. The determination and utilization of freight rates are examined. Various methods to forecast and control transportation costs also are discussed. **Credit 4**

**0212-241 International Logistics and Transportation**  
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**

## Real Estate

**0213-201 Basic Real Estate Principles: Salesperson's Course**  
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 percent attendance (40½ hours) requirement and pass the final exam. Individuals interested in licensure only should call 475-4927. **Credit 4**

**0213-202 Advanced Real Estate Principles: Broker's Course**  
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 percent attendance (40½ hours) requirement and pass the final exam. Individuals interested in licensure only should call 475-4927. **Credit 4**

**0213-203 Real Estate Investment and Finance**  
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. **Credit 4**  
For license renewal, this course is approved by NYS Department of State as a 30-hour course with exam.

## International Business

**0218-410 Doing Business in International Markets**  
An orientation to conducting business successfully in the global marketplace. Manufacturing, management, marketing, sales, technology transfer, transportation of goods and those factors that influence commerce in world markets are emphasized. The environmental framework of labor, finance, international regulations, competition, cooperative agreements and arrangements, and relevant political and cultural factors are introduced. This is a general course in the international business certificate. **Credit 4**

**0218-412 Doing Business in Mexico and Latin America**  
Political, social and regulatory changes like the North American Free Trade Agreement (NAFTA) have made Mexico and Latin America an attractive market for U.S. goods and for multinational manufacturers. Topics include an examination of NAFTA and the social, political, cultural and economic environments influencing trade and commerce and business transactions in Mexico, Brazil and Argentina. This is a specialty course in the international business certificate. **Credit 4**

**0218-413 Doing Business in Japan and the Pacific Rim**  
Provides an understanding of the cultural, political and social environments affecting commerce and trade with Japan and countries that form the Pacific Rim. Differences and similarities of the countries' business environments are analyzed. Topics include tradition, quality and participatory responsibility in production and management of Japanese business and their effect on the environments in which business transactions take place; the importance of a single ethnic and cultural source; and the importance of specific idiosyncratic styles. This is a specialty course in the international business certificate. **Credit 4**

**0218-430 Communicating Across Cultures**  
Individuals will encounter profound cultural differences when travelling internationally or interacting with people of different cultures. Behavior is rooted in the cultural experience of locale, region and country. Communicating across cultures is about managing differences between distinct ways of life. Course topics include deciphering variations in dress, demeanor, body language, interpersonal and social behavior, material things in business and social contexts, and applying these insights to various host countries. This is a general course in the international business certificate. **Credit 4**

**0218-452 International Trade: Importing and Exporting**  
Introduction to the logistics, cultural and transportation systems, and regulations necessary to transact international trade. Topics include documentation procedures, regulations, related services and techniques to reduce the costs of international trade. This is a specialty course in the international business certificate. **Credit 4**

**0218-454 International Advertising and Public Relations**  
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 United States. The course follows the traditional path of advertising and public relations marketing support activities, identifying and learning how to deal with the unique characteristics of the international marketplace. Major areas of study include standardization of localization, agency operations, language and cultural considerations, media planning and analysis, international communication, processes and production of marketing plans, and strategy selection. This is a specialty course in the international business certificate. **Credit 4**

### Interdisciplinary Studies

**0220-220 Career Planning and Decision Making**  
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**

**0220-230 Introduction to Quality**  
An introduction to the fundamental concepts of total quality management. Includes an overview of the competitive environment, the cost of nonquality, 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**

**0220-231 Basic SQC Techniques**  
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 also are addressed. (High school algebra or equivalent) **Credit 4**

**0220-270 Methods of Inquiry**  
Provides 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**

**0220-330 Leadership Skills for Quality**  
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. (0220-230 or approval of department) **Credit 4**

**0220-340 Statistics for Total Quality**  
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. (Certificate in basic quality or approval of department) **Credit 4**

**0220-410 Costing for Quality**  
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 nonconformance to customer requirements. (Certificate in basic quality or approval of department) **Credit 4**

**0220-430 Implementing Total Quality**  
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. (Certificate in basic quality) **Credit 4**

**0220-440 Creative Critical Thinking and Problem Solving**  
An interdisciplinary approach to the generation and evaluation of ideas and solutions. Includes analysis of the conditions limiting creativity and the development of a “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**

**0220-442 Managing Change**  
At a time when America is learning that change—and not stability—is at the heart of business and organizational vitality, this course offers students insight into theories of organizational dynamics and change as well as an introduction to skills for managing change, conflict and differences in personal and professional life. The strategies covered include, but are not limited to, community building, recognizing prejudice, conflict management, managing change, identifying resistance, negotiation/mediation and related communication skills. Real-life applications and experiential learning in class are emphasized. Teaching strategies include case studies, experience logs, self-assessment inventories, role playing and assigned reading. **Credit 4**

**0220-445 Special Topics: The Learning Organization**  
This interdisciplinary course combines management thought, control theory psychology and systems thinking. It focuses on theory and techniques for building and sustaining an efficient, creative organization that promotes problem solving and collaborative learning. Learning organization principles of systems thinking, personal mastery, mental models, shared vision, team learning. Provides an introduction to control theory psychology with applications for improved personal interaction and a noncoercive approach for lead managing. Includes analysis of the conditions limiting an organization’s capacity to learn and remediation of organizational “learning disabilities.” **Credit 4**

**0220-450 Teams and Team Development**  
Meets the increasing need to understand and participate in teams in the workplace. Students establish a strong framework of group theory through topics that include current group and team theory research, individual functions in a team and team leadership, mission and goal development, evaluating team effectiveness, negotiating, persuasion and conflict resolution. This course is highly interactive, with projects that require the student to use the theory in constructing and observing cross-functional work teams, self-directed teams and integrated work teams. Learning takes place through lectures, case studies, simulations and group projects that develop strong team skills and reinforce team theory. **Credit 4**

**0220-501 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 “Negotiation and Conflict Resolution,” to “Microeconomic Battle Plans” and “Organizational Culture.” Limited to qualified applied arts and science BS degree students. (Approval of adviser) **Credit 4**

### Ceramics

**0222-201 Introduction to Ceramics**  
An extensive survey of on- and off-the-wheel forming techniques using stoneware and porcelain clays. Students are introduced to a variety of decorative methods as well as the basics of glazing and firing finished work. Class projects emphasize the development of competent skills and good design. **Credit 2**

**0222-211 Intermediate Ceramics**  
An exploration of Japanese wheel-throwing techniques. Students work with raku stoneware and porcelain, using methods and tools common to Japanese potters. Class projects concentrate on production techniques, with special emphasis given to glazing and firing procedures. (0223-201 or equivalent) **Credit 2**

**0222-301 Advanced Ceramics**  
An introduction to the world of the professional potter. Work centers on advanced forming and decorative techniques ranging from sectional throwing to photo-sensitive emulsion glazing. Special emphasis is on independent projects that 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 are discussed. (0222-211 or equivalent) **Credit 2**

**0222-240 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**

**0222-243 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**

**0222-245 Earthenware Techniques**  
An intensive introduction to earthenware with an emphasis on exploring the characteristics of unglazed, functional and sculptural forms. **Credit 2**

**0222-295 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 chairperson. Credit may vary from one to five quarter-credits. For information on independent study, contact your adviser or the program chairperson. **Credit variable**

**0222-298 Special Topics: Ceramics**  
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter. **Credit variable**

## Design

**0223-201, 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.**

**0223-211, 212, 213 Display Design I, II, III**  
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. (0224-201, 202, 203 and 0223-201, 202, 203 or equivalent experience) **Credit 2/Qtr.**

**0223-215, 216 Rendering Techniques I, II**  
Introduction to the materials and techniques used by designers in rendering interiors, layouts, products, etc. Marker sketching, perspective, shadowing, media selection and presentation techniques are covered. Suggested for all design students. (0224-201, 202, 203; 0223-201, 202, 203 or equivalent) **Credit 2/Qtr.**

**0223-220 Art for Reproduction**  
Prepares students to enter the field of graphic design by providing orientation and the studio experience in the presentation of imagery for reproduction. Presentations include board techniques, materials, tools, mechanical art procedures, printing and bindery processes, etc. (0223-201, 202, 203 or equivalent) **Credit 3**

**0223-224, 225 Interior Design I, II**  
Career orientation. Emphasis on practical aspects of the profession. Details of purchasing all furnishings used in a home. Client-centered planning and design. (0224-201, 202, 203; 0223-201, 202, 203 or equivalent) **Credit 2/Qtr.**

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

**0223-227 Business Aspects of Environmental Design**  
Introduces students to various occupations available to the environmental and interior designer. Instructs 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 also is covered. Assignments are structured to meet the personal business needs of each student. **Credit 2**

**0223-231 Color Theory in Art**  
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. (0223-201, 202, 203 or equivalent experience) **Credit 2**

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

**0223-251, 252, 253 Environmental Design**  
The study of enclosed space, using material and the elements of design, line form, texture and color to develop living space. (0224-201, 202, 203 and 0223-201, 202, 203 or equivalent experience) **Credit 2/Qtr.**

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

**0223-261, 262, 263 Advanced Design and Typography**  
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 lettering. Proceeds from rough letter indication to development of finished lettering and application in commercial advertising problems. Typography and photo lettering methods are studied relative to their use in commercial design. (0224-201, 202, 203 and 0223-201, 202, 203) **Credit 2/Qtr.**

**0223-270 Graphic Communication for the Non-Artist I**  
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). Designed for people with little or no previous art training. Lecture/demonstration and studio format; student projects followed by critiques. **Credit 3**

**0223-271 Graphic Communication for the Non-Artist II**  
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. (0223-270 or equivalent) **Credit 3**

**0223-280 Basic Computer Graphics**  
Experimenting with basic principles and elements of design, students approach the computer as a tool for image making. No prior design training or computer background is necessary. **Credit 2**

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

**0223-298, 398 Special Topics: Design**  
Special Topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter. **Credit variable**

223-311, 312, 313

**Graphic Design**

A contemporary approach to design for printed advertising with the emphasis on creative experience. Working knowledge of the field of graphic design, its history, its future and general practices among current professionals is provided. The role of the graphic designer in the communications field, and how the designer actually implements that role are discussed. (0224-201, 202, 203; 0223-201, 202, 203 or equivalents. 0223-261, 262, 263 recommended) **Credit 2/Qtr.**

0223-315, 316, 317

**Advertising Design**

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. (0224-201, 202, 203 and 0223-201, 202, 203 or equivalent experience. 0223-261, 262, 263 and 311, 312, 313 recommended) **Credit 2/Qtr.**

0223-360

**Portfolio Workshop**

A workshop designed to help students take what they have learned in art classes (or work situations) and prepare and present a portfolio. Students produce a résumé and cover letter appropriate to their career goals. Projects are tailored to the needs of individual students, allowing them to compile an accurate representation of their skills in a concise, positive and beneficial manner. Includes visits from prominent people in the field showing their work and sharing their experiences. **Credit 2**

0223-371, 372, 373

**Designing with Computers I, II, III**

An introduction to the Macintosh computer as a design tool. Created for people just beginning to apply their design skills to a computer. In a hands-on lab, over three quarters, the basic software covered includes ALDUS Superpaint (bit-map program), Pagemaker (page-layout program) and Freehand (vector-based program) for illustrative techniques. Discussions on a variety of related topics, such as design concepts, other software, computer needs and misconceptions. Previous design experience is necessary. (0223-201, 202, 203 or 0223-270, 271 or equivalent; must be taken in sequence) **Credit 3/Qtr.**

0223-375, 376, 377

**Photographic Imaging with Computers I, II, III**

An introduction to the Macintosh computer as a photographic tool for people just beginning to apply their photography or photo-design skills to a computer. Adobe Photoshop is presented in a hands-on, three-quarter lab sequence. In the first-quarter lab, students explore traditional photographic techniques using a computer with an electronic camera; second quarter, photographic manipulation using a computer with a flatbed scanner. The third-quarter lab allows for free exploration, with independent projects ranging from fine arts to practical applications. **Credit 3/Qtr.**

**Drawing**

0224-201, 202, 203

**Basic Drawing and Media**

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.**

0224-207

**Basic Figure Drawing**

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. (0224-201, 202, 203 or equivalent) **Credit 2**

0224-250

**Cartooning**

Various cartooning styles are examined, identifying and discussing the factors that make cartoons appealing and effective. The focus of the course is the study and practice of the principles of cartoon illustration. The importance of obtaining good reference materials and maintaining a file of other cartoon art are stressed. Students complete weekly drawing assignments, covering different elements of cartoon, building in complexity and culminating in the completion of several finished cartoon pieces. (0223-201, 202, 203; 0224-201, 202, 203 or permission of chairperson) **Credit 2**

0224-306

**Advanced Drawing**

Drawing in a variety of media, including an introduction to line, form and color as elements of pictorial expression. Organic, inorganic and imaginative stimuli are presented. May be elected more than once for credit. (0224-201, 202, 203; 0223-201, 202, 203 or equivalent) **Credit 2**

0224-307

**Figure Drawing**

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. (0224-207 or equivalent recommended) **Credit 2**

0224-320

**Human Anatomy for the Artist**

Students learn to identify and define the bones and muscles that affect the surface structure of the human anatomy. The instructor demonstrates how to draw these structures in simplified shapes and forms. The students then apply this information to figure drawing in the class. **Credit 2**

0224-350

**Advanced Cartooning**

This course builds upon the foundation established in Cartooning. The value of gesture drawing is stressed, and an exploration of the many elements of cartooning is made. Assignments are more specific and become more comprehensive in content. Color is used more, and a wide variety of media options are explored. Composition, layout and attention to detail are stressed. Reference materials are integrated into many of the assignments. Client-vendor relationships and the pros and cons of freelancing are discussed. (0224-250) **Credit 2**

**Painting**

0224-211

**Introduction to Painting**

Study of the materials and techniques of painting through use of still-life and nature forms. Basic training and foundation for advanced work. (0224-201, 202, 203; 0223-201, 202, 203 or equivalents) **Credit 2**

0224-227

**Figure Painting**

Painting from costumed and nude models. The emphasis is 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. (0224-307 or equivalent) **Credit 2**

0224-301

**Painting**

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 are used for inspiration. May be elected more than once for credit. (0224-211 or equivalent) **Credit 2**

0224-341

**Watercolor Painting**

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. (0224-201, 202, 203 or equivalents) **Credit 2**

**Illustration**

0224-230

**Collage**

A basic study of the history, materials and techniques used in collage. Students 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. (0223-201, 202, 203; 0224-201, 202, 203) **Credit 2**

0224-263

**Calligraphy**

Introduction to either the Foundational or the Italic form of lettering. Students explore the history, theory and techniques that have shaped letter forms as we know them today. Emphasis is 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 studied include majuscules, minuscules, rhythm, spacing, techniques, media, color, design, page layout and either the mechanics of bookbinding or camera-ready art. **Credit 2**

0224-361

**Illustration**

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. (0224-207 or equivalent) **Credit 2**

**0224-362** **Airbrush Techniques**  
An opportunity for beginners to develop the basic skills and techniques of painting with an airbrush and for 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 is limited to 10 students. (0223-201, 202, 203 and 0224-201, 202, 203 or equivalent) **Credit 3**

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

### Printmaking

**0224-295** **Independent Study: Fine Arts**  
Independent studies may be developed at the upper-division level. Projects must be developed with an instructor, subject to approval of the program chairperson. Credit may vary from one to five quarter-credits. For information on independent study, contact your adviser or the program chairperson. **Credit variable**

**0224-296** **Introduction to Printmaking**  
An introduction to the methods, materials, tools and techniques of printmaking. Areas covered may include woodcut, etching, engraving, stencil, collagraphs and lithography. Students are required to pull an edition of print in one area. (0224-201, 202, 203 and 0223-201, 202, 203 or equivalents) **Credit 2**

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

**0224-397** **Printmaking Workshop**  
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. (0224-296) **Credit 2**

### Metalcrafts and Jewelry

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

**0225-211** **Intermediate Metalcrafts and Jewelry**  
Work of a more complex nature is introduced. Some techniques included are surface treatment of metal, more sophisticated stone setting, basic hollowware, casting and more. Independent and creative statements are emphasized in keeping with the student's technical and aesthetic development. May be elected more than once for credit. (6 credits 0225-201 or presentation of portfolio) **Credit 2**

**0225-295** **Independent Study: Metalcrafts/Jewelry**  
Independent studies may be developed at the upper-division level. Project must be developed with instructor, subject to approval of the program chairperson. Credit may vary from one to five quarter-credits. For information on independent studies, contact your adviser or the program chairperson. **Credit variable**

**0225-298** **Special Topics: Metalcrafts and Jewelry**  
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter. **Credit variable**

**0225-301** **Advanced Metalcrafts and Jewelry**  
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**

## Woodworking

0227-201

**Introduction to Woodworking**

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**

0227-211, 212, 213

**Intermediate Woodworking**

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 is emphasized. May be elected more than once for credit. **Credit 2/Qtr.**

0227-295

**Independent Study: Woodworking**

Independent studies may be developed at the upper-division level. Projects must be developed with an instructor, subject to the approval of the program chairperson. Credit may vary from one to five quarter-credits. For information on independent study, contact your adviser or program chairperson. **Credit Variable**

0227-298

**Special Topics: Woodworking**

Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter. **Credit Variable**

0227-301

**Advanced Woodworking**

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**

## Deaf Studies

0234-211

**Sign Language and Manual Communication: System I**

Develops fluency at a basic level. 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**

0234-212

**Sign Language and Manual Communication: System II**

A continuation of conversational signing skill development. 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. (0234-211 or equivalent sign skill) **Credit 2**

0234-213

**Sign Language and Manual Communication: 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. (0234-212 or equivalent sign skill) **Credit 2**

0234-241

**Aspects and Issues of Deafness I**

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**

0234-242

**Aspects and Issues of Deafness II**

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 are implemented. (Recommended: 0234-241) **Credit 3**

0234-311

**American Sign Language I**

Students 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. (0234-213 or equivalent sign skill) **Credit 2**

0234-312

**American Sign Language II**

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. (0234-311 or equivalent sign skill) **Credit 2**

## Humanities

0235-201

**Humanities**

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**

0235-202

**Humanities**

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**

0235-203

**Humanities**

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. **Credit 4**

0235-298

**Special Topics: Humanities**

Experimental lower-division courses are offered under this number; titles appear in each quarter's course listing. **Credit variable**

0235-340

**Values and Experience**

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. **Credit 4**

0235-359

**Contemporary Moral Problems**

A one-quarter course that presents moral issues that 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.) **Credit 4**

0235-360

**African American Film:****Survey and Interpretation**

Five thematic periods of African American filmmaking are explored through the lenses of history, theme type and sociological content. Special emphasis is given to the evolution of roles played by African American actors and to the achievements of African American directors. **Credit 4**

## Communication

*NOTE: Students who apply for Dynamic Communication, 0236-214, or Communication, 0236-220, must take a pretest to determine the course most appropriate for their communication needs. Only students who have credit for 0236-214 or equivalent may register for Communication, 0236-220.*

0236-214

**Dynamic Communication**

Dynamic Communication focuses on developing and improving writing skills. The achievement of clarity, coherence, logical development of ideas and effective use of language is emphasized. Basic research techniques are included. (Requires pretest) **Credit 4**

0236-220

**Communication**

Focuses on refining writing skills—emphasizing organization, support and effective expression of ideas in multiparagraph 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 pretest or completion of 0236-214) **Credit 4**

**0236-240** **Interpersonal Communication Skills**  
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**

**0236-298, 398** **Special Topics: Communication**  
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter. **Credit variable**

**0236-301** **Professional Presentations**  
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**

**0236-302** **Discussion Skills and Leadership**  
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 that simulate those of civic, business and industrial settings. Peer critiquing and videotapings allow students to apply theory as they learn to recognize the elements of successful conferences. **Credit 4**

**0236-307** **Communicating in Business**  
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. (0236-220 or equivalent) **Credit 4**

**0236-308** **Technical Report Writing**  
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. (0236-220 or equivalent) **Credit 4**

**0236-315** **Report Writing**  
Principles of organizing information into clear, concise reports; techniques for oral technical reports, letters and memos included. **Credit 2**

**0236-323** **Technical Writing and Editing**  
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. (For students in basic technical communication program. Others contact chairperson.) **Credit 4**

**0236-324** **Research Techniques**  
Focuses on techniques for information generation. Interviewing skills, review and use of literature, and task analysis are included. (For students in basic technical communication program. Others contact chairperson.) **Credit 2**

**0236-325** **Instructional Design Principles**  
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. (0236-323 and 324) **Credit 2**

**0236-326** **Document Design**  
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. (0236-323 and 324) **Credit 2**

**0236-327** **Practicum: Designing Manuals**  
With supervision, students apply general principles of technical communication to the process of planning, researching, writing, editing, formatting and producing a technical manual. (0236-323 and 324) **Credit 2**

**0236-328** **Writing for the Sciences**  
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. (0236-220 or equivalent) **Credit 2**

**0236-329** **Oral Skills for Technical Communication**  
Focuses on effective techniques for oral presentation of technical material and participation, both as leader and member, in formal and informal meetings. **Credit 2**

**0236-330** **Writing Software User Documentation**  
Defines and provides examples of end-user documentation for software products; defines the conventional audience, content, structure and language of software user manuals; identifies typical problems in user manuals; explores types of online user information; and defines usability testing. Practice in writing step-by-step procedures, defining system and software concepts, and describing functional processes. **Credit 2**

**0236-331** **Promotional Writing**  
Focuses on practical guidelines for preparing marketing materials including brochures, data sheets, trade press articles, press kits and advertising copy. (0236-220 or equivalent) **Credit 2**

**0236-332** **Managing the Project**  
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 also are covered. **Credit 2**

**0236-333** **Managing Media Presentations**  
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. **Credit 2**

**0236-340** **Interpersonal Communication for Customer Service**  
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. Organizational policy, management and ethical issues are considered. Through simulation and role playing, skills are developed that may be applied to a variety of work, social and other situations. **Credit 4**

**0236-360** **Introduction to Public Relations**  
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 adviser to management; and as spokesperson, media manager, and services purchaser and provider. Course may be counted as either a business or communication elective. (Consult adviser) **Credit 2**

**0236-365** **Writing for the Organization I**  
Designed for nonprofessional 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 and news releases, reporting information and creating feature articles. (0236-220 or equivalent) **Credit 2**

**0236-366** **Writing for the Organization II**  
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. (0236-365 or equivalent) **Credit 2**

**0236-368 Scripting for AV and Video Presentations**  
Introduces writing and production techniques for audiovisual and video presentations. Scripting prepares students to write a specialized form of communication—dialogue that is to be spoken and heard. Instruction on enhancing the verbal message with visuals is presented. Dimensions of wording, voice characterization, sound, motion and color are explored. Includes story-boarding and an introduction to traditional and emerging production methods. (0236-220 or equivalent) **Credit 2**

**0236-369 Speechwriting**  
Introduces principles of speechwriting, a highly specialized form of professional communications. Speechwriting covers techniques for preparing a speech in the “voice” of another. Writing for the “ear” and adapting the message, wording, body language and tone to the speaker are included. Techniques for enhancing message retention are studied. (0236-220 or equivalent) **Credit 2**

**0236-395 Coordinating Publications Production**  
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. (0236-323 or 366, or equivalent) **Credit 2**

**0236-415 On Camera! On Mike!**  
Focuses on preparation and delivery skills for effective radio and TV appearances by nonprofessionals 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. (0236-220 or 301, or equivalent) **Credit 4**

### Social Sciences

**0237-227 The New Service Economy**  
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**

**0237-316 Psychology: Behavior in Industry**  
Industry presents one environment for understanding human behavior. This course applies psychological and social concepts to the industrial setting. Topics covered are motivation, performance, assessment, quality of work life, group behavior, leadership, organizational structure, communication and decision making. (0514-210 recommended) **Credit 4**

**0237-317 Psychology of Stress and Adjustment**  
Physiological, psychological and social stress can have serious consequences on one's daily life. This course familiarizes students with basic concepts, the positive and negative ramifications of stress and strategies for stress management. (0514-210 or equivalent) **Credit 4**

**0237-320 Psychology of Persuasion**  
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 require students to use theory in designing effective strategies for various purposes and audiences. Required for the public relations communications certificate. **Credit 2**

**0237-431 Understanding Corporate Culture**  
An introduction to the concepts of organizational/corporate culture and the methods of analyzing it. Focuses on the development of skills required to assess corporate culture in terms of such constituent parts as ritual, symbol, structure, language and identity. Also included are a history of the study of corporate culture, an analysis of leadership styles and communication patterns in the workplace, an overview of strategies for managing corporate and organizational change and an orientation to leadership styles appropriate to the successful manipulation of cultural elements. Emphasis is on both individual and interactive learning processes. (0510-210 and either 0514-210 or 0515-210) **Credit 4**

## Science and Technology

### Mathematics

*NOTE: A diagnostic examination is required of students applying for mathematics course 0240-201.*

**0240-201, 202 Technical Mathematics**  
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 pretest) **Credit 4/Qt.**

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

**0240-205 Mathematical Thought and Processes**  
An examination of mathematical thought and processes through a study of elementary mathematical concepts. This course will acquaint the student with the “mathematical way of thinking.” Topics include sets, numeration systems, number theory, real numbers and finite systems. **Credit 4**

**0240-206 Modern Mathematical Methods**  
A continuation of 0240-205 with an examination of selected modern mathematical methods used in today's society. This examination includes a study of equations, inequalities, problem solving, graphs and functions, probability, statistics and the usefulness of these methods in today's society. **Credit 4**

### Contemporary Science

**0246-221 Contemporary Science: Biology**  
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 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. (0240-201 or 0240-205 or 0208-201 or equivalent) **Credit 4**

**0246-222 Contemporary Science: Chemistry**  
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 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. (0240-201 or 0240-205 or 0208-201 or equivalent) **Credit 4**

**0246-223 Contemporary Science: Physics**  
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. (0240-201 or 0240-205 or 0208-201 or equivalent) **Credit 4**

**0246-224 Contemporary Science: Oceanography**  
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 is investigated in terms of basic scientific concepts, and topics discussed include plate tectonics and earthquake prediction, the impact of ocean pollutants, climate fluctuations, cetacean intelligence and resources from the sea. (A distance learning offering) **Credit 4**

**0246-289 Contemporary Science: Mechanical Universe**  
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. Topics covered include units and dimensional analysis, motion, force, energy, heat, waves, light, relativity, atoms and quantum mechanics. (A distance learning offering.) **Credit 4**

**0246-350 Sports Physiology and Life Fitness**  
A contemporary science course that provides a foundation for understanding the importance of nutrition and energy transfer in maximizing the potential for exercise and training. In addition to the basic principles of exercise physiology, a variety of contemporary issues are covered, including use of legal and illegal aids, cardiovascular fitness and disease prevention, training methodologies and fitness assessment. Particularly appropriate for individuals interested in maintaining their level of physical fitness and wellness, participating in competitive athletics or working in recreation or physical therapy. **Credit 4**

### Computer Systems

**0250-200 Introduction to Computers and Programming**  
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**

### Machine Shop

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

**1710-051 Shop Mathematics**

**1710-052 Shop Algebra**

**1710-053 Shop Geometry**

**1710-054 Shop Trigonometry**  
These courses are now offered through the Learning Development Center and can be found under Learning Development Center—Technical.

**0266-101, 102 Precision Measurement**  
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 quarter. **Credit 1/Qtr.**

**0266-103 Precision Measurement (SPC)**  
A study of statistical process control. Topics include comparisons and contrasts to conventional quality programs, basic statistical concepts, theory, calculation of control limits, sampling and sampling plans, charting and graphing, and applications of computers for SPC. **Credit 1**

**0266-104 to 0266-109 Advanced Machine Shop I, II**  
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. (0266-203) **Credit 1/Qtr.**

**0266-111 to 0266-119 Instrument Making and Experimental Work I, II, III**  
Student must operate all tool room equipment. Skillful manipulation of hand tools; make small temporary tooling required to form or bend the finished parts; blank development and precision layout; make small punches, dies, cutters and assemblies to simulate actual industrial model work. (0266-203) **Credit 1/Qtr.**

**0266-121 to 0266-129 Tool and Die Making I, II, III**  
Planning and making accurate, complete tool and die assemblies. Emphasis is on accuracy of the individual parts and the fitting of the assembled tool or die. Samples from the forming and blanking dies are inspected for quality. (0266-106) **Credit 1/Qtr.**

**0266-161, 162 Heat Treatment**  
Practical heat treatment of metals; carburizing, cyaniding, nitriding, annealing, normalizing and hardening of steels. Relation of tool steels to particular applications and their resulting properties, including hardness, toughness, wear resistance, machinability and movement in hardening; treatment of non-ferrous alloys including aluminum, brass, bronze, zinc beryllium, copper, silver, monel, stainless and magnetic steel. Several types of heat treating furnaces and atmospheres are available for laboratory exercises and demonstrations of these metals and alloys to prove out the theories of class lectures and discussions. **Credit 2/Qtr.**

**0266-200 Mechanical Blueprint Reading**  
The study of mechanical detail and assembly drawings. Topics include sketching, orthographic projection and section views. Dimensioning practices, including geometric dimensioning and tolerancing used on detail and assembly drawings are emphasized. **Credit 2**

**0266-201, 202, 203 (Lec.) Machine Shop**  
**0266-206, 207, 208 (Lab)**  
Machine shop theory and techniques involving basic machine tools, machining theories and practices. Explanations, demonstrations and working out of basic problems in measuring, layout and cutting tools, with lathe, milling, drilling and grinding work. Must register for lecture and lab. **Credit 2/Qtr.**

**0266-281 Computer Numerical Control (Mill)**  
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**

**0266-282 Computer Numerical Control (Lathe)**  
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 are covered with compensation for tooling radius. Bar feed programming along with straight and taper threading. Includes hands-on. (Phase I machine shop diploma programs or approval of machine shop counselor) **Credit 3**

**0266-283 Computer-Aided Manufacturing**  
Emphasizes computer-aided manufacturing (CAM) for numerically controlled machine tools. Automatic fabrication of parts utilizing programs developed for a computer system is 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. (0266-281 or 282 or programming experience) **Credit 3**

### Emergency Management

**0285-301 Emergency Management Laws and Regulations**  
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. (0285-201 or 202) **Credit 4**

**0285-311 Earth Sciences for the Emergency Manager**  
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**

**0285-321 Man-Made Hazards**  
Survey of the chemistry of hazardous materials, including toxics, caustics, flammables and reactives. 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**

**0285-371** **Emergency Planning and Methodology**  
Quantitative methods of risk and hazard analysis, the scope of a comprehensive emergency plan, classes of protective actions, evacuations, turf problems associated with multiagency plans, command structures, the post-incident recovery phase; the design of exercises, the role of new technologies in disaster response. Students prepare hazard analyses and write sections of comprehensive plans for actual communities. (0285-301, 311, 321) **Credit 4**

**0285-381** **Emergency Operations**  
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 gain familiarity with on-scene command responsibilities through role plays on an incident simulator. (0285-301, 311, 321; 0285-371 may be taken concurrently) **Credit 4**

## School of Professional Studies

### Environmental Management

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

**0286-201** **Principles of Environmental Management**  
Overview of the history, issues, impacts, legislation, technologies, methodologies and strategies of the environmental manager in both public and private sectors. Students gain a foundational understanding of the field of environmental management within the contexts of global, regional and local environmental events and issues and become competent in the use of environmental research resources available locally and on the information highway. **Credit 4**

**0286-220** **Physics for Environmental Management**  
Basic principles of work, force, hydraulics, statics and shear strength; properties of materials; unit conversions; mass balances; and engineering problem-solving techniques. (1016-204, 1011-211) **Credit 4**

**0286-301** **Recycling**  
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. (0286-201) **Credit 4**

**0286-311** **Waste Reduction**  
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. (0286-201) **Credit 4**

**0286-350** **Solid and Hazardous Waste Management**  
An examination of strategies and technologies currently in use for reducing, recycling, handling, treating, storing and disposing of solid and hazardous waste in industry. Associated environmental impacts, regulatory concerns, technical feasibility and costs are considered. Students learn to identify applicable environmental regulations and monitoring and measurement requirements, and develop strategies for managing wastes and protecting human health and the environment. (0286-201) **Credit 4**

**0286-352** **Industrial Wastewater Management**  
Investigates characteristics and sources of industrial wastewaters, related environmental impacts, regulatory implications, and technical and cost considerations of current treatment and disposal methodologies. Students learn to identify appropriate methods, technologies and sequences for source reduction, treatment and pretreatment, direct discharge and management of associated industrial wastewater treatment plant sludges. (0286-201) **Credit 4**

**0286-354** **Air Emissions Management**  
Identifies and categorizes industrial air pollutants and their sources. Covers applicable state and federal laws and regulations, reduction strategies, control technologies, testing, monitoring and reporting requirements. Students develop strategies for evaluating and reducing air emission sources, managing ash and pollution control sludges, quantifying emissions, identifying data gaps, obtaining and meeting the conditions set forth in environmental permits. (0286-201) **Credit 4**

**0286-360** **Environmental Monitoring and Measurement**  
An in-depth view of environmental monitoring and measurement, giving the student the knowledge to plan, execute and interpret a sampling project. Covers techniques for sampling air, soil, surface water and groundwater with an emphasis on landfill construction and monitoring. Students learn to plan sampling events, determine the number and type of samples needed, collect quality assurance/quality control samples, determine correct sampling technique and document sampling. (1011-211, 213; 1001-201; 0286-380, 382; 1004-210) **Credit 3**

**0286-362** **Environmental Monitoring and Measurement Lab**  
Laboratory to accompany 0286-360, Environmental Monitoring and Measurement. (Credit or coregistration in 0286-360) **Credit 1**

**0286-370** **Environmental Geology**  
An introduction to environmental geology, including a survey of basic geology and topics applicable to environmental management. Basic geology topics include earth materials and the earth's internal and external processes. Environmental geology topics include erosion and slope stability, soil properties, glacial geology of Monroe County and geologic aspects of landfill siting. (0286-220 or equivalent) **Credit 3**

**0286-372** **Environmental Geology Lab**  
Laboratory to accompany 0286-370, Environmental Geology. (Credit or coregistration in 0286-370) **Credit 1**

**0286-380** **Introduction to Hydrology**  
An introduction to hydrology, covering surface water, groundwater and water chemistry. Students learn theoretical background as well as practical applications of the science to environmental management. Topics include the hydrologic cycle, surface water, vadose zone, groundwater flow, groundwater monitoring, normal and polluted water chemistry, landfill hydrology and hydrology of Monroe County. (0286-370, 372) **Credit 3**

**0286-382** **Introduction to Hydrology Lab**  
Laboratory to accompany 0286-380, Introduction to Hydrology. (Credit for or coregistration in 0286-380) **Credit 1**

**0286-401** **Land Disposal and Treatment**  
(Previously under 0286-321) A survey of the technological factors in siting, designing and operating modern landfills and composting facilities. Topics 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. (0286-360, 380) **Credit 4**

**0286-411** **Energy Recovery**  
(Previously under 0286-331) A survey of solid waste energy recovery and material conversion technologies. MSW as a feedstock for the production of energy and material products is examined. Topics include mechanical, thermal, chemical and biological processes and conversions. (0286-360) **Credit 4**

**0286-440** **Environmental Permitting**  
A practitioner-oriented examination of why environmental permits are required; how to get a permit; when the procedure must begin; how long each step will take; where to get information, forms, guidance, etc.; who will be involved and what are their roles, perspectives and motivations; and what does it take to "live with" permit provisions and requirements. Students learn to develop realistic strategies, sequences and schedules for securing permits and to develop appropriate methods for complying with the provisions and restrictions of environmental permits. (Open only to fourth-year environmental management majors or with department approval) **Credit 4**

**0286-444** **Remedial Investigation and Corrective Action**  
Delineates and describes the sequence of events required in remedial investigations (RI), feasibility studies and corrective actions at hazardous waste sites. Explains the process flow logistics, concepts and rationale behind each RI action. Investigates the strategies, technologies and methodologies commonly in use for site investigation and characterization and corrective action. Explores current issues of "how clean is clean?" and "Superfund" liability. Students learn to develop conceptual site characterization plans; effective solicitations for RI proposals; review and evaluate work plans, procedures and operations plans, and contingency plans. (Open only to fourth-year environmental management majors or with department approval) **Credit 4**

## Learning Development Center— Technical

**0286-450** **Environmental Health and Safety**  
Comprehensive examination of methods of minimizing employee exposure to chemical, biological and physical hazards in the work place. Topics include OSHA/NIOSH requirements, hazardous waste reporting, hazard communication, work place monitoring, lockout/tagout, confined space, etc. (1001-201, 1011-211, 213, 1004-210) **Credit 4**

**0286-452** **Environmental Accounting and Finance**  
A survey of governmental 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 governmental purposes and enterprise fund activities. (0101-301, 0511-301) **Credit 4**

**0286-455** **Business, Public Policy and the Environment**  
Covers concepts of public goods, value of environmental assets, economic development and environmental protection, corporate environmental responsibility, costs and opportunities arising from environmental regulations, new approaches to environmental challenges and international environmental issues. **Credit 4**

**0286-475** **Special and Hazardous Wastes**  
A survey of the techniques and strategies used to manage hazardous wastes, nonhazardous industrial wastes, infectious wastes and other problematic materials that enter municipal solid waste systems. (0286-360, 362, 401, 411) **Credit 4**

**0286-480** **Environmental Regulatory Law I**  
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. (Open only to fourth-year students) **Credit 4**

**0286-481** **Environmental Law II**  
An examination of environmental law and regulation and the requirements of the Resource Conservation and Recovery Act; Comprehensive Environmental Response, Compensation and Liability Act; Superfund Amendment and Reauthorization Act; Clean Water Act; Clean Air Act; National Environmental Policy Act; public vs. private environmental legal issues; and pollution prevention mandates. (Open only to fourth-year students) **Credit 4**

**0286-490** **Project Management**  
Students gain hands-on, practitioner-oriented skills in resource allocation, task scheduling, critical path development, use of Gantt and Pert charts and project management software packages, project budget management, proposal and solicitation development and procurement practices. Applicable to a broad range of educational fields and work situations; projects are tailored to student's area of programmatic interests. (Open only to fourth- or fifth-year students)

**0286-509** **Senior Project Planning**  
(Previously Integrated Solid Waste Management Seminar, 0286-510) This individualized course prepares the student for the senior project, 0286-511. (Open only to fifth-year environmental management majors) **Credit 1**

**0286-511** **Senior Project**  
Independent work demonstrating the ability to solve a significant solid waste management problem in a comprehensive fashion. The problem focuses on future or emerging technologies as well as current techniques. (0286-509) **Credit 4**

**0286-515** **Corporate Environmental Management**  
Presents the fundamentals of developing and implementing a corporate environmental vision or policy. Explores economic and regulatory motivations and strategies for corporate environmental management. Identifies components of environmental regulatory compliance management. Introduces general management considerations, concepts of pollution prevention during the production process, design for the environment, environmental management of materials, environmental self-assessments and environmental performance evaluation. (Open only to fifth-year environmental management majors) **Credit 4**

**1710-011** **Introductory Algebra**  
A review of arithmetic and geometry and an introduction to topics from algebra. These topics include signed numbers, order of operations, polynomials, linear equations, inequalities, word problems and factoring. **Credit 0**

**1710-012** **Intermediate Algebra**  
Continuation of Introductory Algebra, with topics in factoring and algebraic fractions. Also included are graphing linear equations, working with systems of equations, exponents and scientific notation, radicals and complex numbers. **Credit 0**

**1710-051** **Shop Mathematics**  
Elements of computational mathematics designed to increase analytical ability to solve complicated shop problems. 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**

**1710-052** **Shop Algebra**  
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**

**1710-053** **Shop Geometry**  
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**

**1710-054** **Shop Trigonometry**  
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

**0302-210 Introduction to Engineering**  
A one-credit course for the undeclared engineering student that presents 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, are discussed as they pertain to each major. **Class 2, Credit 1 (F)**

**0302-215 Computing for Engineers**  
A first course in computer programming for engineers, which involves extensive development of programming skills required in the engineering disciplines. **Class 4, Credit 4 (F)**

## General Engineering

**0302-610 Multidisciplinary Design Experience I**  
The first course of a two-course sequence. Most products designed today reflect the fusion of the efforts of a team of engineers from many disciplines. It follows that successful product designers must be able to converse and work with engineers and managers from a variety of backgrounds. A group of students, drawn from at least three different disciplines, is formed into a team to design an actual product. These products are sponsored by industry or agencies who cooperate closely with the team during the entire design process. Elective course, open normally to undergraduate and graduate students.

The first course includes lectures and seminars about organizing and planning techniques, an introduction to team dynamics, and courses and seminars relating to the specific product design and manufacture. At the conclusion of the course, the team is expected to produce a written proposal for the design, accompanied by an oral presentation. **Credit 2-6 (F, W)**

**0302-620 Multidisciplinary Design Experience II**  
The second of a two-course sequence, with the main thrust on the completion of the design begun in 0302-610 and on the construction and evaluation of an engineering prototype. A written final report is required, along with an oral presentation to the faculty and the sponsoring organization.

Since this is usually a very busy time, the lectures and seminars are run at a somewhat lower level than in the first course. The topics addressed are more general in nature and involve ethical and professional considerations, ergonomics and some general system considerations. (0302-610) **Credit 2-6 (W, S)**

Computer Engineering  
Required Courses

**0306-200 Introduction to Computer Engineering**  
Briefly describes the field of computer engineering and provides a frame of reference for the sequences of computer engineering, computer science and electrical engineering courses that appear in the computer engineering curriculum. Topics include an introduction to computers and computing, basic concepts, nomenclature, historical background and some elements of data representation. **Class 1, Credit 1 (F)**

**0306-250 Assembly Language Programming for Computer Engineers**  
An introduction to fundamental computer organization, assembly language programming and input/output techniques of a modern microprocessor system. Covers 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 device drivers are considered. An introduction to basic digital computer organization concepts also is provided. The Motorola MC68000 microprocessor family of devices is used in most class examples and all required programming projects. (0601-242 or equivalent) **Class 4, Credit 4 (F, S)**

**0306-341 Introduction to Digital Systems for Computer Engineers**

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 combinational and sequential systems considers the use of standard modules such as decoders, encoders, multiplexers, shifters, ROMs, PLAs, adders, registers and counters. The laboratory provides 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, as well as CAD tools. (1016-265 concurrently) **Class 3, Lab 3, Credit 4 (W)**

**0306-361 Modeling of Linear Systems**  
An introduction to mathematical modeling of dynamic systems. Linear models are developed in terms of state-variable and input-output differential equations and transfer functions. Time-domain, linear algebra and Laplace transform methods are introduced to solve systems of simultaneous differential equations. Mechanical and electrical systems are studied. Assignments involve the use of MATLAB to verify and simulate dynamic systems modules. (1016-306) **Class 4, Credit 4 (S)**

**0306-452 Linear Control Systems**  
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 are studied using the frequency domain approach and the state space approach. Students are required to verify their linear control system design projects using computer simulation techniques. (0301-352, 1016-306, 0306-361) **Class 4, Credit 4 (F, W)**

**0306-550 Computer Organization**  
Provides an understanding of the information transfer and transformations that occur in a computer, with emphasis on the relations between computer architecture and organization. Topics include design levels and their respective primitives, modules and descriptive media, register transfer and micro-operations, 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). (0306-341, 0603-440) **Class 4, Credit 4 (S, SU)**

**0306-551 Computer Architecture**  
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)**

**0306-553 Digital Control Systems Design**  
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. Focus is 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 are assigned. (0306-452; 0306-560 concurrently) **Class 3, Lab 3, Credit 4 (S, SU)**

**0306-560 Interface and Digital Electronics**  
Introduction to some common transducers, transformations from raw measured quantity to transducer output. Instrumentation amplifiers, active filters, analog switching for applications in multiplexers, 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)**

**0306-561 Digital System Design for Computer Engineers**  
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. Covers the MSI/LSI modules, PALs, and EPROMs and their use in design. Design for testability is emphasized. (0306-341, 560) **Class 3, Credit 3 (S, SU)**

**0306-630 Introduction to VLSI Design**  
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 are 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 is placed on the use of static CMOS circuits and regular structures, such as programmed logic arrays in custom and standard cell-based designs. There is extensive use of workstations with Mentor Graphics Corporation design tools for circuit simulation and for the design of circuit layouts. Laboratory design projects are required. **Class 4, Lab 2, Credit 4 (F, S, SU)**

**0306-654 Computer Engineering Design Projects I**  
The first part of a capstone undergraduate design projects course in computer engineering. Lecture materials include realtime programming techniques, formulating independent project proposals and a brief introduction to the laboratory tools available in the concluding course. Students undertake a relatively simple, independent design project and formulate a proposal for a more complex electro-mechanical, closed-loop, computer-controlled design project to be completed during the concluding course. (Fourth-year standing in computer engineering) **Class 1, Credit 1 (S, SU)**

**0306-657 Computer Engineering Design Projects II**  
The conclusion of a capstone undergraduate design projects course in computer engineering. Students will have prepared for the major course project during the previous course and will have done some detailed project analysis over the intervening co-op work period. This course begins with project design reviews presented to the class and selected faculty members. Project performance analysis and reliability will be major metrics. A smaller independent learning experience design project concludes the course. (0306-654) **Class 3, Credit 3 (F, W)**

**0306-694 Data and Computer Communications**  
Provides a unified view of the broad field of data and computer communications. Emphasis is 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 are discussed. The topology, access control and performance of various types of local area networks are studied in detail. (Fifth-year standing in computer engineering or permission of instructor) **Class 4, Credit 4 (S)**

### Technical Electives

**0306-620 Design Automation of Digital Systems**  
Deals with the computer as a tool or aid in the design and creation of digital systems. The VHDL hardware description language is taught and used to specify digital systems on the behavioral, data-flow, register-transfer and structural levels or logic elements levels. Simulation techniques and logic synthesis methods are studied and implemented on VHDL models using Mentor Graphics Corporation QuickVHDL, QuickSIM and Autologic tools. (0306-550 or 0603-520 or 0603-720) **Class 4, Credit 4 (F, W)**

**0306-631 Advanced VLSI Design**  
A second course in the design and implementation of Very Large Scale Integration (VLSI) circuits and systems. Emphasis is 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 are investigated. Topics on the design and use of a standard cell library in the implementation of large system designs are covered. The use of workstations with Mentor Graphics Corporation design tools is required in laboratory projects leading to the design, fabrication and testing of an integrated circuit device. **Class 4, Lab 2, Credit 4 (W, S)**

**0306-661 Engineering Design of Software**  
An advanced course moving the student beyond computer programming to the engineering of software. Design of software from an engineering perspective, based on software construction from reusable software components. Methods for predicting, measuring and controlling a software artifact's time and space characteristics. Mathematical models of software and their analysis, including call graph models and flow graph models. Software metrics and their uses, including size metrics and complexity metrics. Software projects are required. (0601-243, 450; 0603-325) **Class 4, Lab 2, Credit 4 (F, W)**

**0306-662 Concurrent and Embedded Software Design**  
Methods for designing concurrent software, which consists of many cooperating processes, and embedded software, which senses and controls variables in the external environment. Alternative techniques for constructing concurrent and embedded software, employing tasks, cyclic executives and reusable software components. Mathematical models of concurrent software and their analysis, including Petri net models and rate monotonic scheduling theory. Software projects are required. (0603-440; 0306-250, 560, 661). **Class 4, Lab 2, Credit 4 (S)**

**0306-672 Special Topics in Computer Engineering**  
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**

**0306-683 Document Image Processing**  
Suitable for both undergraduate and graduate students interested in document image processing. Several topics are covered in the field, including input scanning, output printing and image processing. Interpolation techniques for scaling and resolution conversion are discussed. Rotation, edge extraction, halftoning and compression of digital images are covered. Feature extraction and recognition of image characters are described. Provides a framework for showing the relationships among these various topics in electronic document processing. **Class 4, Credit 4 (S)**

0306-699

**Independent Study**

Allows 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 1-4**

## Electrical Engineering

0301-203

**Electrical Engineering Freshman Seminar**

Gives the entering first-year student an overview of electrical engineering and helps integrate the incoming student into the RIT EE community. Topics discussed include the electrical engineering course of study, the cooperative work experience, an overview of RIT facilities and career options in electrical engineering. Also gives the student an opportunity to interact with EE faculty, upper-division students and other first-year EE students. **Credit 1 (F)**

0301-240

**Introduction to Digital Systems**

Introduces students to the basic components used in digital systems and is 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 registers and counters, is introduced. Programmable devices are surveyed. A traditional approach to the design of state machines is taken with an end object of hardware implementation on a programmable device. The laboratory component consists of small design projects that must be constructed and validated by the student. The projects run from traditional combinational logic using SSI chips to small subsystem implementation of EPLDs and EPROMs. **Class 3, Lab 2, Credit 4 (W, S, Ext. day F)**

0301-310

**Numerical Methods**

Introduces students to the potential of the digital computer for solving engineering problems and further hones their skills 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 include an introduction to data structures and to techniques for handling and operating on large arrays of data. Also introduces students to the use of application software, such as MatLab, for the solution of engineering problems. (0301-345 or equivalent) **Class 3, Credit 3 (W, SU, Ext. day S)**

0301-330

**Seminar in C Programming**

Introduces the C programming language to those who already have learned some other language (Fortran, Pascal). Introduces the standard C variable types, operators, expressions, control structures and standard C input/output. Additional C topics, including pointers and arrays and file input/output, also are presented. The student is introduced to the C preprocessor and to the use of header files. Weekly programming exercises are used to augment classwork. Students are encouraged to work either on the RIT VAX system or on personal computers. **Class 2, Credit 1 (F, W, S, Ext. day W)**

0301-345

**C Programming for Engineers**

Introduction to computer programming using the C programming language on the RIT VAX system and on personal computers. 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 is covered, and programming models include straight line, branching and looping programs. Students are introduced to C data types, variables, operators, expressions and standard C control structures. C functions are studied thoroughly, and the student learns additional C features such as pointers, arrays, structures and unions. A wide variety of computer programming exercises is featured. (0301-365) **Class 4, Credit 4 (F, SU, Ext. day W)**

0301-351

**Circuit Analysis I**

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. (1017-313 and 1016-253 or equivalent) **Class 4, Credit 4 (F, S, SU, Ext. day S)**

0301-352

**Circuit Analysis II**

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. (0301-351) **Class 3, Credit 3 (F, W, Ext. day F)**

0301-362

**Introduction to Electrical Engineering**

Introduction to the basic concepts of electrical circuits, including AC and DC analysis, network theorems and RCL circuits. For non-majors. Design of simple amplifiers, data conversion and an introduction to electromechanical devices are included in the course. **Class 3, Lab 2, Credit 4 (S, SU)**

0301-365

**Introduction to Microcomputers**

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, 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. Includes extensive hands-on exercises. (0301-240) **Class 4, Lab 2, Credit 4 (W, S, Ext. day W)**

0301-380

**Electrical Engineering Lab I**

This laboratory accompanies the lectures of 0301-351 (Circuits I). Introduces the student to the use of the oscilloscope and other common laboratory instruments. Also introduces the student to the use of engineering workstations in the design process for both analog and digital electronic circuits. (0301-240; corequisite: 0301-351). **Credit 1 (F, S, SU, Ext. day S)**

0301-390

**Electrical Engineering Lab II**

This laboratory accompanies the lectures of both 0301-352 (Circuits II) and 0301-441 (Electronics I). It continues 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. (0301-380; corequisite: 0301-441). **Credit 1 (F, W, Ext. day S)**

0301-395

**Electrical Engineering Lab III**

This laboratory accompanies the lectures of both 0301-453 (Linear Systems I) and 0301-442 (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 includes DC operating points, transient response and steady-state frequency response. (0301-390; corequisite: 0301-442). **Credit 1 (S, SU, Ext. day F)**

**0301-441** **Electronics I**  
Introduction to electronics and the basic principles of small signal analysis of circuits with nonlinear components. Covers the use of ideal operational amplifiers in nonlinear 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. 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. (0301-351, 380) **Class 3, Credit 3 (F, W, Ext. day S)**

**0301-442** **Electronics II**  
Continuation of 0301-441. 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. (0301-352, 441) **Class 3, Credit 3 (S, SU, Ext. day F)**

**0301-443** **Linear Systems I (Continuous)**  
Provides the foundations of signal and system analysis, including signal and system description and modeling. Topics 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. (0301-352; 1016-306, 420) **Class 4, Credit 4 (S, SU, Ext. day F)**

**0301-455** **Linear Systems for Microelectronics**  
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. (Cannot be used by EE majors as a substitute for 0301-453.) (1016-306, 0301-352) **Class 4, Credit 4 (S, SU)**

**0301-471** **Electromagnetic Fields I**  
A study of electrostatic and magnetostatic fields and the physical laws that govern their behavior. Analytical techniques are developed that serve as a good foundation for solving electromagnetic problems. Topics discussed include 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. (1016-324) **Class 4, Credit 4 (S, SU, Ext. day S)**

**0301-472** **Electromagnetic Fields II**  
Studies the propagation, reflection and transmission of electromagnetic waves in unbounded regions and in guiding structures, such as two-conductor transmission lines and rectangular waveguides. Topics discussed include 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. (0301-471) **Class 4, Lab 2, Credit 4 (F, W, Ext. day F)**

**0301-513** **Introduction to Automatic Control**  
A first course in the study of linear control systems and their physical behavior, including stability and transient response, 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. (0301-554) **Class 3, Lab 3, Credit 4 (S, SU, Ext. day F)**

**0301-521** **Introduction to Photonics**  
An introduction to the application of 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. (0301-453, 472) **Class 4, Credit 4 (S, SU)**

**0301-531** **Electromechanical Energy Conversion**  
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. (0301-352) **Class 3, Lab 3, Credit 4 (F, W, Ext. day S)**

**0301-534** **Introduction to Communication Systems**  
Provides the basics of the formation, transmission and reception of information over communication channels. Spectral density and correlation descriptions for deterministic and stationary random signals. Amplitude and angle modulation methods (e.g., AM and FM) for continuous signals. Carrier detection and synchronization. Phase-locked loop and its application. Introduction to digital communication. Binary FSK and PSK. Noise effects. Optimum detection: matched filters, maximum-likelihood reception. Computer simulation. (1016-351, 0301-453) **Class 4, Credit 4 (S, SU, Ext. day W)**

**0301-544** **Semiconductor Electronics**  
Teaches 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. Emphasizes the relationships between the physical and structural parameters of these devices and their electrical performance. (0301-442) **Class 4, Credit 4 (F, W, Ext. day W)**

**0301-545** **Digital Electronics**  
Studies the principles of digital electronic circuits with emphasis on MOS (CMOS in particular) and their use in logic circuits. Serves 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 introduces the student to fabrication of integrated circuits, simulation of digital circuits and design of basic logic circuits using workstations and software packages. (0301-240, 441, 442, 544) **Class 3, Lab 3, Credit 4 (S, SU, Ext. day S)**

0301-554

**Linear Systems II (Discrete)**

Topics include continuation of the linear systems concepts from 0301-453, 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. (0301-453) **Class 4, Credit 4 (F, W, Ext. day W)**

0301-590

**Thesis**

A research or development project to be carried out under the general supervision of a faculty member. The project need not be of the state-of-the-art type, but a reasonable problem of theoretical and/or experimental investigation. To be arranged with an individual faculty member. **Credit 4**

0301-599

**Independent Study**

A supervised investigation within an electrical engineering area of student interest. (Permission of instructor) **Class variable, Credit variable**

0301-605

**Robotic Vision**

An introductory course on computer vision with special emphasis on its use in a manufacturing environment. Develops an understanding of how information obtained from images can be used for industrial automation. Topics include image formation and sensing, effects of lighting, image recognition, binary images, geometrical properties, image segmentation, gray-scale image processing, enhancement, edge detection, 3-D structure, motion analysis, industrial applications. In the laboratory portion, students are required to use and experiment with the set of available image processing algorithms. Students are also required to do a project in which image processing techniques are applied to solve practical problems. (0301-554) **Class 3, Lab 3, Credit 4 (S, SU)**

0301-610

**Analog Electronic Design**

Enhances the student's skills in designing analog circuits. Subjects covered include nonideal characteristics of op-amps, of op-amp applications, A/D and D/A conversion, multipliers and modulators, phase-locked loop, frequency synthesis and audio power amplifiers. Students meet in the classroom three hours each week and three hours in the laboratory. The laboratory time is used to discuss and troubleshoot circuits. Students are expected to work on design projects at their own pace outside of class hours. (0301-390, 395, 441, 442) **Class 3, Lab 3, Credit 4**

0301-614

**Design of Digital Control Systems**

Adds to the analytical skills developed in 0301-513 and 0301-554 and applies them to sampled data systems and digital control systems. Stress is on classical design techniques based on the Z-Transform. Root locus, Bode, Bode diagrams and the direct method of design are discussed and examples presented. The student is expected to utilize available computer-aided design packages (ACSL, CONTROL-C, etc.) in both class assignments and in laboratory projects. Each student is required to participate in the design of a digital control system or detailed design of a system component as the laboratory portion of the course. (0301-513, 554) **Class 3, Lab 3, Credit 4 (F, W)**

0301-621

**Microwave Engineering**

Studies the theory and design of microwave components and circuits, beginning with a review of basic EM theory, TEM waves in transmission lines, and TE and TM waves in rectangular waveguides (topics covered in 0301-472). Topics discussed include micro-striplines and striplines; TE and TM waves in cylindrical wave-guides; the scattering matrix description of multiport microwave circuits; 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 illustrates the various microwave component design and microwave measurement techniques using state-of-the-art equipment. Also required is a project on the design of a microwave component. (0301-472) **Class 3, Lab 3, Credit 4 (W)**

0301-622

**Antenna Design**

This design course in antennas studies the fundamental principles of antenna theory and applies them to the analysis and design of antennas. Emphasis is on the design procedures for some practical and popular antenna configurations: e.g., the dipole; thin linear antennas; linear arrays—broadside and end-fire and phased arrays; nonuniform amplitude linear arrays—the binomial array and the Dolph 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 also is exposed to the measurement techniques of antenna characteristics, such as radiation pattern, gain and input impedance, using state-of-the-art equipment. Of primary importance is a project involving the design, construction and testing of an antenna. The project requires a report and a presentation with a demonstration. (0301-472) **Class 3, Lab 3, Credit 4 (S)**

0301-646

**Power Electronics**

The study of a variety of semiconductor devices generally used for purposes other than signal processing, including thyristors, unijunction transistors, opto-couplers, power MOS and IGBTs. Applications stressed are concerned with the use of electrical power for control of lighting, motion and heat. Particular attention is given to switching-mode power supplies and regulators. Replaces 0301-645, Special Semiconductor Devices. (0301-545) **Class 3, Lab 3, Credit 4**

0301-650

**Design of Digital Systems**

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 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. (0301-240, 365) **Class 3, Lab 2, Credit 4 (F, W, S)**

0301-651

**ASIC Design**

A technical elective that introduces students to the fundamental principles of Application Specific I.C. (ASIC) design. Both circuit design and system design are covered. The student also is introduced to CAD tools for schematic capture, placement and routing of standard cells. The projects are designed and simulated using commercial CAD tools and are fabricated by MOSIS. Top-down design using a hardware description language (VHDL) is included. (0301-650) **Class 4, Credit 4 (S)**

0301-665

**Object-Oriented Programming with C++**

An introduction of the C++ programming language to electrical engineering majors, beginning with a discussion of the concepts relevant to object-oriented programming, such as data abstraction, polymorphism and inheritance. An examination of the features in C++ that support the object-oriented programming follows. Some of the enhancements in C++ over C, such as stronger typing, are discussed. Programming projects, with emphasis on the applications in electrical engineering, are required. **Class 4, Credit 4**

0301-665

**Microcomputer-Based Systems Design**

Gives the student detailed knowledge of the hardware and software organization of 8-bit microprocessor systems with an emphasis on design. Memory system design, including dynamic RAMs and DMA control, are studied. Peripheral interfacing, serial and parallel I/O, including interrupts, are considered. Special attention is given to interfacing microcomputers with the analog world, including the use of A/D and D/A converters. Software organization as well as design tools are discussed. Design case studies of typical microcomputer-based systems are examined. (0301-365) **Class 3, Lab 3, Credit 4 (F, SU)**

0301-666

**32-Bit Microcomputer Systems**

Covers both the hardware and software aspects of 32-bit microcomputer systems. The architecture, timing and enhanced instruction sets are discussed. Memory and serial and parallel I/O interfacing techniques, including standard interface chips, are examined. Modular programming concepts and the software tools are introduced. Use of A/D and D/A converters to interface with the analog world is discussed. (0301-365) **Class 3, Lab 3, Credit 4 (W, S)**

0301-670

**Introduction to Microelectronics**

Introduction to the processing techniques and systems used in the fabrication of integrated circuits (primarily silicon). Topics include crystal growth and wafer preparation, crystalline defects, solid state diffusion, thermal oxidation, ion implantation, epitaxy, metallization, plasma fundamentals, sputter deposition and etching, ion milling, plasma etching, reactive ion etching, and overall process design and integration (bipolar, NMOS, CMOS). The students use CAD tools such as ICE (computer-aided integrated circuit layout), SUPREM (process modeling) and SPICE (device and circuit modeling). A prerequisite for 0301-676, I.C. Processing Laboratory, in which students actually process wafers in the clean room and fabricate and test integrated circuits. (0301-544) **Class 4, Credit 4 (SU, F)**

0301-672

**Optical Devices and Systems**

An introductory course in applied optics. Reviews fundamentals of geometrical and physical optics, including lenses, interference, diffraction; introduces devices employed in modern engineering optics, such as lasers, detectors, holograms, acousto-optic and electro-optic devices; and applies 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 includes experiments selected from these topics: lenses and Fourier transform optics, optical heterodyning, holography, electro-optic effect, Gaussian beams, photodetectors. (0301-472 concurrently) **Class 3, Lab 3, Credit 4 (F, W)**

0301-674

**Fiber Optics: Theory and Applications**

Introduction to fiber optics, which begins with a review of communication systems and lightwave fundamentals. The study of dielectric waveguides and optical fibers, light-emitting diodes (LEDs), laser diodes and photodetectors (pin and a.p.d) follows. 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 includes experiments selected from these 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. (0301-472) **Class 3, Lab 3, Credit 4 (S)**

0301-677

**Digital Filters and Signal Processing**

A continuation of the topics studied in 0301-554. 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. Includes several design projects in the digital signal processing laboratory. (0301-554) **Class 4, Credit 4 (F, W)**

0301-679

**Analog Filter Design**

A study of the 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. (0301-453) **Class 4, Credit 4 (W)**

0301-692

**Communication Networks**

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 as well as 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 covers key aspects of the structure of present-day digital communication networks. (0301-534) **Class 4, Credit 4 (S)**

0301-693

**Digital Data Communications**

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. (0301-534) **Class 4, Credit 4 (W, S)**

0301-694

**Information Theory and Coding**

Introduction 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. (1016-351; 0301-453, 534) **Class 4, Credit 4 (S)**

0301-697

**Senior Design Project Part I**

The first half of a two-quarter sequence in electrical engineering design, devoted to the creative portion of the design project and its logistics. Under the guidance of a faculty adviser, teams of three or four students are formed early in the quarter to attack a specific design problem. By the end of the quarter, a written project proposal, along with an oral presentation, must be prepared. The report should include a schedule, a parts list (if appropriate), a budget and the analytical basis of design. An oral design review before the students' peers is required as well as a written status report. **Class 2, Open Lab, Credit 2 (F, W)**

0301-698

**Senior Design Project Part II**

The sequel to 0301-697, Senior Design Project Part I. The prototype in Part I (if the project indeed involved hardware) must be constructed (or implemented) and evaluated. A written and an oral presentation of the prototype's design and its validation by demonstration is given by the design teams. In this second quarter, there are also a few lectures, focusing mainly on professional aspects of engineering, such as intellectual property rights, ethical considerations and entrepreneurship. (0301-697) **Class 2, Open Lab, Credit 2 (S)**

0301-699

**Senior Design Project**

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 advisers are provided. Permission of the faculty adviser is necessary for registration. (Fifth-year standing) **Class 4, Credit 4 (F, W, S)**

## Industrial and Manufacturing Engineering

*The following courses are required, except as noted, of industrial engineering students.*

0303-201

**Introduction to Industrial Engineering**

An introductory course in industrial engineering for first-year students. Describes engineering in an overall sense and industrial engineering in particular. 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 covers 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)**

0303-203

**Freshman Seminar**

Gives the first-year student an overview of engineering and helps integrate the incoming student into the RIT IME community. Topics include the industrial and manufacturing engineering course of study, the cooperative work experience, an overview of RIT facilities and career options in engineering. Also gives the student an opportunity to interact with IME faculty, upper-division students and other first-year IME students. **Credit 1 (F)**

0303-204

**Computer Tools for Increased Productivity**

Builds upon the basic computer competence from the Introduction to Engineering lab experiences. Students continue to learn more about various computer software programs, including word processing, spread sheets, presentation graphics and database programs. **Class 2, Credit 2 (W)**

- 0303-302** **Computing for Industrial Engineers**  
A first course in computer programming for engineers. Involves extensive development of programming skills required in the engineering disciplines. "C" is the current language of choice. **Class 4, Credit 4 (W)**
- 0303-401** **Introduction to Operations Research I**  
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. (1016-331 or permission of instructor) **Class 4, Credit 4 (F)**
- 0303-402** **Introduction to Operations Research II**  
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. (1016-351, 306 or permission of instructor) **Class 4, Credit 4 (F)**
- 0303-415** **Ergonomics**  
Physiological and biomechanical aspects of human performance. The human capacity for physical work and human anthropometry is studied to enable the student to design work places, processes, products and procedures that are consistent with human capabilities and limitations. A systems approach to design is emphasized. Topics include repetitive motion disorders, manual materials handling, hand tool design and selection, as well as current OSHA requirements. (1016-351 or permission of instructor) **Class 3, Lab 2, Credit 4**
- 0303-420** **Work Measurement and Analysis I**  
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, NIOSH Materials Handling guidelines and RMI issues related to work place design, various techniques for generating time standards (time study, MOST, etc.) and design of workstations. **Class 3, Lab 2, Credit 4 (F)**
- 0303-422** **Systems and Facilities Planning**  
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. Introduces computer-aided drafting tools as well as state-of-the-art computer-aided layout design packages. (0303-401 or permission of instructor) **Class 3, Lab 2, Credit 4 (S)**
- 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. Professional elective. (0303-511 or permission of instructor) **Class 4, Credit 4**
- 0303-481** **Management Theory and Practice**  
Development of the fundamental principles of the industrial enterprise. Internal organization as well as general economic conditions are considered. Emphasis is on the role of behavior science. (Permission of instructor) **Class 4, Credit 4 (S)**
- 0303-482** **Production Control I**  
A basic course in production control emphasizing the systems approach. Topics include forecasting, mathematic inventory models, material requirements planning and scheduling, including PERT. Professional elective. (0303-511 and 0303-503, or permission of instructor) **Class 4, Credit 4**
- 0303-483** **Production Control II**  
A design course in production control. Each student is asked to design, test and implement a complete production control system for an operating plant. Professional elective. (0303-482) **Class 4, Credit 4**
- 0303-503** **Simulation**  
A first course in simulation emphasizing the role of the computer in developing simulation models. Simulation language usage is emphasized. (0303-302, 1016-351 or equivalent) **Class 4, Credit 4 (F)**
- 0303-504** **Introduction to Operations Research III**  
Provides 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. Professional elective. (0303-401, 402 or permission of instructor) **Class 4, Credit 4**
- 0303-505** **Simulation Modeling Techniques**  
Increase simulation modeling skills primarily in the areas of network and discrete event simulations. Emphasis is on methods of model construction, design of simulation experiments, model validation and output data analysis. Students utilize these techniques to analyze the performance of production systems. Professional elective. (0303-503, 1016-352 or permission of instructor) **Class 4, Credit 4**
- 0303-510, 511** **Applied Statistics I, II**  
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. (1016-351, 352) **Class 4, Credit 4 (F-510, S-511)**
- 0303-512** **Reliability**  
Deals with concepts and techniques of analysis useful in measuring systems reliability. Topics include probability distributions, component reliability, system reliability and reliability models. Emphasis is on failure data analysis model development. Students utilize the techniques to study reliability, availability and maintainability of systems. Professional elective. (0303-510, 511 or permission of instructor) **Class 4, Credit 4**
- 0303-516** **Human Factors**  
Psychological and cognitive aspects of human performance. The human information processing capabilities are studied to enable students to design work places, procedures, products and processes that are consistent with human capabilities and limitations. A systems approach to design is emphasized. Topics include the human sensory, memory, attention and cognitive processes; display and control design principles; as well as human computer interface issues. (1016-351 or permission of instructor) **Class 3, Lab 2, Credit 4**
- 0303-520** **Engineering Economics**  
Economic analytical techniques that relate to decision making in an engineering design context. Topics include time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting. (1016-351 or permission of instructor) **Class 4, Credit 4 (F)**
- 0303-530** **Engineering Design**  
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 participate in group design exercises. This course serves as a lead-in to 0303-560, Project Design. (Fourth-year status) **Class 4, Credit 4 (S)**
- 0303-540** **Introduction to Operations Research IV**  
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. Professional elective. (Fifth-year I.E. standing or permission of instructor) **Class 4, Credit 4**
- 0303-545** **Mathematical Techniques of Systems Engineering**  
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) Professional elective. **Class 4, Credit 4**
- 0303-550** **Safety Engineering**  
Acquaints students with practical aspects of safety engineering. Students acquire a working knowledge of legal and technical aspects of safety. Topics include OSHA, Consumer Product Safety Commission and the NIOSH Workplace Guidelines. Students also are exposed to research methodology and ways of evaluating safety programs and related research. Reference sources are outlined. Professional elective. **Class 4, Credit 4**
- 0303-560** **Project Design**  
A design course oriented to the solution of on-site industrial engineering problems. Each student group attempts to define, analyze, design and implement a solution to actual ongoing problems in the Rochester community. (0303-530 or permission of instructor) **Class 4, Credit 4 (S)**
- 0303-599** **Independent Study**  
A supervised investigation within an industrial engineering area of student interest. (Permission of instructor) Professional elective. **Class variable, Credit variable**

**0303-625** **Concepts in Manufacturing**  
An introductory course in computer-aided manufacturing. Topics include computer-aided design, group technology, process planning, adaptive control, programmable automation, numerical computer control, robotics and computer-integrated manufacturing. Professional elective. (Permission of instructor) **Class 4, Credit 4**

**0303-630** **Computer-Aided 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 of 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. (0303-503, permission of instructor) **Class 3, Lab 3, Credit 4 (S)**

**0303-690** **Seminar in Computer-Integrated Manufacturing**  
Overview of current technology and management practice and trends related to the evolving factory of the future. A multidisciplinary offering for upper-division undergraduate and graduate students enrolled in any RIT program. Seminar format. Topics of discussion may include quality assurance, robots, CAD, group technology, MRP, flexible manufacturing systems, material handling, systems integration through computer applications and TQM. Professional elective. **Class 3, Credit 3**

## Mechanical Engineering

*The prerequisites are listed in parentheses after each course description. A course that does not specify a prerequisite may be taken by any student matriculated in the BSME program. When fifth-year or upper-level standing is specified as a prerequisite, it means such standing in the BSME program. Fifth-year standing requires completion of at least three co-op blocks and one technical elective.*

**0304-203** **Freshman Seminar**  
Gives the entering first-year student an overview of mechanical engineering and helps integrate the incoming student into the RIT community. Topics 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 gives the student an opportunity to interact with the faculty, upper-division students and other first-year students. **Credit 1 (F, W)**

**0304-211** **Introduction to Graphics**  
This freshman course introduces the student to engineering in general and also develops fundamental skills in engineering graphics communications. 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. Course work conforms to ANSI standards. **Class 2, Lab 2, Credit 3 (F, W)**

**0304-311** **Computer-Aided Design**  
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 is devoted to a project. The student learns to convert functional requirements to production drawing callouts. Includes instruction in isometric sketching of part applications. (0304-211, 343) **Class 2, Lab 2, Credit 3 (W, S)**

**0304-330** **Elements of Statics and Dynamics**  
This basic course for nonmechanical engineering students begins with the static equilibrium of particles and rigid bodies under the action of forces. Topics include forces, couples, equilibrium, trusses and friction. This is followed by the fundamentals of dynamics of particles and rigid bodies. Topics include kinematics and kinetics of particles and rigid bodies, work, energy and momentum. Applications will include rotating machines and gear trains. (1017-311; corequisite: 1016-306) **Class 5, Credit 5 (W, S)**

**0304-331** **Mechanics I**  
For students majoring in 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, torsion and bending. (1017-311, 1016-252) **Class 4, Credit 4 (F)**

**0304-332** **Mechanics II**  
For students majoring in industrial engineering. Topics include dynamics of particles and rigid bodies with an introduction to kinematics and kinetics of particles and rigid bodies, work, energy, impulse momentum and mechanical vibrations. Emphasis is on problem solving. (0304-331) **Class 4, Credit 4 (S)**

**0304-336** **Statics**  
This basic course treats the equilibrium of particles and rigid bodies under the action of forces. It integrates the mathematical subjects of calculus, vector algebra and simultaneous algebraic equations with the physical concepts of equilibrium in two and three dimensions. Topics include concepts of force and moment, trusses, frames, machines, shear force and bending moment diagrams and equations, friction, fluid statics, centroids and moments of inertia. (1016-252; corequisite: 1017-311) **Class 4, Credit 4 (F, S)**

**0304-342** **Problem Solving with Computers**  
Introduces students to VAX/VMS utilities such as a text editor (EVE), Fortran language-sensitive editor (LSE), electronic mail (MAIL), phone (PHONE) and notes conferencing (NOTES). Fundamentals of algorithm development and programming using structured VAX-Fortran are presented. Techniques include extensive use of function and subroutine subprograms with adjustable arrays, IF-THEN-ELSE, Indexed DO and DO-WHILE structures. Students are taught personal computer tools such as a spreadsheet (Excel), symbolic computation system (Mathematica) and word processing (Word). These utilities and tools support the development of students' problem-solving skills. Students are asked to solve open-ended problems for which they need to make reasonable assumptions, apply a variety of heuristics to successfully refine their solutions and learn to validate the solutions they obtain. (Corequisite: 1016-252) **Class 2, Lab 2, Credit 3 (W, S)**

**0304-343** **Materials Processing**  
A study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Processes covered include cutting, molding, casting, forming, powder metallurgy and welding. Students make a project in the lab portion of the course. **Class 3, Lab 2, Credit 4 (F, W)**

**0304-344** **Materials Science**  
The structure and properties of metallic, polymeric, composite and ceramic materials as related to structural imperfections, atom movements and phase changes. Develops a basic understanding of the structure/properties relationship in materials and their behavior in service environments. (1011-273, 277) **Class 3, Lab 2, Credit 4 (W, S)**

**0304-347** **Mechanics of Materials**  
A basic course in the fundamental principles of the mechanics of deformable media, including stress, strain, deflections and the relationships among them. The basic loadings of tension, compression, shear, torsion and bending are also included. Mechanics of Materials Lab (0304-348) is to be taken concurrently with this course. (0304-336; corequisite: 0304-348) **Class 4, Credit 4 (W, S)**

**0304-348** **Mechanics of Materials Laboratory**  
A required laboratory course taken concurrently with 0304-347. 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. (0304-336; corequisite: 0304-347) **Lab 2, Credit 1 (W, S)**

**0304-359** **Dynamics**  
A basic course in the kinematics and kinetics of particles and rigid bodies. Newton's Laws and the theorems of work-energy and impulse-momentum are applied to a variety of particle problems. Systems of particles are employed to transition to the analysis of rigid body problems. Absolute and relative motion are used to investigate the kinematics and kinetics of systems of rigid bodies. Newton's Laws and the theorems of work-energy and impulse-momentum are also applied to a variety of rigid body problems. (0304-336) **Class 5, Credit 5 (F, W)**

**0304-413** **Thermodynamics**  
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. (1016-252, 0304-336, 1017-312) **Class 4, Credit 4 (F, W)**

**0304-415****Fluid Mechanics**

Includes the physical characteristics of a fluid: density, stress, pressure, viscosity, temperature, vapor pressure, compressibility. Descriptions of flows: Lagrangian and Eulerian; stream lines, path lines, streak lines. Classification of flows. Fluid statics: hydrostatic pressure at a point, pressure field in a static fluid, manometry, forces on submerged surfaces, buoyancy, standard and adiabatic atmospheres. Flow fields and fundamental laws: systems and control volumes, Reynolds Transport theorem, integral control volume analysis of basic equations for stationary and moving control volumes. Inviscid Bernoulli and the Engineering Bernoulli equation, some applications. Incompressible flow in pipes; laminar and turbulent flows, separation phenomenon. Dimensional analysis: Buckingham's pi-theorem, similitude, model studies. (0304-413; corequisite: 0304-416) **Class 4, Credit 4 (S, SU)**

**0304-416****Thermal Fluid Science and Energy Lab I**

This laboratory course provides reinforcement for Thermodynamics (0304-413) and Fluid Mechanics (0304-415) through homework assignments and laboratory exercises. There are four homework and four laboratory exercises, including the Rankine cycle steam power plant, vapor compression refrigeration cycle, Reynolds pipe flow and centrifugal pumps. (0304-413; corequisite: 0304-415) **Lab 2, Credit 1 (S, SU)**

**0304-431****Thermal Sciences for Electrical Engineers**

Basic concepts of thermodynamics and heat transfer are applied to electrical/microelectronic engineering systems. In thermodynamics, the conservation of mass and energy equations for closed and open systems are applied to a variety of engineering problems. Topics include properties of pure substances, ideal gas law, processes, cycles and second law of thermodynamics. In heat transfer, three basic modes of heat transfer—conduction, convection and radiation—are introduced using the concept of equivalent thermal resistance. Thermal network solution techniques are employed to analyze practical heat transfer problems encountered in electrical engineering. Correlations for Nusselt number for natural and forced convective heat transfer in different situations are introduced. Cooling of different electrical and microelectronic components is discussed. (1017-312) **Class 4, Credit 4 (TBA)**

**0304-437****Introduction to Machine Design**

The analysis and theory of machine design and applications to systems design problems; particular emphasis on the design and analysis of machine elements. A discussion of engineering professionalism and ethics is also included. (0304-347, 348) **Class 4, Credit 4 (F, W)**

**0304-440****Numerical Methods**

A study of the numerical methods for modeling 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 nonhomogeneous systems of linear algebraic equations, numerical integration and differentiation, and ordinary differential equations. Applications are taken from the student's background in statics, strength of materials, dynamics, mathematics and thermodynamics. Students are expected to write a number of programs. (0304-342 or equivalent computer experience, 1016-318, and third-year standing) **Class 4, Credit 4 (F, W)**

**0304-441****Computer Tools**

Gives students hands-on experience with a microcomputer-based spreadsheet (Excel), a computer algebra system (Mathematica) and VAX/VMS utilities such as the EVE editor, MAIL, NOTES and PHONE. It must be taken concurrently with 0304-440, Numerical Methods, by students who transfer into the mechanical engineering program with transfer credit for 0304-342, Problem Solving with Computers. **Lab 2, Credit 1 (F)**

**0304-460****Introduction to Environmental Engineering**

Provides a broad introduction to the major topic areas of environmental engineering. Topics include an introduction to environmental problems, water resources, air resources, solid waste, hazardous waste and environmental management. (Calculus II, Chemistry I and third-year standing) **Class 4, Credit 4 (S)**

**0304-464** **Design for Manufacture**  
The student learns how to design parts for economical manufacture and how to design assemblies with the optimum number of parts. This project-based course includes lectures on the creative process. The student uses both manual and software techniques to calculate assembly design efficiencies and software techniques to determine part and part tooling costs. (0304-311, 344) **Class 4, Credit 4 (S, SU)**

**0304-514** **Heat Transfer I**  
A basic course in the fundamentals of heat transfer by conduction, convection and radiation, together with applications to typical engineering systems. Topics 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 (0304-413, 415) **Class 4, Credit 4 (F, W)**

**0304-518** **Advanced Computational Techniques**  
This extension of Numerical Methods, 0304-440, covers finite element and finite difference techniques and their applications in mechanical engineering (structural analysis, heat transfer, fluid mechanics). (0304-440) **Class 3, Lab 2, Credit 4 (S, SU)**

**0304-543** **System Dynamics**  
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. (0304-359, 1016-306, 0301-362; corequisite: 0304-545) **Class 4, Credit 4 (F, W)**

**0304-545** **System Dynamics Laboratory**  
This *required* laboratory course gives 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 are of mechanical, electrical and electromechanical composition. The student has opportunities to experimentally test and evaluate systems modeling, analysis and design procedures learned in 0304-543. (Corequisite: 0304-543) **Lab 2, Credit 1 (F, W)**

**0304-550** **Transport Phenomena**  
A second course in fluid mechanics, integrating concepts of heat and mass transfer. Use of the differential form of the fundamental equations of the conservation of mass, momentum and energy is derived and used throughout. Topics include potential flow, viscous internal plane and pipe flows, external boundary layers, and the convective transport of heat and mass. (1016-318, 0304-415; corequisite: 0304-514) **Class 4, Credit 4 (F, W)**

**0304-551** **Thermal Fluid Science and Energy Lab II**  
A companion laboratory course for Transport Phenomena (0304-550), consisting of four experiments and including 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. (0304-545, 550) **Lab 2, Credit 1 (S, SU)**

**0304-560** **Introduction to Aerospace Engineering**  
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. (0304-359, 415) **Class 4, Credit 4 (F or W)**

**0304-599** **Independent Study**  
A student project course encompassing both analytical and experimental work. (Fourth- or fifth-year standing) **Class variable, Credit variable (F, W, S, SU)**

**0304-630** **Senior Design Project I**  
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 develop their proposed 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; see definition prior to 0304-203, p. 205) **Class 4, Credit 4 (F, W)**

**0304-631** **Senior Design Project II**  
The second of the two-course capstone design sequence. The same student teams from Senior Design I return to build and test a *working* prototype of their final design previously developed. 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. (0304-630) **Class 4, Credit 4 (S)**

**0304-673** **Aeromechanics Laboratory**  
A companion laboratory course for 0304-671 and 0304-675 illustrating 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 multicell members. Wind tunnel experiments investigate basic concepts of lift and drag on bluff bodies, wing sections and lifting bodies. Boundary layer characterization is simulated on digital computers and investigated experimentally. Structural analysis and design evaluation also are simulated where appropriate. (0304-560; corequisite: 0304-671, 675) **Lab 2, Credit 1 (S or SU)**

## 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.*

**0304-605** **Applications in Fluid Mechanics**  
Deals with specific design-oriented applications of fluid mechanics. Covers one advanced fluid mechanics topic such as: (a) hydrodynamics, (b) dispersion and diffusion in the environment, (c) two-phase flows, or other topics as determined by need or interest of the faculty and/or students. Students are required to design, and sometimes to build, a prototype. Use of computers is encouraged in the design process. (0304-440, 550) **Class 4, Credit 4 (TBA)**

**0304-610** **Topics in Mechanical Engineering Design**  
In response to student and/or faculty interest, special courses of current interest and/or logical continuation of regular courses are presented. A design project is required. **Class 4, Credit 4 (TBA)**

**0304-615** **Robotics**  
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. (Fifth-year standing) **Class 4, Credit 4 (F, W)**

**0304-618** **Computer-Aided Engineering and Design**  
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: solids modeling, finite elements, dynamic analyses, etc. The student uses 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 are presented. A design project is selected from one or more of the topics covered. (0304-437, 440, 543) **Class 3, Lab 2, Credit 4 (S)**

**0304-620** **Introduction to Optimal Design**  
An introduction to some basic optimization techniques for engineering design synthesis. Topics 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. (0304-437, 440, 543) **Class 4, Credit 4 (F, W)**

**0304-624** **Vehicle Dynamics**  
Deals with the fundamentals of ground vehicle stability and control. The contribution of tire lateral force, stiffness, and aligning torque to vehicle stability is discussed. Bicycle and four-wheel vehicle models are analyzed for neutral, under and oversteer characteristics. The effects of suspension geometry, chassis stiffness and roll stiffness on stability and handling are analyzed. (0304-543, 545) **Class 4, Credit 4 (F or W)**

**0304-635** **Heat Transfer II**  
Consists of the numerical solution of heat transfer problems. One- and two-dimensional steady-state as well as transient conduction cases are analyzed. A detailed study of single-phase forced and natural convective heat transfer is presented. Heat transfer during pool boiling, flow boiling and condensation is studied. Design aspects of heat transfer equipment are introduced. A major design project is undertaken by the students. (0304-440, 514) **Class 4, Credit 4 (S, SU)**

**0304-640** **Internal Combustion Engines and Air Quality**  
An in-depth look at mobile source emissions, their environmental impacts and their control. Topics include impacts of mobile sources, engine types and cycles, the combustion process, fuels, emissions modeling and measurement, exhaust gas analysis and emission control systems. (0304-460, 514 and 1011-213 or equivalent) **Class 4, Credit 4 (F)**

**0304-641** **Stationary Source Emissions and Controls**  
An in-depth look at the major classes of stationary source emissions and the equipment presently utilized to control them. Topics include area and point-source definition and examples, particulates, general control of gases and vapors, oxides of sulfur and nitrogen, ozone and photochemical smog, and an introduction to air toxics. (0304-460, 514, 550 and 1011-273 or equivalent) **Class 4, Credit 4 (W)**

**0304-642** **Air Pollution Dispersion Modeling**  
An introduction to air pollution meteorology and the fundamentals of dispersion modeling. Topics include atmospheric structure and circulation, atmospheric stability, gaussian diffusion and dispersion, gaussian plume models for point and line sources, plume rise calculation, mobile source modeling and an overview of regulatory models. (0304-460, 514, 550; corequisite: 0304-518) **Class 4, Credit 4, (S)**

**0304-652** **Fluid Mechanics of Turbomachinery**  
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. Includes a major design project. (0304-415) **Class 4, Credit 4 (F, W)**

**0304-660** **Refrigeration and Air Conditioning**  
A basic course in the principles and applications of refrigeration and air conditioning involving mechanical vapor compression and absorption refrigeration cycles, associated hardware, psychometrics, heat transmission in buildings and thermodynamic design of air conditioning systems. Students are expected to do a design project. (0304-514) **Class 4, Credit 4 (S, SU)**

**0304-671** **Aerostructures**  
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, multicell beams and columns; wing and fuselage stress analysis; and structural stability. Strain energy concepts and matrix methods are utilized throughout the course. (0304-437, 518) **Class 4, Credit 4 (S or SU)**

**0304-672** **Dynamics of Machinery**  
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 a synthesized mechanism for specific application is kinematically and dynamically analyzed. (0304-543) **Class 4, Credit 4 (S, SU)**

**0304-675** **Aerodynamics**  
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. (0304-560 or 0304-550 with instructor's consent) **Class 4, Credit 4 (S or SU)**

**0304-678** **Propulsion**  
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. (0304-514 and 0304-550 or 0304-560) **Class 4, Credit 4 (F or W)**

**0304-682** **Flight Dynamics**  
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. (0304-560) **Class 4, Credit 4 (F or W)**

**0304-694** **Stress Analysis**  
Extends the student's theoretical, numerical and experimental base of knowledge of stressed mechanical components covered in Mechanics of Materials (0304-347), Mechanics of Materials Lab (0304-348) and Advanced Computational Techniques (0304-518). 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 0304-518 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 0304-348, 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. (0304-437, 440; corequisite: 0304-518) **Class 4, Credit 4 (S, SU)**

**0304-698** **Independent Study Design Project**  
A design-oriented independent study requiring a major design project. (Senior standing) **Credit 4**

**0304-743** **Control Systems**  
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 provides students with significant hands-on analysis and design experience. (0304-543, 545) **Class 3, Lab 2, Credit 4 (S)**

**0304-758** **Engineering Vibrations**  
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-free motion, such as support motion, machinery unbalance and isolation. Modal analysis of multidegree of freedom systems is introduced. In addition to laboratory exercises on vibration instrumentation, an independent design project is assigned. (0304-543, 545) **Class 3, Lab 2, Credit 4 (F, W)**

### Free-Elective Courses

**0304-600** **Topics in Mechanical Engineering**  
In response to student and/or faculty interest, special courses of current interest and/or logical continuation of regular courses are presented. **Class 4, Credit 4 (TBA)**

**0304-637** **Laser Engineering**  
The applications of lasers as engineering tools. Background physics relevant to the operation of a laser and the interaction of light with matter is given. Safety regulations are discussed and specific applications in industry are covered. (1017-313) **Class 4, Credit 4 (S) (TBA)**

**0304-687** **Engineering Economy**  
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 also are presented. (Fifth-year standing) **Class 4, Credit 4 (TBA)**

## Microelectronic Engineering

**0305-201 Introduction to Microelectronics**

An overview of the fabrication and operation of silicon-based integrated circuits including resistors, diodes, transistors and their current-voltage (I-V) characteristics. Laboratory teaches the basics of IC fabrication and I-V measurements. A five-week project provides experience in digital circuit design, schematic capture, simulation, breadboarding, layout design, IC processing and testing. **Class 3, Lab 3, Credit 4 (F)**

**0305-215 Introduction to Microelectronics—Transfer**  
Combines 0305-201 and 0305-350 into one course for third-year transfer students only. **Class 3, Lab 3, Credit 4 (F)**

**0305-221 Introduction to Microlithography**  
An introduction to the fundamentals of microlithography. Topics include IC masking, sensitometry, radiometry, resolution, contact lithography, projection lithography, photoresist materials and processing. Laboratories include mask-making, source characterization, resist characterization and stepper operation. (1011-212) **Class 3, Lab 3, Credit 4 (F, S)**

**0305-350 Integrated Circuit Technology**  
An introduction to the physics, chemistry and materials of integrated circuit fabrication with a focus on the p-n junction. Topics include a mathematical understanding of the p-n junction, as well as the basic process steps of crystal growth, oxidation, photolithography, diffusion, ion implantation, CVD and metallization used to build these junctions. The laboratory uses a 4-level, metal gate PMOS process to fabricate a working IC and provide experience in device design, process design, materials evaluation, in-process characterization and device testing. (0305-201) **Class 3, Lab 3, Credit 4 (S)**

**0305-460 Semiconductor Devices I**  
Introduces the student to the theoretical fundamentals of semiconductor materials and devices. Topics include crystal structures, Bragg reflection and dispersion relation in crystalline solids, electronic motion in crystals, density of electronic states function, statistical physics, carrier statistics in semiconductors, current and continuity equations, recombination-generation of carriers, p-n junction diode and metal-semiconductor contacts. Device design and SPICE models for these devices are investigated. (1017-314; 0305-350, 530) **Class 4, Lab 0, Credit 4 (S, SU)**

**0305-514 Design of Experiments**  
An introduction to experimental design concepts for microelectronic engineering application. Topics include analysis of variance, screening designs, response surface designs and design robustness. Students utilize statistical software packages (RS1) to analyze case studies and design optimal experiments. (1016-314) **Class 4, Lab 0, Credit 4 (F, W)**

**0305-520 VLSI Design for Process Engineers**  
Introduction to the design of CMOS very large scale integrated (VLSI) circuits. Extensive use of Mentor Graphics software in a networked workstation environment, including homework and design project. Topics include logic design and state machines, schematic capture, electrical simulation, geometrical layout, design and electrical rule checking. Standard cell libraries are used for selected assignments with place and route software. The emphasis is placed on a further understanding of the fabrication process by discussion of mask layers, rule checks and circuit simulation. (0301-240, 442; 0305-350, 560) **Class 4, Lab 0, Credit 4 (S, SU)**

**0305-530 Electromagnetic Fields I**  
A study of electrostatics and magnetostatics important to the understanding of the physics of semiconductor devices and microelectronic processing. (1016-328, 1017-313) **Class 4, Lab 0, Credit 4 (F, W)**

**0305-540 Electromagnetic Fields II**  
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. (0305-530) **Class 3, Lab 3, Credit 4 (S, SU)**

**0305-560 Semiconductor Devices II**  
An introduction to the physical mechanisms that govern the operation of bipolar junction transistors, metal-oxide semiconductor (MOS) capacitors, MOS field-effect transistors, and related devices. Special emphasis is given to the relation between the structural parameters of these devices and their electrical characteristics. Device design and SPICE models for these devices are investigated. (0305-460) **Class 4, Lab 0, Credit 4 (F, W)**

**0305-563 Microlithography I**  
Covers the chemical aspects of microlithography and resist processes. The chemistry of positive (novalac-based) and negative (crosslinking) resist systems are studied, along with processing technologies and methods of process optimization. Concentration is on single-layer resist materials and processing for optical lithography. Material characterization is studied through experimental design techniques. (0305-221, 350, 514) **Class 3, Lab 0, Credit 3, (S, SU)**

**0305-573 Microlithography I Laboratory**  
Laboratory to be taken concurrently with 0305-563. Topics emphasize optical lithography and single-layer resist materials. Material characterization is studied through experimental design techniques. (0305-221, 530, 514) **Class 0, Lab 3, Credit 1 (S, SU)**

**0305-599 Independent Study**  
A supervised investigation within a microelectronic area of student interest. (Permission of instructor) **Class variable, Credit variable**

**0305-632 Microelectronic Engineering**  
An intermediate course in the study of integrated circuit processing. Topics include atomic models for diffusion, oxidation and ion implantation. Process integration for bipolar and MOS device fabrication is studied in detail. Students learn how to design processes to realize a variety of device structures and properties. Extensive use of CAE tools such as SUPREM. (0305-350, 560, 563, 573; 0301-442) **Class 3, Lab 3, Credit 4 (F, W)**

**0305-643 Thin Film Processes**  
A selection of topics related to thin film materials and processes that are important to the manufacture of integrated circuits, including chemical vapor deposition, plasma etching, physical vapor deposition (sputtering) and rapid thermal processing. Students design processes and model them using SUPREM and DEPICT. Students participate in the design of experiments to characterize thin films and processes utilizing techniques such as emission spectroscopy, EDAX, ellipsometry, mass spectroscopy and interferometry. (0305-350, 514) **Class 3, Lab 3, Credit 4 (S, SU)**

**0305-645 Microelectronics Manufacturing**  
A microelectronics manufacturing course. Topics include computer-integrated manufacturing (MESA), scheduling, database query, statistical process control, costing, inventory control and other manufacturing topics. Students design manufacturing processes and compare simulations with real factory operation. Advanced processes for CMOS microelectronic devices, isolation techniques, contact metallization schemes, LDD structures. Structural and process flow design of submicron CMOS. Design of test structures. (0305-560, 643) **Class 3, Lab 3, Credit 4 (F, W)**

**0305-650 Integrated Circuit Processing Lab**  
A laboratory course in which students complete the design, electrical simulation, process simulation, fabrication and testing of an integrated circuit. Topics include laboratory safety, design, maskmaking, stepper job design, process design, capacitance-voltage measurements, and MOS and BJT device fabrication. (0305-632) **Class 2, Lab 6, Credit 4 (F, W)**

**0305-660 Seminar/Research**  
A capstone design experience for microelectronic engineering seniors. Students propose a 10-week project, design the experiments and timetable, and carry it through to completion. Technical presentations of the results, including a talk and poster, are required at the annual department conference in May. A written paper following IEEE format for conference papers is required. (0305-650) **Class 2, Lab 6, Credit 4 (S)**

**0305-665 Microlithography II**  
Covers advanced resist systems for optical lithography, including antireflective coatings, bilayer resists, trilayer resists and silylation. Electron beam lithography, x-ray lithography and deep-UV lithography also are covered. Technologies are studied from both chemical and physical standpoints. Process characterization is studied through experimental design techniques. (0305-563, 573) **Class 3, Lab 0, Credit 3 (F, W)**

**0305-670** **Advanced Microlithography**  
An advanced course covering the physical aspects of optical lithography. Image formation in projection and proximity systems are studied. Makes use of optical concepts as applied to lithographic systems. Fresnel diffraction, Fraunhofer diffraction and Fourier optics are utilized to understand diffraction-limited imaging processes and optimization. Topics include illumination, lens parameters, image assessment, resolution, phase-masking and resist interactions. Lithographic systems are designed and optimized through use of modeling and simulation packages. (0301-455; 0305-665, 675; 2051-525) **Class 3, Lab 3, Credit 4 (S)**

**0305-675** **Microlithography II Laboratory**  
Laboratory to be taken concurrently with 0305-665. Topics emphasize multiple layer processes, including antireflective coatings, contrast enhancement, deep-UV bi-layer and silicon resist processes. Process characterization is studied through experimental design techniques. (0305-563, 573) **Class 0, Lab 3, Credit 1 (F, W)**

## Software Engineering

**3010-101** **Software Engineering Seminar**  
Provides first-year students with the skills necessary to succeed at RIT and in the software engineering program. Small group sessions are used to help new students make friends, create a stronger bond with RIT and their program and become acquainted with the campus and its facilities. Activities focus on communication and small-group skills useful throughout students' academic careers. In addition, students are introduced to ethical issues they will face in both academic and professional engineering. **Class 1, Credit 1**

**3010-362** **Engineering of Software Subsystems**  
Continuation of 0603-361, with a more in-depth treatment of design and redesign, resource estimation and testing of non-trivial software subsystems. Topics include personal process improvement (with an emphasis on professional team-building strategies); common subsystem design patterns; maintenance; testing techniques. Students engage in active participation in the software process through a term-long team-based project. (0603-361) **Class 3, Lab 2, Credit 4**

**3010-420** **Formal Methods for Specification and Design**  
Introduction to the use of mathematical models of sequential software systems and the refinement of these models to designs and implementations. Topics include finite state machine models and regular expressions; state machine and regular expression equivalence; language syntax and semantics; formal specification, design, implementation and verification. (0603-266, 3010-362) **Class 4, Credit 4**

**3010-440** **Principles of Software Architecture and Design**  
Examination of the fundamental building blocks and patterns for construction of software systems. Examines the fundamental elements of software systems in the context of a sound design process, forming the foundation for subsequent courses in the principles of concurrent, distributed and information systems. All courses are structured around exploration of design, patterns of construction, case studies and standards. Topics include structuring computation, patterns of design, graphical user interfaces, documenting design and functional design. Class lectures are reinforced by laboratory exercises and projects. (3010-362) **Class 3, Lab 2, Credit 4**

**3010-441** **Principles of Concurrent Software Systems**  
Issues and structures common in the construction of concurrent software systems. Emphasis is on fundamentals repeated in the design and development of closely coupled systems. Topics include the basics of concurrent hardware architectures, synchronization and coordination techniques and common models of software systems. Other issues include scheduling, reliability and problem decompositions. (3010-440) **Class 3, Lab 2, Credit 4**

**3010-442** **Principles of Distributed Software Systems**  
Issues and structures common in the construction of distributed software systems. Emphasis is on fundamentals repeated in most systems of this type. Topics include the basics of data communication and networking, as well as higher-level issues encountered in the design of distributed systems. (3010-440) **Class 3, Lab 2, Credit 4**

**3010-443** **Principles of Information Systems Design**  
Issues and structures common in the construction of information systems. Emphasis is on fundamentals repeated in most systems of this type. Topics include historical review of methods of organizing and accessing information, high-level modeling techniques, performance and security concerns, implications of storing new data types (e.g., sound, pictures) and new dimensions (e.g., time) on information systems architectures. Emphasizes support information systems provided for specific software engineering activities. Team projects are required. (3010-440) **Class 3, Lab 2, Credit 4**

**3010-450** **Software Process and Product Metrics**  
Software metrics help a software organization on two main fronts: quality assessment of its process and products and assessment of its progress toward its main goal—the production of software artifacts. Students are exposed to metrics used in industry to control large software processes. Topics include product and process metrics, personal metrics portfolio, metrics attributes, and resource and time estimation metrics. (3010-440) **Class 4, Credit 4**

**3010-452** **Software Verification and Validation**  
Introduction to a set of principles and techniques that represent the foundation for improving software products. Topics include verification and validation, unit level testing, system level testing, software quality assurance, and software reliability. Team projects are emphasized. (3010-440) **Class 4, Credit 4**

**3010-455** **Software Requirements and Specification**  
In-depth coverage of the early phases of the software development life cycle commonly called software requirements analysis and specification. Topics include requirements elicitation and definition, requirements prototyping, functional and nonfunctional requirements specification, and legacy systems. Team projects are emphasized. (3010-420, 3010-440) **Class 4, Credit 4**

**3010-456** **Software Engineering Process**  
Introduction to software engineering process and related project management issues. Topics include software maturity framework, software process assessment, software process and the software life cycle, issues in software project management and control, and measurements related to the software process. (3010-440) **Class 4, Credit 4**

**3010-561** **Software Engineering Project I**  
The first course in a two-course, senior-level, capstone project experience. Students work as part of a team to develop solutions to problems posed by either internal or external customers. Problems may require considerable software development or evolution and maintenance of existing software products. Culminates with the completion and presentation of the first major increment of the project solution. Class time is divided among lectures on contemporary issues in software engineering, guest lectures by industry practitioners and time devoted to team-based activities. (Senior-level standing in software engineering) **Class 4, Credit 4**

**3010-562** **Software Engineering Project II**  
The second course in a two-course, senior-level, capstone project experience. Students submit one or more additional increments that build upon the solution submitted at the end of the first course. Students make major presentations for both customers as well as technical-oriented audiences, turn over a complete portfolio of project-related artifacts and offer an evaluation of the project and team experience. (3010-561) **Class 4, Credit 4**

## College of Imaging Arts and Sciences

### Interdisciplinary Imaging Arts

2001-555

#### **E.s.p.r.i.t Production**

Students produce a special-interest publication(s), *E.s.p.r.i.t.*, via print and/or electronic methods. They are required to design and build the publication(s) by working beyond normally scheduled class hours. Lectures and hands-on activities enable each student to discover the applications of electronic imaging; interactive publishing; electronic publishing (CD-ROM or Internet); desktop publishing via print, page and screen design; as well as the procedures necessary to provide quality results. Lecturers include faculty from the schools of Photographic Arts and Sciences, Printing Management and Sciences, Art and Design, School for American Crafts and other Institute disciplines as deemed appropriate. (Matriculated senior or graduate-level status and instructor's approval based on student's experience and production team's needs) **Class 4, Credit 4**

### School of Art and Design

#### Graphic Design

2010-301

#### **Introduction to Graphic Design**

Sequential course in graphic design includes one full day and one half day of the core experience. *Full day:* Introduction to graphic design and visual communications through formal and perceptual understanding. Includes visual aesthetics, form, structure, concept development, semiotics, Gestalt principles, visual organizational systems, technology and media, and the working relationship between perceptual design principles and communication concepts. Relationships of typography, computer graphics, production and other fields are included. *Half day:* Introduction to computer graphic design methods. Students learn the technical aspects of vector drawing, raster graphics, image manipulation and page layout software. Elements of typography and production are stressed. (Foundation program or equivalent required) Prerequisite for major in graphic design. **Lab 9, Credit 4**

2010-302

#### **Introduction to Typography**

Focuses on the use of typography

2010-303

#### **Introduction to Type and Image**

Emphasizes the integration of type and image

**Prerequisite for 400-level graphic design: sophomore graphic design core or its equivalent, or by permission of the instructor**

2010-401

#### **Typography in Graphic Design (junior major, fall)**

Explores visual typography, in both its theoretical and practical aspects. Assignments are geared to applying and exploring the possibilities inherent in the theoretical principles introduced; they allow the student to focus on meaning, aesthetics and functionality in typographic design. **Lab 6, Credit 3**

2010-402

#### **Imagery in Graphic Design (junior major, fall)**

Creative problem-solving experiences focus on the selection, generation and use of imagery in graphic design. The relationship of typography to imagery, layout and the use of color is also stressed. Concept development is emphasized as an aspect of visual communication. **Lab 6, Credit 3**

2010-403

#### **Symbols in Graphic Design (junior major, winter)**

Provides students with opportunities to think about and develop designs to express the essence of a company, product or service through elements such as pictographs, logos and logotypes applicable to a range of communication tools. **Lab 6, Credit 3**

2010-404

#### **Graphic Design for Publications (junior major, winter)**

Creative problem-solving experiences focus on publication design, with applications ranging from magazine layouts to booklet design. Technical considerations such as copyfitting and type specification are covered as well as organizational structures such as grids, formatting and sequential design. Concept development, design aesthetics and the interaction between type and image are stressed. **Lab 6, Credit 3**

2010-405

#### **Information Design (junior major, spring)**

Provides students opportunities for developing approaches to factual information to be presented in schematic or tabular forms; i.e., charts, maps, tables, diagrams. Emphasis is on arriving at fresh, persuasive solutions and on the selection of typographic and graphic elements appropriate to the context in which they are to be presented. (2010-401, 402, 403, 404) **Lab 6, Credit 3**

2010-406

#### **Packaging and Environmental Graphics (junior major, spring)**

Creative problem-solving experiences focus on the graphic design aspects of packaging, signage and architectural graphics. In addition to three-dimensional considerations, the projects offer opportunities for interaction with the environment. Innovation in choice of materials as well as in concept and design is encouraged. Effective use of both typography and imagery is expected. **Lab 6, Credit 3**

2010-411, 412, 413

#### **Graphic Design Elective**

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 desktop publishing, design of self-promotional materials, typographic forms). **Lab 6, Credit 3, (offered every quarter)**

**Prerequisite for 500-level graphic design: senior standing in graphic design or its equivalent, or by permission of the instructor**

2010-501

#### **Career Skills and Professional Practices (senior major)**

The course is divided into two segments. The first half focuses on résumé development, cover letters and interviewing practices. The emphasis is on using present level of experience to enter the job market. The second half of the course focuses on beginning a private design practice. This includes the types of legal forms of business, setting up the practice, client contact and sales, client briefings, books and records, professional consultants, working with suppliers, establishing credit. **Lab 6, Credit 3**

2010-502

#### **Corporate Design (senior major)**

This course is based on solving one problem that has many components—the development of a visual identity program for a Fortune 500 company. The project consists of analysis of the company, goals statement for the program, design of a mark, signature, colors, letterhead, envelope, business cards and the design standards manual with explanatory copy. **Lab 6, Credit 3**

2010-504

#### **Graphic Systems (senior major)**

To investigate and apply principles, concepts and creativity to graphic systems. Research, concept development, process, application and presentation are emphasized. Teamwork and individual work are integrated into the projects. All students must meet the project and evaluation requirements in order to complete the course. **Lab 6, Credit 3**

2010-505

#### **Advertising Design (senior major)**

Advanced creative problem-solving experiences relating to advertising design and developing a selling tool. Course content and projects include advertising assignments, ethics, research methodology and production. Concept development and the use of imagery in advertising are stressed. **Lab 6, Credit 3**

2010-506

#### **Concept and Symbolism (senior major)**

Advanced creative problem-solving experiences emphasizing getting your point across visually. Two projects are involved. The first is a pair of book jackets that must be done from two different points of view—one positive and one negative. The concepts must be developed, and symbolism used to convey the two different and specific messages. The second project is a promotional piece for a paper company intended for designers and art directors who specify paper. The concepts and symbolism used must be very innovative and “design” conscious, yet must emphasize specific characteristics and qualities of paper. **Lab 6, Credit 3**

2010-507

#### **Design Marketing Relationships (senior major)**

This course deals with the relationship between marketing and graphic design. It is not a marketing course to teach professional marketing skills and practices but is directed at teaching the graphic designer basic skills and terminology. The goal is to bring into play marketing concepts with design practice, focusing on short- and long-term marketing and design projects. When possible, specific firms are contacted and engaged as client/consultants. **Lab 6, Credit 3**

2010-508

#### **Photography in Graphic Design (senior major)**

Advanced creative problem-solving experiences that emphasize learning and exercising skills in the design of projects using typography with photography. The relationship between type and photo is examined in order to strengthen control over the communication through design. **Lab 6, Credit 3**

2010-509

#### **Design Specifications (senior major)**

Advanced creative problem-solving experiences that deal with the development of design concepts to meet budget specifications and with the working relationships with printers, paper reps, illustrators, photographers, etc. **Lab 6, Credit 3**

**2010-510** **Design Applications (senior major)**  
Advanced creative problem-solving experiences that focus on preparations for the design job market. Projects could include work with local clients, a self-promotional booklet (designed and printed), résumé revision, portfolio development and practice interviews. Interaction, discussion and student presentations are also part of this course. **Lab 6, Credit 3**

**2010-511** **Advanced Information Design (senior major)**  
Advanced creative problem-solving experiences that investigate how to communicate simple and complex amounts of information. The student learns to analyze data and other forms of information before transforming it into useful visual form. He or she may develop charts, graphs, time lines, maps or technical drawings to impart this information. **Lab 6, Credit 3 (offered on sufficient demand)**

**2010-512** **Interactive Media Design (senior major)**  
New opportunities are available to graphic designers that did not exist just a few years ago. Students are introduced to the ideas, concepts, uses and general principles of interactive media on the computer. Several forms of logic and how they can be used in this design process are explored. Included are several projects to develop the students' understanding of software, logic and aesthetic considerations in this field. Students are expected to complete assigned readings and projects. **Lab 6, Credit 3**

**2010-513** **Senior Project (senior major, spring)**  
Advanced creative problem-solving experiences relating to visual communication imagery in the form of a self-designed project. This is based on a strong emphasis of formal design values and their utilization for the communication of ideas and information. The project is reviewed by the faculty mentor, and modifications may be made based on consultation with the student. The project may be thought of as a senior thesis project. **Lab 6, Credit 3**

**2010-514** **Editorial Design for Graphic Designers**  
Explores the role of the graphic designer in developing appropriate and communicative editorial design. Students interpret and develop concepts for the author's text and point of view for each assigned editorial article. Content includes the relationship and use of typography, imagery and layout for editorial impact. Students work with the Editorial Photo class on assigned projects to experience the working relationship between the photographer and the designer, particularly in regard to editorial design. (graphic design senior or permission of instructor) **Class 6, Credit 3**

**2010-518** **Public and Social Service Design**  
Gives the graphic design senior professional experience developing and creating visual communications for nonprofit organizations. Through various community service agencies and in cooperation with the United Way Internship Program, students create design projects requiring skill and the ability to develop concepts through production, with emphasis on message content in relation to its audience. With guidance from the instructor, and by closely working with the organizations, students understand and experience client-designer relationships, budget limitations, and time and project management. (graphic design senior or permission of instructor) **Class 6, Credit 3**

**2010-552** **Public and Social Service Design (senior major)**  
Explores the role of the designer within the community including working for nonprofit organizations and institutes and pro-bono work. Nonprofit organizations that are in need of design services are invited to work with student designers to solve their communication design problems. Students thus have the opportunity to work with a real client on a real job.

**2010-552** **Illustration for Designers**  
Working with traditional drawing materials and paints, as well as the digital (electronic) palette, students focus on the design uses of illustration through structured practical applications of concept and execution. Historical examples augment in-class demonstrations and handling of materials for illustrative impact. Word and image relationships are explored in depth. Projects completed in this course should add an important aspect to the designer's portfolio. **Credit 1**

**2010-552** **Editorial Design for Graphic Designers (senior major)**  
Explores the role of the graphic designer in developing appropriate and communicative editorial design. Interpretation of the author's text and point of view are of great importance, as is the development of concept. Content of the course includes the relationship and use of typography, imagery and layout for editorial impact. When possible, this class works with the senior editorial photo class on assigned projects in order to better understand and experience the working relationship between the photographer and the designer, particularly in regard to editorial design. **Lab 6, Credit 3**

## Foundation

**2013-205, 206, 207** **Creative Sources**  
Encourages students to become aware of themselves, their experiences and their environment as tools for creative problem solving. This is accomplished through lectures, individual and group assignments, demonstrations and guest speakers. **Class 1, Lab 1, Credit 2**

**2013-211, 212, 213** **Drawing**  
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. **Lab 9, Credit 4 (offered each year for majors in the School of Art and Design)**

**2013-231, 232, 233** **2-D Design**  
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**

**2013-241, 242, 243** **3-D Design**  
The elements of design and their structural relationship as applied to problems in three dimensions. A variety of media are used. Lab fee required. **Lab 6, Credit 3**

**2013-261, 262, 263** **Drawing Crafts**  
Drawing in a 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 for majors in the School for American Crafts)**

## Interior Design

**Prerequisite for 300-level courses:  
foundation program or equivalent required**

**2015-305** **Architectural Drafting (sophomore major)**  
An introduction to interior design through architectural drafting. **Lab 6, Credit 3**

**2015-306** **Interior Perspective Rendering (sophomore major)**  
An introduction to residential interior design and perspective rendering. **Lab 6, Credit 3**

**2015-307** **Introduction to Interior Design (sophomore major)**  
An introduction to interior design with emphasis on basic process, spatial relationships, design conceptualization and development. **Lab 6, Credit 3**

## 214 Imaging Arts and Sciences

### 2015-308 Computer-Aided Design Applications (sophomore major)

An introduction to the use of the computer as a tool in the interior design process. Use of the computer is required. **Lab 3, Credit 1**

### 2015-309 Interior Design Model Building (sophomore major)

An introduction to interior design conceptually through model making. **Lab 3, Credit 1**

### 2015-310 Human Dimension Applications (sophomore major)

Introductory applications of human dimension related to interior space and its design. **Lab 3, Credit 1**

**Prerequisite for 400-level interior design: sophomore interior design core or its equivalent, or by permission of the instructor**

### 2015-404 Hospitality Design (junior major)

The applications of design methods and skills to the design of interior space for hospitality use. **Lab 6, Credit 3**

### 2015-405 Applications of Color and Light (junior major)

Introduction to color and light for spacial development. **Lab 6, Credit 3**

### 2015-406 Retail Design (junior major)

Introduction to designing interior space for retail use. **Lab 6, Credit 3**

### 2015-407 Materials and Processes for Interior Design (junior major)

Introduction of materials and processes for interior design. **Lab 6, Credit 3**

### 2015-408 Office Design and Planning (junior major)

Introduction to interior design and planning for office use. **Lab 6, Credit 3**

### 2015-409 Interior Specifications (junior major)

Introduction to specifications with emphasis on planning, construction documents, textiles, finishes, testing standards and liability. **Lab 6, Credit 3**

### 2015-411, 412, 413 Interior Design Elective

An elective offering basic instruction and involvement in design application projects. Each quarter concentrates on a specific topic of design study.

411—Environmental

412—Interior

413—Environmental

**Lab 6, Credit 3**

**Prerequisite for 500-level interior design: junior interior design major courses or their equivalent, or by permission of the instructor**

### 2015-504 Multipurpose, Multistorage Design (senior major)

The application of design methods and skills to professional-level projects in interior design. **Lab 6, Credit 3**

### 2015-505 Codes and Regulations (senior major)

Application projects concerned with building codes, regulations, fire safety, public safety and health, barrier-free design and Americans with Disabilities Act. **Lab 6, Credit 3**

### 2015-506 Environmental Control Applications (senior major)

Application projects involving plumbing, heating, ventilation, electrical, vertical transportation and acoustic concerns. **Lab 6, Credit 3**

### 2015-507 Health Care Design (senior major)

An introduction to designing interior space for health care use. The application of design methods and skills to professional-level projects focusing on health care facilities. **Lab 6, Credit 3**

### 2015-508 Interior Design Business Practices (senior major)

An introduction to professional practices with emphasis on business formation, design marketing, legal and ethical responsibilities. **Lab 6, Credit 3**

### 2015-509 Career Planning (senior major)

Development of a résumé, portfolio and job search techniques with a focus on career planning. **Lab 6, Credit 3**

### 2015-510 Working Drawings (senior major)

Professional-level interior design projects with an emphasis on the construction sequence and construction documentation. **Lab 6, Credit 3**

### 2015-511 Special Projects (senior major)

Special projects in interior design emphasizing communication skills, theory and methods for the professional. **Lab 6, Credit 3**

### 2015-512 20th Century Interior Design (senior major)

Application of theoretical base to current design problems, issues, philosophy and evolution of interior design in the 20th century. **Lab 6, Credit 3**

## Illustration

**Prerequisite for all 300-level illustration courses: foundation program or equivalent required**

### 2019-304 Anatomical Figure Drawing (sophomore major)

Helps students correlate underlying osseous and muscular anatomy with surface form and structure. Instruction also emphasizes gesture, proportion and balance. Course work requires students to use their figure drawing skills while solving illustration assignments. **Lab 6, Credit 3**

### 2019-305 Desktop Illustration I (sophomore major)

Emphasis on layout and spacial relationships between typographic and illustrative elements. Course work provides exposure to computer concepts needed as the basis for future explorations. **Lab 3, Credit 1**

### 2019-306 Heads, Hands, Facial Expression (sophomore major)

Models and photographic references are used to help students learn the structure, proportion and forms of the head, face and hands. Building on their understanding of these structures, students apply their observational skills to manipulate gesture and posture to create expression and character. Course work introduces a variety of line illustration techniques. **Lab 6, Credit 3**

### 2019-307 Reference Photography (sophomore major)

Students use the 35mm camera as a tool for recording light, texture, value and form. Course work includes photographic design and composition, camera operation, lighting conditions, processing and developing. The primary goal is to introduce the use of the camera as a visual source of information for the illustrator. **Lab 3, Credit 1**

### 2019-308 The Figure and the Environment (sophomore major)

Students use knowledge and skills gained from the preceding figure, design and photographic courses to create illustrations describing figures engaged in various activities in various environments. Research projects may include people at leisure or engaged in sports, manual labor tasks and everyday activities. Media exploration concentrates on color and mixed media techniques. **Lab 6, Credit 3**

### 2019-309 Desktop Illustration II (sophomore major)

Continued development of the skills begun in Desktop Illustration I by introducing advanced paint and layout applications. Instruction nurtures further development and exploration of spacial relationships among illustrative, graphic and typographic elements as solutions to communication problems. **Lab 3, Credit 1**

**Prerequisite for 400-level illustration courses: sophomore illustration core or its equivalent, or by permission of the instructor**

### 2019-405 The Figure in Advertising Illustration (junior major)

An in-depth introduction to the field of advertising illustration. Emphasis on drawing and painting the figure in a variety of situations and formats common in contemporary advertising. All problems are designed to develop an understanding of the use of visual images for communication in this specialty area. The importance of referencing, deadlines and business concerns for the freelancer are a few of the topics covered in this course. **Class 6, Credit 3**

### 2019-406 The Graphic Elements of Illustration (junior major)

Exploration using illustration with typography in a coherent design that pays special attention to composition and work with graphic media most often employed by the illustrator. Students also will work with black and white media and effective use of the silhouette to convey information. Techniques include work with marker and airbrush for layout and design, as well as other materials. **Class 6, Credit 3**

### 2019-407 Illustration Source: Creating the Scene (junior major)

Focuses on exploring the different ways in which illustrators utilize reference (photos/life drawing). Students learn to create their own photo reference, learn resourceful ways to find good reference and learn how to combine existing reference with their own to achieve the best possible results. Imaging environments and situations are created by piecing together many different sources. **Class 6, Credit 3**

**2019-408 Publishing Your Illustrations (junior major)**  
Focuses on the use of illustration in the book publishing field, starting with the children's book and the history of illustration in children's educational materials. Discusses methods of production that affect the preparation of illustrations, the use of color separations and the organization of text and picture. Looks at special areas, including the illustrated novel and the pop-up book. All aspects of publishing and the techniques used in the field are our subject. **Class 6, Credit 3**

**2019-409 Symbolism in Editorial Illustration (junior major)**  
An in-depth introduction to the field of editorial illustration. Emphasis is placed on brainstorming and concepts. Cultural images and symbols are examined and utilized to express ideas. Students are encouraged to expand in a personal direction while effectively communicating specific information from a given article or story. Efficient and effective time and energy priorities are established. **Class 6, Credit 3**

**2019-410 The Illustrator and the Editorial Statement (junior major)**  
The illustrator works from texts and develops concepts and statements in visual form. Often these can take the form of a narrative or a visual comment, as in a political cartoon. During class, we investigate the history of editorial art, looking at examples in class, and experiment with our quest for the completion of an artistic vision that embodies a topical subject. **Class 6, Credit 3**

**Prerequisite for 500-level illustration courses: junior illustration major courses or their equivalent, or by permission of the instructor**

**2019-501 The Illustrator as Journalist (senior major)**  
Illustration problems that require the student to visually report and record a specific happening or event. These projects are of longer duration and consist of several major paintings, many drawings, sketches, notes and photo references. This journalistic approach to illustration demands that the student attend the event and select those images that best communicate the atmosphere of the event. Students are encouraged to sharpen their observations in order to clarify or embellish what might be commonplace to the nonvisual observer. **Lab 6, Credit 3**

**2019-505 A Contemporary History of Illustration (senior major)**  
Students are introduced to a sequence of historical events that have had the most lasting effect on 20th century illustration. These events affect the look of illustration and provide a place to begin discussion. The effects on Surrealism, on the one hand, the Social Realism, on the other, represent a swing of the pendulum of narrative and representational art. Studio work incorporates ideas embodied in these and other contemporary art trends. Lectures and illustrated talks compare contemporary art and illustration history. **Class 6, Credit 3**

**2019-506 Computer Techniques for Illustration (senior major)**  
Focuses on the computer as the primary tool in developing illustrations for specific assignments. Adobe Illustrator, Adobe Photoshop and Design Studio are used to illustrate specific assignments. The emphasis is on a creative investigation of the computer and software as tools in the development of illustrative concepts. **Class 6, Credit 3**

**2019-507 Illustration for Books (senior major)**  
Explores the basic principles in developing illustrations for books. Composition, conceptualization and storyboard development are covered, as well as finishing art preparation. Emphasis not only on creativity of expression, but also on conceptual and technical experimentation. Work is geared toward books for a variety of age groups and functions. **Class 6, Credit 3**

**2019-508 Illustration as a Promotional Tool (senior major)**  
Takes an in-depth look at using illustration for advertising and promotional campaigns. Also looks at the business of marketing oneself as an illustrator. Students develop examples of illustration as advertising and view examples by masters in this field. Lectures focus on the Pricing and Ethical Guidelines published by the Graphic Artists Guild as a text to discuss contracts and career building. **Class 6, Credit 3**

**2019-509 Computer Illustration (senior major)**  
Looks at the ability of the illustrator to take a subject and exploit image-processing techniques to generate many variations expediently. The student uses sketches and photo reference for research and provides a longer sequence of illustrations dealing with a specific subject. The emphasis is on attitude and creative thinking in developing portfolio pieces that show a personal interest. **Class 6, Credit 3**

**2019-510 Personal Focus in Illustration (senior major)**  
A series of illustration projects in which students are encouraged to investigate topical subjects of their choice. Each student's own creativity, self-expression and visual communication skills are stressed. Emphasis is on clarity of concepts and developmental procedures necessary to work as an illustrator. **Class 6, Credit 3**

**2019-511 Alternative Materials and Media (senior major)**  
Looks at the use of alternative techniques for the illustrator, including dimensional materials and electronic programs. Also looks at specialized areas of illustration, which may include an in-depth look at scientific topics as a subject for illustration. Specialized markets and electronic and digital image making round out the applications studies in this section of Senior Illustration. **Class 6, Credit 3**

**2019-512 Contemporary Computer Issues (senior major)**  
Students use the computer to develop portfolio pieces that investigate topical subjects that look clearly at issues of the day, including political, cultural, economic and technical issues. In addition, students lay out their résumés during this quarter. **Class 6, Credit 3**

### Medical Illustration

**Prerequisite for 400-level medical illustration courses: sophomore illustration core or its equivalent, or by permission of the instructor**

**2020-401 Medical Illustration Applications (junior major)**  
An in-depth study of carbon dust, charcoal and pastel techniques developed for medical illustration. Concentration is on detailed illustrations of human anatomy as a preparation for future courses in anatomical and surgical illustration. **Lab 6, Credit 3**

**2020-406 Anatomic Drawing I (junior major)**  
Students are assigned projects to reinforce their knowledge of anatomy while collaborating on dissection and illustration from the cadaver. Problems include oncology from cross sections and x-rays in preparation for surgical and medical/legal art. Mixed media is encouraged. **Lab 6, Credit 3**

**2020-407 Anatomic Illustration: Wet Media (junior major)**  
Development of range and mastery of medical wet media illustration techniques. Course work emphasizes transition of anatomical drawing done from dissected cadavers into "instructional anatomical illustrations" designed to be published using halftone and four-color reproduction techniques. **Lab 6, Credit 3**

**2020-408 Computer Applications in Anatomic Illustration (junior major)**  
Advanced application of computer hardware and software to create illustrations in support of anatomical instruction. Course work emphasizes translating on-site drawings from student dissections into digital illustrations. **Lab 4, Credit 2**

**2020-409 Anatomic Drawing II (junior major)**  
Building on experience gained in Anatomic Drawing I, students are assigned projects to reinforce their knowledge of anatomy while collaborating on dissection and illustration from the cadaver. Problems include oncology from cross sections and x-rays in preparation for surgical and medical/legal art. Mixed media is encouraged. **Lab 4, Credit 2**

**2020-410 Anatomic Illustration: Mixed Media (junior major)**  
Development of range and mastery of airbrush and mixed media illustration techniques. Course work emphasizes creating illustrations aimed at a variety of medical illustration markets, including medical/legal, editorial and advertising. **Lab 6, Credit 3**

**2020-430 Medical Illustration Gross Anatomy**  
Dissection and study of the human body is presented with such topics as developmental comparative and applied anatomy. Emphasis is directed toward osteology, radiographic anatomy.

Required of all students in the medical illustration program, offered through the University of Rochester Medical Center, with a tuition surcharge.

**Prerequisite for 500-level medical illustration courses: junior medical illustration major courses or their equivalent, or by permission of the instructor**

**2020-501 Advanced Medical Illustration (senior major)**  
Advanced medical illustration techniques. Graphic design related to illustrative and photographic practice. Lab sessions to be scheduled in operating room facilities. Jointly sponsored by RIT and the University of Rochester. **Lab 6, Credit 3**

**2020-506-01 Computer Animation for Medical Instruction (senior major)**  
Advanced study of hardware and software applications to support medical instruction. Course introduces students to creating two-dimensional computer animations as support for biomedical instruction. **Lab 6, Credit 3**

**2020-507-01 Marketing and Business Practices in Medical Illustration (senior major)**

Course work prepares students for entry into the medical illustration profession. Topics include writing and designing résumés, cover letters and self-promotional materials as instruments for gaining employment. Additional classroom lectures and demonstrations cover professional ethics, copyrights, contracts and client/illustrator negotiations. **Lab 6, Credit 3**

**2020-508-01 Medical Illustration Portfolio (senior major)**  
Students receive individual assessments of their current portfolio from faculty. Course work supports construction of "exit" portfolios reflecting each student's strengths and interests. Traditional two-dimensional and electronic portfolios are constructed. **Lab 6, Credit 3**

**2020-551-01 Scientific Illustration (junior major)**  
Translation of on-site drawings into ink illustrations designed to aid in scientific instruction. Assignments include illustrating zoological, entomological, botanical and anthropological subjects. Course work includes layout and design of typographic, graphic and illustrative elements into mechanical art that complies with "line printing" requirements. **Lab 6, Credit 3**

**2020-551-02 Computer Applications in Scientific Illustration (junior major)**  
Introduction to hardware and software applications for layout and typographic design and creation of line and continuous-tone illustrations. Course explores combining drawing and digital imaging as tools for designing illustrations in support of scientific and biomedical instruction. **Lab 4, Credit 2**

**2020-551-03 Surgical Drawing and Illustration II (senior major)**  
Students observe surgical procedures in local operating suites. Assignments require translating sketches and research into illustrations designed to instruct physicians or the lay public. Illustrations are designed to be reproduced for audiovisual use and as illustrative components of interactive computer presentations. Watercolor, airbrush, photographs and paint software techniques are used to execute final solutions. **Lab 18, Credit 6**

### Painting

**Prerequisite for all 300-level painting or printmaking (Introduction to Fine Arts) courses: foundation program or equivalent**

**2021-305 Introduction to Painting**  
Emphasis is on painting and the development of form, space and expression from a variety of sources, including the human figure. Emphasis on basic techniques, materials and concepts for further study in painting and related media. Introduction to the materials and techniques of permanent painting media. Preparation and execution in both direct and indirect painting methods. Safe handling of artists' materials is stressed. **Lab 6, Credit 3**

**2021-306, 308, 310 Fine Arts Drawing**  
Emphasis is on drawing and the development of form, space and expression from a variety of sources, including the human figure. Emphasis on basic techniques, materials and concepts for further study are explored. **Lab 3, Credit 1**

**2021-309 Introduction to Sculpture**  
Emphasis is on sculpture and the use of form, space and expression from a variety of sources, including the human figure. Emphasis on basic techniques, materials and concepts for further study in sculpture and in the fine arts. Introduction to the materials and techniques of permanent three-dimensional media. Preparation and execution in both direct and indirect painting methods. **Lab 6, Credit 3**

**2021-320 Color**  
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, spacial effects and image-ground distortion. **Class 3, Lab 3, Credit 3**

**Prerequisite for 400-level painting courses: sophomore fine arts core or its equivalent, or by permission of the instructor**

**2021-401, 402, 403 Painting (junior major)**  
Second year of painting in a three-year degree sequence. Increased development of mastery of painting media and the experience of drawing. Emphasis placed upon individual solutions and expression. **Lab 12, Credit 6**

**2021-411, 412, 413** **Painting**  
An elective providing the opportunity for exploration of personal expressive through a painting medium or a variety of mixed media. **Lab 6, Credit 3**

**Prerequisite for 500-level painting courses: junior painting major courses or their equivalent, or by permission of the instructor**

**2021-501, 502, 503** **Painting (senior major)**  
The third year of advanced painting completing a major course of study in the fine arts. Concentrated studio production focused upon individual creative solutions. Individual and group presentations of work in an exhibition format is encouraged, as is the development of a visual portfolio of one's work. Advanced drawing incorporated into studio procedure. **Lab 18, Credit 9**

**2021-511, 512, 513** **Painting**  
An elective that provides further exploration of personal expressive styles through a painting or related medium. **Lab 6, Credit 3 (offered on sufficient demand)**

### Printmaking

**2022-307** **Introduction to Printmaking**  
Emphasis is on printmaking and the objective mastery of form, space and expression from a variety of sources, including the human figure. Emphasis on basic techniques, materials and concepts for further study in printmaking and the fine arts. Introduction to the materials and techniques of permanent printmaking media. Preparation and execution in both direct and indirect painting methods. Safe handling of artists' materials is stressed. **Lab 6, Credit 3**

**Prerequisite for 400-level printmaking courses: sophomore fine arts core or its equivalent, or by permission of the instructor**

**2022-401, 402, 403** **Printmaking (junior major)**  
A three-quarter sequence in printmaking. Specific technical assignments, individual growth and development through personal statements is stressed in lithography, intaglio and relief printing. Expansion and development in combined and complex print forms are encouraged. A limited-edition portfolio project is developed with the participation of all students. **Lab 12, Credit 6**

**2022-411, 412, 413** **Printmaking**  
An elective providing the opportunity to explore personal statements through one of the following: lithography, etching, woodcut, papermaking. **Lab 6, Credit 3**

**Prerequisite for 500-level printmaking courses: junior printmaking major courses or their equivalent, or by permission of the instructor**

**2022-501, 502, 503** **Printmaking (senior major)**  
Continuation of third-year printmaking. Expanding the technical involvement in 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**

**2022-511, 512, 513** **Printmaking**  
An elective that provides further exploration of printmaking with emphasis on personal statement. Lab fee required. **Lab 6, Credit 3 (offered on sufficient demand)**

### Industrial Design

**Prerequisite for all 300-level industrial design courses: foundation program or equivalent required**

**2035-305** **Layout Systems (sophomore major)**  
An introduction to the fields of industrial and packaging design. Emphasis is on design conceptualization and development, form and functional studies of packages, graphics and exhibits. **Lab 6, Credit 3**

**2035-306** **Technical Drawing (sophomore major)**  
An introduction to drafting in the field of industrial and packaging design. Emphasis is on basic skills in orthographic drawing, O-Datum and decimal, inch dimensioning and engineering drawings. **Lab 6, Credit 3**

**2035-307** **Graphic Visualization (sophomore major)**  
Sketching and rendering techniques are developed through exercises that also promote abilities to visualize three-dimensional forms in two-dimensional representations. **Lab 6, Credit 3**

**2035-308** **Soft Model Making (sophomore major)**  
Development of mock-up building skills as an introduction to the fields of industrial and packaging design. Emphasis is on basic skills necessary for three-dimensional design conceptualization and development. **Lab 3, Credit 1**

**2035-309** **Hard Model Making (sophomore major)**  
Development of finished model building skills as an introduction to the fields of industrial and packaging design. Emphasis is on advanced skills and processes necessary for three-dimensional design conceptualization and development. **Lab 3, Credit 1**

**2035-310** **Computer-Aided Design Applications**  
An introduction to the use of the computer as a tool in the design process. Use of the computer is required. **Lab 6, Credit 3**

**2035-320** **Graphic Visualization**  
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)**

**Prerequisite for 400-level industrial design courses: sophomore industrial design core or its equivalent, or by permission of the instructor**

**2035-405** **Materials and Processes Applications (junior major)**  
The acquisition of a technical and theoretical base in industrial design through a formal introduction to materials and processes. **Lab 6, Credit 3**

**2035-406** **Consumer Product Design I (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, processes and materials. Design development of small products through sketches, quick study mock-ups and finished form studies. **Lab 6, Credit 3**

**2035-407** **Human Factors Applications (junior major)**  
The acquisition of a technical base in human factors for industrial design, emphasizing function and safety. **Lab 6, Credit 3**

**2035-408** **Equipment Design (junior major)**  
Application of communicative and problem-solving skills to comprehensive design projects involving form, style, function, safety, processes and materials. Design development of tools and equipment through sketches, mock-ups and technical drawings to finished form studies. **Lab 6, Credit 3**

**2035-409** **Product Style (junior major)**  
The study of style, fashion and graphics as they apply to product form, storage and distribution. **Lab 6, Credit 3**

**2035-410** **Consumer Product Design II (junior major)**  
The application of communicative and problem-solving skills to comprehensive design projects. Project emphasis on the consideration of style and fashion in determination of product form. **Lab 6, Credit 3**

**2035-411, 412, 413** **Industrial Design Elective**  
An elective that provides basic instruction in three-dimensional computer graphics applications for designers. **Lab 6, Credit 3**

**Prerequisite for 500-level industrial design courses: junior industrial design major courses or their equivalent, or by permission of the instructor**

**2035-505** **20th Century Designers (senior major)**  
Design issues and ethics are explored through examination of biographical material. Selected 20th century designers are reviewed and discussed. **Lab 6, Credit 3**

**2035-506** **Design Collaborative (senior major)**  
Advanced product development in conjunction with a corporate design program providing technical information, marketing concerns and outside review of students' work. **Lab 6, Credit 3**

**2035-507** **Advanced Product Design (senior major)**  
The application of design methods, universal design principles and team skills to professional-level projects in industrial design. **Lab 6, Credit 3**

**2035-508** **Furniture Design (senior major)**  
Experience in the design of furniture for a defined market is acquired through a project exercise involving industry collaboration. **Lab 6, Credit 3**

**2035-509** **Furniture Research and Development (senior major)**  
Students become acquainted with the ergonomic, material construction and marketing considerations in the design of furniture. An understanding of factors affecting furniture style is gained through the study of 20th century furniture designers. **Lab 6, Credit 3**

**2035-510** **Professional Practice I (senior major)**  
A review and study of design practices, including contracts, agreements, billings and business procedures. Résumé, portfolio development and employment possibilities also are explored. **Lab 6, Credit 3**

**2035-511** **Product Development (senior major)**  
A special student-interest project in industrial design, usually focused on the areas of sports/recreation products or toys. **Lab 6, Credit 3**

**2035-512** **Advanced Product Design (senior major)**  
The application of design methods and skills to professional-level projects in industrial design. Emphasis is on techniques and competencies common to or expected in the commercial world. **Lab 6, Credit 3**

**2035-513** **Professional Practice II (senior major)**  
Résumé and portfolio completion with informational interviewing and employment advising. **Lab 6, Credit 3**

### Art History

**2039-225, 226, 227** **Art and Civilization**  
Survey of the history of art from prehistory to the present, with particular attention given to the social and cultural backgrounds of art production and to the relationship between the arts: architecture, sculpture, painting, and decorative arts and crafts. Lectures, independent study, discussion groups, assigned gallery visits, papers, reports. **Class 3, Credit 3**

**2039-300** **History of Design**  
Explores the historical precedents of two- and three-dimensional design including fine arts, industrial, graphic and environmental design. The course provides a foundation for individual decisions on planning and designing to complement and enhance present and future environments. **Class 3, Credit 3**

**2039-310** **History of Crafts**  
Explores creative thinking and designing in the area of crafts through the ages with special emphasis on clay, fibers, glass, metal and wood. The course highlights the artistic achievements of the craftsmen of the past to enable present students to view their own time in its historical perspective and thereby understand more thoroughly their creative heritage and the efforts of contemporary craftspeople. **Class 3, Credit 3**

**2039-320** **History of Art Criticism**  
A study of what makes art "good" (philosophical theories of art and the aesthetic experience) and what art criticism is and does (types and principles of art criticism) with direct applications to the life and work of the artist and craftsman/designer. **Class 3, Credit 3**

**2039-330** **Philosophy in Art**  
Traces the historical changes that art has undergone. Traces the interaction between philosophic thought and artistic styles throughout art history. Explores art as a reflection of human values. **Class 3, Credit 3**

**2039-340** **Symbols and Symbol Making**  
A concentrated study of the nature of sign and symbol as visual metaphor paralleling legend, myth, folklore and fairy tale as verbal metaphor; analysis of Freudian and Jungian theories about symbolic/metaphoric communication; and application of the theories to contemporary examples. Designed to help the artist, designer and craftsman produce more effective visual communication. **Class 3, Credit 3**

**2039-350** **Asian Art**  
A study of the art of India, China and Japan in the area of painting, printmaking, sculpture, architecture and the crafts with emphasis on their implications for contemporary artists, designers and craftspeople. **Class 3, Credit 3**

**2039-360** **18th and 19th Century Art**  
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**

**2039-370** **20th Century Art**  
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**

**2039-380** **Contemporary Art**  
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**

**2039-390** **Native American Art**  
Survey of Native American visual arts within the context of Native American cultures and within a historical and anthropological framework. Native American arts—their roots, traditional expression, changes with European contact and contemporary expressions—are examined by culture area. Consideration also is given to materials used, techniques of construction, individual and tribal styles, as well as to the meaning and function of various art forms within Native American societies. **Class 3, Credit 3**

**2039-420** **American Art**  
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**

**2039-430** **Dada and Surrealism**  
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 are analyzed in paintings, literary works, films and objects. **Class 3, Credit 3**

**2039-440** **Conceptual Art**  
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**

**2039-450** **Pop Art and Pop Culture**  
Explores the social, cultural and political context within which this movement of the 1960s developed. Emphasis is on artists in New York and Britain. Lectures, discussions and films compose the course content. **Class 3, Credit 3**

**2039-460** **Media Advertising and Consciousness**  
Provides a discourse on the interaction of media and advertising through both historical and theoretical means. The historical part of the course deals with the social impact of industry on "modern life" at the turn of the century. The theoretical part of the course discusses the impact of advertising and media on social consciousness. **Class 3, Credit 3**

**2039-566** **Special Topics**  
Consideration of special art historical themes, areas and topics not covered in regular courses. **Class 3, Credit 3**

## School for American Crafts

### Ceramics and Ceramic Sculpture

**Prerequisite for 200-level ceramics and ceramic sculpture courses: matriculation in the ceramics and ceramic sculpture program**

**2040-200** **Ceramics Materials and Processes (freshman major)**  
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 are offered. Lab fee required. **Lab 15, Credit 5**

**2040-251, 252, 253** **Ceramics Elective**  
An elementary course in design and techniques in ceramics. Each quarter different techniques are taught, including wheel, hand building, glaze and decorating. Lab fee required. **Lab 6, Credit 3**

**Prerequisite for 300-level: successful completion of freshman-level courses in ceramics and ceramic sculpture**

**2040-300** **Ceramics Materials and Processes (sophomore major)**  
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 fee required. **Lab 15, Credit 5**

**Prerequisite for 400-level: successful completion of sophomore-level courses in ceramics and ceramic sculpture**

**2040-400** **Ceramics Materials and Processes (junior major)**  
Personal interpretation of the issues in contemporary ceramics is investigated. Each student develops a proposal to be approved by the faculty. The proposal enhances self-expression and a personal direction in clay. Lab fee required. **Lab 15, Credit 5**

**Prerequisite for 500-level: successful completion of junior-level courses in ceramics and ceramic sculpture**

**2040-500** **Ceramics Techniques and Thesis (senior major)**  
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 stresses a high level of aesthetic content and skilled execution. Lab fee required. **Lab 24, Credit 8**

### Glass

**Prerequisite for 200-level of glass: matriculation in the glass program**

**2041-200** **Glass Materials and Processes (freshman major)**  
A basic survey course regarding the properties, techniques and technologies of glass, plus an overview of glass history. Individuals participate in a variety of hot and cold techniques: basic blowing, color applications, stemware, stained glass, lamination, polishing, sand casting, adhesives and slumping/fusing techniques. Basic knowledge of technique lays the foundation for concept development. Lab fee required. **Lab 15, Credit 5**

**2041-251, 252, 253** **Glass Elective**  
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 fee required. **Lab 6, Credit 3**

**Prerequisite for 300-level: successful completion of freshman-level courses in glass**

**2041-300** **Glass Materials and Processes (sophomore major)**  
Stationary/multisectional mold blowing, color overlay, graphal and latticino are part of the emphasis on glass blowing in this sequential course for three quarters. Neon bending, gravity casting, pate-de-verre, engraving and fabrication are offered. In-depth history of glass and chemistry of glass are studied. Emphasis is placed upon individual solutions, expression and technical development. Lab fee required. **Lab 15, Credit 5**

**2041-361** **The Corning Museum of Glass, Glassforming I**  
Introduces students to the properties, history and techniques of glass. Casting, fusing, stained glass, glassblowing and sandblasting are techniques taught at The Studio at The Corning Museum of Glass. Work focuses on one or more of the techniques. Students will become familiar with the permanent collection and the Rakow Library. (sophomore glass major status or above) **Lec. 1, Lab 5, Credit 3**

**2041-371** **The Corning Museum of Glass, Intermediate Processes**  
Work at the glass furnace and study from the permanent collection of The Corning Museum of Glass and Rakow Library to create a body of personalized work. The media will employ aesthetic, style and technique of the Venetian master glass artisans. The working properties of colored bora-silicate glasses are explored through frameworking techniques. (2041-200 and glass major status) **Lec. 1, Lab 5, Credit 3**

**Prerequisite for 400-level: successful completion of sophomore-level courses in glass**

**2041-400** **Glass Materials and Processes (junior major)**  
Design projects from industry are undertaken and business practices are acquired. Techniques of painting on glass, electroforming and CO<sub>2</sub> casting are explored. Conceptualization is further developed through site-specific sculpture and environmental projects. Students are encouraged to exhibit professionally in regional and national exhibitions. Lab fee required. **Lab 15, Credit 5**

**Prerequisite for 500-level: successful completion of junior-level courses in glass**

**2041-500** **Glass Techniques and Thesis (senior major)**  
Creative problem solving and concentrated studio work is culminated with a one-person exhibition supporting thesis and documentation. Future career plans guide specific studies. Lab fee required. **Lab 24, Credit 8**

**2041-520** **Stained Glass**  
An elective relating advanced individual exploration using structural elements of color design and visual expression. Fabricating techniques involve cutting, shaping, soldering, leading, foiling and glazing stained glass. **Lab 6, Credit 3 (offered on sufficient demand)**

### Metalcrafts and Jewelry

**Prerequisite for 200-level of metalcrafts and jewelry: matriculation in the metalcrafts and jewelry program**

**2042-200** **Metalcrafts Materials and Processes (freshman major)**  
Sequential course for three quarters introducing basic exercises in the use of equipment and metal techniques through holloware and jewelry design in various metals. With a strong emphasis on design concepts, the following techniques are covered: sinking, raising, cutting, filing, finishing, hard soldering, casting, basic gem setting and rendering. Lab fee required. **Lab 15, Credit 5**

**2042-251, 252, 253** **Metalcrafts Elective**  
An elective course providing an opportunity for introductory study in metals in the area of either holloware or jewelry. Lab fee required. **Lab 6, Credit 3**

**Prerequisite for 300-level: successful completion of freshman-level courses in metalcrafts and jewelry**

**2042-300** **Metalcrafts Materials and Processes (sophomore major)**  
Sequential course for three quarters introducing gold as a material, advanced casting techniques, rubber mold making, computer chasing, rendering, chasing and repousse, tool making, electroforming, aluminum anodizing and acid etching. Lab fee required. **Lab 15, Credit 5**

**Prerequisite for 400-level: successful completion of sophomore-level courses in metalcrafts and jewelry**

**2042-400 Metalcrafts Materials and Processes (junior major)**  
Sequential course for three quarters introducing spinning, advanced holloware techniques, rendering, industrial design, advanced gem setting and identification, lapidary work and mechanisms. Lab fee required. **Lab 15, Credit 5**

**Prerequisite for 500-level: successful completion of junior-level courses in metalcrafts and jewelry**

**2042-500 Metalcrafts Techniques and Thesis (senior major)**  
Sequential course for three quarters providing individual research in technique and design. The senior-level students are required to assemble an audiovisual group presentation of their four years' work, complete a job search and a professional portfolio including résumé, photography and renderings. Lab fee required. **Lab 24, Credit 8**

### Weaving and Textile Design

**Prerequisite for 200-level of weaving and textile design: matriculation in the weaving and textile design program**

**2043-200 Textile Materials and Processes (freshman major)**  
The first two quarters are involved with the basics of various textile processes. The student experiences the three basic weave structures—plain, twill and twill derivations, and satin; natural dyeing; spinning; and the basic processes of surface design. Lab fee required. **Lab 15, Credit 5**

**2043-251, 252, 253 Textile Elective**  
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 nonloom textile processes. Lab fee required. **Lab 6, Credit 3 (offered every year or alternate year)**

**Prerequisite for 300-level: successful completion of freshman-level courses in weaving and textile design**

**2043-300 Textile Materials and Processes (sophomore major)**  
The fall and winter quarters involve the student with the option of selecting individual courses offered as special classes on a rotation basis over a four-year period. The spring quarter is considered the Journeyman's Quarter of Study, when a student selects a special area for research and development toward a specific direction approved by the professor. Lab fee required. **Lab 15, Credit 5**

**Prerequisite for 400-level: successful completion of sophomore-level courses in weaving and textile design**

**2043-400 Textile Materials and Processes (junior major)**  
Each quarter, the student selects from the special classes that are offered on a rotation basis over a four-year period. Lab fee required. **Lab 15, Credit 5**

**Prerequisite for 500-level: successful completion of junior-level courses in weaving and textile design**

**2043-500 Textile Techniques and Thesis (senior major)**  
For fall quarter, the student selects from the special classes that are offered on a rotation basis over a four-year period. The winter and spring quarters are devoted to the Senior Thesis, for which a student selects a specific research direction for the creation of a single piece or series of works, complemented with a written thesis that meets all RIT writing requirements. Lab fee required. **Lab 24, Credit 8**

### Woodworking and Furniture Design

**Prerequisite for 200-level of woodworking and furniture design: matriculation in the woodworking and furniture design program**

**2044-200 Woodworking Materials and Processes (freshman major)**  
Sequential course for three quarters covering function and care of hand and machine woodworking tools. Wood as a material: history, kinds, qualities, sources. Fundamental techniques of wood fabrication, including basic joinery, turning and finishing. **Lab 15, Credit 5**

**2044-220 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**

**2044-231, 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. Both traditional hand-drawn techniques and computer drafting systems are introduced. Topics covered include lettering, use of instruments, standard conventions, dimensioning, basic layout techniques and formats, orthographic projection, sectioning, auxiliary views, axonometric drawings, perspective sketching and visualization, measured perspective and presentation techniques. **Lab 3, Credit 2**

**2044-251, 252, 253 Wood Elective**  
A nonsequential, elementary course in designing and building wooden projects such as a tray, small box or small table. More choice of project is afforded students who take the course for a second or third quarter. Lab fee required. **Lab 6, Credit 3**

**Prerequisite for 300-level: successful completion of freshman-level courses in woodworking and furniture design**

**2044-300 Woodworking Materials and Processes (sophomore major)**

A sequential course for three quarters covering designing from found objects, wood bending, veneering, plywood construction and chair construction. The course includes a historical survey of furniture. **Lab 15, Credit 5**

**2044-320 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 basic chair construction, 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. (2044-231, 232, 233) **Lab 24, Credit 7**

**2044-331, 332, 333 Furniture History (AOS major)**

A survey of the history of furniture from Egyptian times to the present. Particular attention is given to the social, functional, technological and cultural background of furniture use and production. The lives, works and influence of known furniture designers and craftspeople are emphasized. The course includes lectures, independent study, discussion groups, gallery visits, papers and reports. **Lab 3, Credit 2**

**2044-341, 342, 343 Wood Professional Practices (AOS major)**

A sequential course for three quarters covering topics associated with the professions of woodworking. These include employment options, portfolio, résumé writing, business cards and stationery, marketing, client relations, contracts and other legal issues, record keeping, banking, insurance, taxes, location and layout of a shop, electrical and machinery considerations, etc. The course includes lectures, group discussions, independent study, studio and business visits, homework, papers and reports, and oral presentations. **Lab 3, Credit 2**

**Prerequisite for 400-level: successful completion of sophomore-level courses in woodworking and furniture design**

**2044-400 Woodworking Materials and Processes (junior major)**

A sequential course for three quarters covering the design and construction of a complete room of coordinating furniture; for example, a dining set consisting of table, production chairs and buffet or china cabinet. **Lab 15, Credit 5**

**Prerequisite for 500-level: successful completion of junior-level courses in woodworking and furniture design**

**2044-500 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, résumé and stationery. **Lab 24, Credit 8**

**2044, 41, 42, 43, 44-498 Professional Studio Internship**

This internship gives 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 Crafts in order to gain practical experience in the day-to-day operation of a professional studio. Selection of applicants is based on background, portfolios and interviews. **40-hour week, Credit 8 (offered by special approvals)**

## School of Photographic Arts and Sciences

### Fine-Art Photography

**2060-211, 212, 213 Creative Problems**

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 is accomplished through lectures and individual group assignments. **Class 3, Credit 3**

**2060-257 Still Photography**

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**

**2060-258 Still Photography II**

A basic studio course for the hobbyist or someone who occasionally uses photography in his or her work. Ideas for 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. (2060-257 or a working knowledge of developing film and making black-and-white enlargements) **Class 1, Lab 4, Studio 2, Credit 3**

**2060-259 Still Photography III**

A one-quarter course in which students determine their own theme of expression using black-and-white photographs. (2060-257 or a working knowledge of developing film and making enlargements; permission of instructor) **Class 1, Lab 6, Credit 3**

**2060-301, 302, 303 History of Aesthetics of Photography**

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. Slide lectures cover topics from surrealism and documentary to conceptual art and post-modernism. **Class 3, Credit 3 per quarter**

**2060-311, 312, 313 Introduction to Fine-Art Photography**

The meaning and practice of photography in a fine art context is discussed by the faculty. Students create visual work informed by the lectures and reflective of their own personal interests and experience. During all three quarters, the work of relevant artists is surveyed in slide presentations. The courses may be supplemented by field trips to museums, galleries and artists' studios. The sequence of courses provides a 30-week framework for students to:

(311—10 weeks) define their point of view or purpose and begin to explore their subject matter and/or theme with faculty and class feedback.

(312—10 weeks) more fully explore and/or modify the theme with classroom critiques, individual meetings with the faculty and application of new techniques, materials or methods of presentation.

(313—10 weeks) produce a portfolio of work that resolves philosophical, aesthetic, technical and/or content issues raised by class critiques during the previous two quarters and produce a succinctly written "artist's statement" to accompany the visual work. (2067-201, 202 or suitable portfolio) **Credit 4**

**2060-324 Photo Media Survey**

Students experiment with image combinations and alterations such as collage, montage, hand coloring, xerox, hand-coated emulsions, etc. Lectures introduce historical perspective on artists using these techniques and also feature demonstrations of various imaging systems and their integration. **Class 1, Lab 4, Credit 3**

**2060-334 Introduction to Computer Graphics for Photographic Imagemaking**

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. (2060-257) **Class 3, Lab 2, Credit 4**

**2060-401, 402, 403 Photography as a Fine Art I**

The major emphasis is 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 nonsilver, photography techniques may be utilized. (2060-311) **Class 3, Field trip 2, Credit 4 per quarter**

**2060-411, 412, 413 Contemporary Issues**

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 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 prepare an oral debate or a written term paper. **Class 2, Credit 2 per quarter**

**2060-463 Women and Visual Imaging**

Exploration of the nature of gender, its history and its implications in visual images. Students develop a working knowledge of the roles of women both as subjective content in images and as creators of values and ideas in the visual form. (Third- or fourth-year status) **Lec. 2, Critique 2, Credit 4**

2060-501, 502, 503

**Photography as a Fine Art II**

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. (2060-403) **Class 4, Credit 4 per quarter**

2060-550, 551, 552

**Special Topics Workshop**

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**

2060-554

**Gallery Management Display**

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 3, Credit 3 (not offered every quarter)**

2060-556, 557, 558

**Photo Media Workshop**

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. (2060-324) **Class 2, Lab 4, Credit 4 (not offered every quarter)**

2060-566, 567, 568

**Color Photography Workshop**

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)**

2060-574

**Archival Photographics: Processing, Display and Storage**

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**

2060-599

**Independent Study**

Learning experiences not provided by formal course structure may be obtained through use of an independent study contract. **Credit 1-9**

**Biomedical Photography**

2061-001

**Biomedical Freshman Seminar**

Freshman seminar assists students with issues that are of major importance in their first year at RIT. It investigates how to learn, set goals and stay motivated and includes other issues of importance to young students beginning their careers at RIT. Additionally, areas of specific interest to hospital and scientific photographers, such as ethics and animal rights, are investigated. **Class 1, Credit 0**

2061-201, 202, 203

**Biomedical Photography I**

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 3, Lab 4, Studio 4, Credit 5**

2061-211

**Survey of Biomedical Photography**

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 (W only)**

2061-276

**Law Enforcement Photography I**

This basic photography course for non-photo majors emphasizes theory, craftsmanship and visual communication based in technical photography. Forensic, medical, biological and other relevant subject matter are incorporated into this foundation course required as a prerequisite for Law Enforcement Photo II. Students explore camera operation and lens selection, depth-of-field relationships, exposure meters and choosing and using films as well as the use of supplementary artificial light sources. **Lec. 2, Lab 4, Credit 4**

2061-301, 302, 303

**Biomedical Photography II**

Further study and practice of theory and principles used in biomedical photography, including photomacrography, photomicrography, hospital photography techniques, dental and ophthalmic, biological field studies. (2061-203) **Class 2, Lab 10, Credit 5**

2061-312, 313

**Preparation of Biomedical Visuals**

A two-quarter sequence studying the basic principles of effective visual communication. Assignments emphasize the appropriate techniques for producing visuals that exhibit strong design, both mechanically and with the aid of a computer. The emphasis is on using computer technology for visual presentation. (2061-203, 0602-200, 2076-213) **Class 2, Lab 2, Credit 3**

2061-354

**Basic Ophthalmic Photography**

Investigates proper patient, camera and photographic techniques in ophthalmic photography. Diagnostic evaluation of ocular anatomy and physiology utilizing special cameras is presented. (2061-300 series or permission of instructor) **Class 2, Lab 4, Credit 4**

2061-357

**Principles and Techniques of Photomacrography**

A condensed course in principles of photomacrography. It examines the equipment involved with, the technical considerations necessary and the techniques involved in the photography of subjects 1:1 through 20:1 magnification. Lighting, optics, camera technique and various other considerations are evaluated in theory and practice. (Second-year or higher photographic status) **Class 1, Lab 6, Credit 4**

2061-359

**Basic Photomicrography**

A concentrated basic introduction to the principles of microscopy, photo microscopy 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 (SU)**

2061-401

**AV Production I**

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. (2061-303, strong still-photography background) **Class 2, Lab 4, Credit 4**

2061-402, 403

**Advanced Photography in Biomedical Communications**

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 that are similar to those encountered in biomedical and research institutes. (2061-303, basic color course) **Class 2, Lab 6, Credit 4**

2061-454

**Intermediate Ophthalmic Photography**

Intermediate Ophthalmic Photography goes beyond the shooting of retinal fundus photographs or posterior segment photography and concentrates on interpretation of fluorescein angiography films and anterior segment photography. Additionally investigates external ocular photography, slit-lamp biomicrography, common corneal anatomy and diseases. (2061-354) **Class 2, Lab 4, Credit 4**

2061-455

**Advanced Applications in Ophthalmic Photography**

Provides students with clinical experience in ophthalmic photography. Students work off campus in an ophthalmology clinic performing stereo fundus photography, fluorescein angiography, specular biomicrography, slit-lamp biomicrography and gonioscopy. The educational experience is balanced with the needs and tolerance of each patient involved, and represents an important clinical education necessary for diagnostic imaging. Students are responsible for their own transportation to and from site. (2061-354, 2061-552 and consent of the instructor) **Class 3, Lab 2, Credit 4**

2061-463

**Advanced Photomicrography**

Advanced Photomicrography goes beyond the basics of imaging through a microscope. This course investigates optical enhancement techniques, video recording and motion stopping, as well as specimen preparation. (2061-302 or 2076-412) **Class 2, Lab 4, Credit 4**

**2061-464** **Computerized Presentation Graphics**  
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 is 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**

**2061-499** **Co-op**  
Provides biomedical photographic communications students with on-the-job experience. The student seeks and acquires a school-approved co-op position in the health care industry. The working environment provides the forum for learning more about the student's chosen career. A final interview with the co-op coordinator assists the student in evaluating the experience. **Credit 0**

**2061-501, 502, 503** **Photo Concentration**  
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**

**2061-550, 551, 552, 553** **Special Topics in Photography**  
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**

**2061-599** **Independent Study**  
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

**2065-101** **Film/Video Freshman Seminar**  
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**

**2065-201** **Film/Video Production I**  
A fundamental course in 16mm nonsynchronous film production. Filmmaking is presented as a means of interpretation and expression. This course combines technical information in motion picture exposure and editing with a theoretical and practical approach to motion picture continuity. Production is in 16mm (nonsync) format. Students furnish film, tape and processing. Equipment is furnished by the department. **Class 3, Lab 4, Credit 5**

**2065-202** **Film/Production II**  
A foundation course in editing theory and practice for motion pictures. Emphasis is on identification and concerns of a variety of approaches to the edited image. The student edits VHS-format taped projects designed to address specific editorial concerns. Students provide videotape; equipment is furnished by the department. (2065-201) **Class 3, Lab 4, Credit 5**

**2065-203** **Film/Video Production III**  
This is the third course of three for freshman film/video students. It introduces the nature and importance of the sound component in creating cinematic works. Students are exposed to a variety of possible treatments of sound using historical and contemporary examples in cinema. Students engage in the creation of soundtracks that are rich, complex and meaningful. They learn the processes, equipment and techniques, as well as creative and efficient strategies, for multitrack soundtrack creation for both film and video. This course is essential for students of the film/video curriculum, who must be able to create not only images, but also mature and appropriate soundtracks for their film and video works. Also essential for students who wish to pursue sound-related careers in film and video. (2065-201, 2065-202) **Class 3, Lab 4, Credit 5**

**2065-221** **Materials and Processes of the Moving Image I**  
Familiarizes the student with the basic technical concepts of film- and video-making. Students gain an understanding of the technical theory required to work in these media. **Credit 2 (F)**

**2065-222** **Film Language**  
This screenings and readings course gives the student the opportunity to trace the development of the techniques and forms in what now constitutes the classic cinema. **Credit 2**

**2065-223** **Creative Processes**  
A discipline-specific follow-up to the more general theories of Creative Processes I. The course varies in its approach from year to year; i.e., one year it may take the whole quarter to study one film. **Credit 2**

**2065-243** **Introduction to Portable Video I**  
A basic course for nonmajors. 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. VHS production and editing facilities are provided by RIT. Students must purchase a minimum of two 60-minute, 1/2" video cassettes. This course does not count as elective credit for F/V majors. **Class 3, Lab 3, Credit 4 (F, W, S)**

**2065-244** **Introduction to Portable Video II**  
In this course the student applies the basic video skills acquired in 2065-243 to the design and realization of mature narrative imagery. Progress is supervised by the instructor through regular screenings and conferences with the student. (2065-243) This course does not count as elective credit for F/V majors. **Class 3, Lab 3, Credit 4 (W)**

**2065-311** **Video Tools and Technology**  
An intensive tools and technology course that allows the student to work in the S-VHS video format. Examines the technical concerns of single-system portable video production and off-line editing. Production skills in camera work, editing and sound recording are covered. (2065-203) **Credit 5 (F)**

**2065-317** **Production Workshop: Documentary II**  
Students produce short documentary projects in either film or video, depending on their prerequisites, or, with consent of the instructor, they may work in any medium appropriate to their experience and resources, such as still photo, painting, animation, comic strip, performance, radio or multimedia. Students are encouraged to experiment with individual style and, while producing their own work, also serve as production planning team and production crew for all other projects. Students complete projects that were begun during the quarter or during the previous quarter in Production Workshop: Documentary I for presentation at public departmental screenings. (2065-411 or 2065-431) **Class 2, Lab 4, Credit 4 (W)**

**2065-318** **Production Workshop: Documentary I**  
Students produce short documentary projects in either film or video, depending on their prerequisites, or, with consent of the instructor, they may work in any medium appropriate to their experience and resources, such as still photo, painting, animation, comic strip, performance, radio or multimedia. Students are encouraged to experiment with individual style and, while producing their own work, also serve as production planning team and production crew for all other projects. Students complete projects for presentation at public departmental screenings or may plan and shoot more ambitious projects to be completed the following quarter in Production Workshop: Documentary II. (2065-431 or 2065-311) **Class 2, Lab 4, Credit 4 (W)**

**2065-321** **Materials and Processes of the Moving Image II**  
A technical survey of the tools and materials used in video production. (2065-202, 2065-221) **Class 2, Credit 2 (F)**

**2065-327** **Production Workshop: Experimental II**  
Students produce short projects as experiments in concept, style or technology and are encouraged to take risks, break "rules" and explore their own unique creative potential without fear of grade punishment for being different. Students may work in either film or video, depending on their prerequisites, or, with consent of the instructor, they may work in any medium appropriate to their experience and resources, such as still photo, painting, animation, comic strip, performance, radio or multimedia. While producing their own work, students also serve as production planning team and production crew for all other projects. Students complete projects begun during the quarter or during the previous quarter in Production Workshop: Experimental I for presentation at public departmental screenings. (2065-431 or 2065-311 or consent of the instructor) **Credit 4**

**2065-328** **Production Workshop: Experimental I**  
Students produce short projects as experiments in concept, style or technology and are encouraged to take risks, break "rules" and explore their own unique creative potential without fear of grade punishment for being different. Students may work in either film or video, depending on their prerequisites, or, with consent of the instructor, they may work in any medium appropriate to their experience and resources, such as still photo, painting, animation, comic strip, performance, radio or multimedia. While producing their own work, students also serve as production planning team and production crew for all other projects. Students complete projects for presentation at public departmental screenings or may plan and shoot more ambitious projects to be completed the following quarter in Production Workshop: Experimental II. (2065-431 or 2065-311 or consent of the instructor) **Credit 4**

**2065-331** **Introduction to Animation and Graphic Film Production I**  
An introduction to the techniques and practices of graphic and animated film production. 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 illustrate each technique. Proficiency in drawing is required. No prerequisites. **Class 3, Lab 2, Credit 4 (F)**

**2065-332** **Advanced Animation Tools**  
This course in animation techniques and tools provides the student with the training and practical experience necessary for independent operation of animation equipment and the independent production of animated film. A variety of traditional and experimental techniques are explored in depth. These techniques include animation stand as well as three-dimensional animation execution. Students work independently and in group situations and participate in all phases of animated film production. Students have the opportunity to explore mixed technique approaches, as well as to utilize their experiences in photography, graphic arts, painting, sculpture, and other backgrounds and skills. Screenings of films illustrate a variety of different techniques, style, and production concerns and practices. Proficiency in drawing is not required. (Introduction to Animation I) **Lab 3, Credit 4**

**2065-333** **Animation and Graphic Film Production**  
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. (2065-332) **Class 3, Lab 2, Credit 4 (S)**

**2065-337** **Production Workshop: Fiction II**  
Students produce short fictional projects in either film or video, depending on their prerequisites, or, with consent of the instructor, they may work in any medium appropriate to their experience and resources, such as still photo, painting, animation, comic strip, performance, radio or multi-media. Students are encouraged to experiment with individual style, and while producing their own work, also serve as production planning team and production crew for all other projects. Students complete projects begun during the quarter or during the previous quarter in Production Workshop: Fiction I for presentation at public departmental screenings. (2065-431 or 2065-311 or consent of the instructor) **Credit 4**

**2065-338** **Production Workshop: Fiction I**  
Students produce short fictional projects in either film or video, depending on their prerequisites, or, with consent of the instructor, they may work in any medium appropriate to their experience and resources, such as still photo, painting, animation, comic strip, performance, radio or multi-media. Students are encouraged to experiment with individual style, and while producing their own work, also serve as production planning team and production crew for all other projects. Students complete projects for presentation at public departmental screenings or may plan and shoot more ambitious projects to be completed the following quarter in Production Workshop: Fiction II. (2065-431 or 2065-311 or consent of the instructor) **Credit 4**

**2065-342** **Writing for Film and Video I**  
Explores the writing of nonfiction and fiction for theatrical and nontheatrical films and television. Experience in the writing of fiction concentrates on the elements of dramatic construction. The exploration of nonfictional writing examines information gathering techniques and methods of investigation. Both nonfiction and fiction are treated as expository, story-telling 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)**

**2065-343** **Writing for Film and Video II**  
Continuation of 2065-342. (2065-342 or consent of instructor) **Class 2, Lab 3, Credit 3 (S)**

**2065-345** **Acting for Film and Video**  
A course in basic acting technique with emphasis on the special problems peculiar to film and video production. The class is taught in conjunction with 2065-347 (Directing the Actor). Class meetings are organized around the presentation of scenes prepared by student actors and directors. **Credit 3**

**2065-347** **Directing the Actor**  
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**

**2065-354** **The Business of Film and Video**  
Examines the business aspects of designing, developing and producing film and/or video projects. Emphasis is on development of production projects with interactive problem-solving experiences in which the instructor and students work as a production team. Special attention is given to script development techniques, estimation and management of production costs, location productions, live broadcasts and the cost/quality considerations of film/video production. Specific issues and situations are used as exercises for student problem-solving activities. **Credit 3**

**2065-356, 357, 358** **History and Aesthetics**  
A nonscholarly 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 nonverbal image making. (Must be at least a second-year student) **Class 3, Credit 3**

**2065-360** **Animation in the Netherlands and the European Perspective**  
Offers the student the unique opportunity to creatively explore and experience animation production and history in one of Europe's most active and innovative countries in this moving art form. Students interested in production credit learn basic and advanced techniques of the medium and engage in 16mm animated film production. Combined processes involving live-action filmmaking, photography and video are also possible. Equipment is provided.

Students interested in receiving history/critical studies credit research topics in film archives, museums and libraries; conduct interviews with artists; and write papers. These students also participate in aspects of production experience to complement their general understanding of the medium.

All students are exposed to the rich history of the animated film in the Netherlands, as well as in other European countries. This history includes both traditional and experimental forms. Students meet important Dutch artists in special workshops and studio demonstrations, and weekly screenings of Dutch and international animated films take place. Field trips around Holland and to other European locations are planned. Other activities include trips to art museums, special film programs and explorations of Dutch culture. Most people in Holland speak English, and the course is conducted in English.

Open to undergraduates and graduates, with or without production experience. For majors or nonmajors. All students earn 6 credits. RIT students have the opportunity to earn up to 3 credits additional in the fall quarter following their return from the Netherlands for post-production or for continued scholarly research. **Credit 6-9**

**2065-364** **Film Theory and Criticism**  
A historical survey of film theory is offered along with the analysis of films using specific critical methodologies. Provides the student with the viewing and discussion skills necessary to understand film as a fine art. **Class 3, Credit 3**

**2065-370** **Film and Video in Paris Summer Course**  
Provides students with the opportunity to creatively explore and experience film and video production for six weeks in Paris, France. Students study the rich history and prehistory of French (and European) cinema. Study includes weekly screenings of many historical and contemporary film works from the Film Archives at the National Museum of Modern Art in Paris, meetings with French/European filmmakers and historians, museum trips, special film programs at the Cinémathèque Française and the Videothèque de Paris, and library research. Both traditional and experimental French cinema are examined. Equipment is provided. Students produce works in either or both 16mm film and ½" video formats. Open to undergraduates and graduates, majors and nonmajors, with or without production experience. **Credit 6**

**2065-373** **Visual Anthropology**  
We see others as we imagine them to be, in terms of *our* values, not as they see themselves. This course examines ways in which we can understand and represent the reality of others through visual media, across the boundaries of culture, gender and race. It considers *how* and *why* visual media can be used to represent—or to distort—the world around us. (Sophomore standing) **Credit 3 (S)**

**2065-374** **Seminar in International Film History**  
Examines selected, varying film topics in a wider socio-historical context. Seminar themes change each year and may include topics such as post-war German film, films of the Holocaust, Japanese film, surrealist and magic realist film, Soviet film, Native Americans on film, etc. Students are expected to participate actively in the course, via class presentations and discussions. **Credit 3**

**2065-398** **Community Service**  
Allows the student to take film or video production experience to the community. Community organizations and groups make contact with film and video majors—with the assistance of the faculty community service coordinator—for work toward the production of media necessary to the group's outreach, educational or promotional efforts. A final written report, screening of the community project and meeting with the faculty coordinator help the student evaluate the production and the experience. (2065-203) **Credit 4**

**2065-413** **Senior Project Seminar**  
A required course for third-year film/video majors and the prerequisite for 2065-501, Senior Project. Students discuss and generate a written plan for their senior film and/or video projects and select an adviser from among the film/video faculty. (2065-432) **Class 1, Credit 1 (S)**

**2065-427** **Introduction to Computer Animation**  
Students in this course create a motion picture portfolio consisting of a number of short animation projects composed on a digital computer. Lectures discuss a number of topics, both aesthetic and technical, related to the field. **Lec. 3, Lab 4, Credit 5**

**2065-431** **Introduction to 16mm Sync. Sound Production**  
An introduction to all aspects of professional film production. Students produce short projects while learning basic shooting and editorial procedures along with equipment handling and maintenance. (2065-203) **Class 3, Lab 4, Credit 5**

**2065-437** **Advanced Animation Workshop I**  
Students are given the opportunity to produce, either singly or in small groups, a motion picture with sound using an animation technique or combination of techniques of their own choosing. Students may elect to take this course for one or two quarters, depending upon the dimensions of the project. (2065-427) **Lab 4, Credit 4**

**2065-438** **Advanced Animation Workshop II**  
Students are given the opportunity to produce, either singly or in small groups, a motion picture with sound using an animation technique or combination of techniques of their own choosing. Students may elect to take this course for one or two quarters, depending upon the dimensions of the project. (2065-427) **Lab 4, Credit 4**

**2065-444** **Advanced Scriptwriting**  
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. (2065-343) **Class 2, Discussion 4, Credit 4 (W)**

**2065-447** **Experimental Animation Workshop**  
Directed towards experimentation and exploration with single-frame motion image making. Students engage in creative conceptual and experimental investigation and processes to discover new expressions and techniques. This activity is not limited to film format, but may include performance, installation, video, computer imagery, fine arts and photographic processes, nontraditional sound presentation, live action and more. It is also an opportunity for students to involve acquired skills from other disciplines in the research and actualization of their experimental work. Students study past experimental animated works and examine the definition and pretext for the experimental approach, the connections and relationships of experimental works to art and the role of the experimentalist as discoverer and interpreter of new meaning. Students engage in self-directed exploration and experimentation that may culminate in finished works within the quarter's time or may extend into the following quarter in the Animation Production Workshop. **Lab 4, Credit 4**

**2065-452** **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. **Class 1, Lab 2, Credit 3 (F)**

**2065-454** **Production Workshop: Scriptwriting**  
For students who have written a one-act screenplay or who have completed a sizable portion of a feature-length script. Through a combination of class critiques and discussions, conferences and readings, students will revise and complete their screenplays. (2065-343 or consent of instructor) **Lec. 4, Credit 4 (for three quarters)**

**2065-462** **Advanced Sound Recording**  
Continuing the work in 2065-452 to include the decision level in the employment of various sound equipment and including more complex work in multi-track recording and mixing. (2065-452 or permission of instructor) **Class 2, Lab 2, Credit 3**

**2065-463** **Advanced Video**  
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 storage, computer imaging and animation are some of the topics covered. (2065-311) **Class 3, Credit 3**

**2065-498** **Film/Video Internship**  
Provides the students with on-the-job experience in the field of film/video. The student seeks and acquires a school-approved internship position in a business or industry. The working environment provides the forum for learning more about the student's chosen career. A final interview with the internship coordinator assists 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)**

**2065-507** **Senior Project 1**  
The student develops the preproduction planning and completes all major production work on the senior project, meeting weekly with his or her faculty adviser to discuss and devise production plans, screen rushes and revise production strategies. Course work includes budgeting and production economics; script breakdown, shot lists and visual organization; production scheduling, introduction to unit management; and production strategies. (2065-413 and departmental approval) **Lec. 1, Lab 6, Credit 4**

**2065-508** **Senior Project 2**  
Work on the senior project continues into the postproduction process. Course work includes postproduction processes: editing, construction of soundtracks, sound mix, preparation of log for negative cutter and communicating with labs. (2065-507) **Lec. 1, Lab 6, Credit 4**

**2065-511, 512** **Senior Forum I, II**  
These courses accompany and complement the Senior Project 1 and 2 courses. Students in Senior Forum meet as a group to screen dailies, discuss production problems and plan jointly for the use of departmental production resources. (2065-413) **Class 2, Credit 2 (each quarter)**

**2065-513** **Senior Forum III**  
Completes the Senior Project; i.e., on-line editing and/or negative cutting, lab procedures, first trial print, film-to-video transfer, etc., as well as festival entries and distribution. In addition, the course covers producing, crew structure and production management and concludes with practical assistance in job seeking and life after RIT. (Senior standing and completion of Senior Thesis I and II) **Credit 4 (S)**

**2065-550, 551, 552, 553** **Special Topics in Film/Video**  
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**

**2065-599** **Independent Study**  
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 (F, W, S, SU)**

## Applied Photography

**2067-200** **Photography I, BFA transfer—2067/2060 (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 2067-201, 202. Since this course is such an intensive offering, previous photographic experience is highly advisable. **Class 10, Lab 20, Credit 12**

**2067-201, 202** **Applied Photography I**  
An introduction to the major in applied photography that will give the student broad experiences in various areas of photography to assist in making program decisions and practicing visual communications. The curriculum emphasizes both craft and visual problem solving. **Lec./critique 2, Lab/studio 4, Credit 6 (for two sequential quarters)**

**2067-208** **Introduction to Color**  
A one-quarter course introducing color as a new element in making photographs. Offers a theoretical, technical and aesthetic foundation in color photography. The student gains familiarity with the materials through shooting assignments. Emphasis is placed on developing printing skills. **Class 2, Lab 4, Credit 5**

**2067-263** **Studio Light**  
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. (2067-201, 202) **Lec. 2, Critique 2, Studio 4, Lab 4, Credit 5**

**2067-268** **Visual Images: Source/Resource**  
Considers ideas and modes of thinking that can influence the creation of pictures. It is designed around several thematic issues that allow the students to personally and creatively resolve visual problems associated with personal culture and history; photographic and nonphotographic images; integration of aesthetics, ethics and values; ways of working; and discipline, structure and inspiration. Students are 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**

**2067-273** **Visual Inquiry**  
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 is used as a forum for drawing, writing, collages, photographs and other things. We analyze the process we take in order to solve problems (visual and other types). We start with simple posed questions (curiosities) and evolve them into useful solved answers (photographs). **Credit 5**

**2067-278** **The Spiritual/Mystical Image**  
Guides 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**

**2067-283** **Introduction to the Applied and Fine Art Concentrations**  
An interdisciplinary approach to the application of core skills in photography, stressing the similarities and differences between the fine art, advertising and journalism disciplines. The student has the opportunity to work with diverse faculty from these specialties. (2067-201, 202) **Credit 5**

**2067-300** **Photography II, BFA Transfer**  
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 (SU)**

**2067-301, 302** **Applied Photography II**  
Advanced applied photography in black-and-white and color with emphasis on craftsmanship, problem solving and visual communications. Major technical emphasis and introduction to studio electronic flash and large-format photography. Further emphasis is placed on the development of the student's ability to apply creative thinking and contemporary techniques in executing meaningful and effective photographs. (2067-202) **Class 4, Studio 5, Credit 5**

**2067-325 Introduction to Electronic Imaging for Photographers**

Lectures and hands-on activities will permit each student to discover the applications of electronic imaging for still photographers. In addition to photographic lab exercises, there will be lectures and presentations on the basics of these technologies and their applications, integration of the communications fields and an introduction to acquiring and presenting electronic images. Students will be expected to complete both electronic imaging tutorials and photographic assignments. **Lec. 2, Lab. 4, Credit 4**

**2067-363 Zone System and the Fine Print**

A one-quarter introduction to the fundamentals of the Zone System and the Fine Print, using black-and-white photography. Purpose, technique and aesthetics of the system and printing are the content of the course. Emphasis is on large-format technique. (2067-201, 202) **Credit 5**

**2067-364 Art Direction and Copywriting**

A study of art direction and copywriting with emphasis on conceptual thinking as it applies to the photographic image. Some emphasis is placed on basic hand skills, i.e.; layout, type rendering and paste-up. Marketing principles and career possibilities are covered. (Photo student or permission of instructor) **Credit 5**

**2067-373 Nontraditional Photographic Illustration**

An intense exploration of the possibilities for integrating the disciplines and thinking related to art, philosophy, culture and mythology with the production of images for use in advertising and editorial media. The approach is intended to inspire a more spontaneous and emotional form of expression by providing an opportunity to experiment with alternative processes and fine-art methodology in the broad context of commercial applications. (Second-, third- or fourth-year status) **Credit 5**

**2067-374 Nontraditional Darkroom**

Students produce a series of nontraditional photographic images while learning to utilize the darkroom as a primary tool in their expression. Course is an introduction to, and exploration of, alternatives to camera/lens photography. Not limited to in-camera paper negative photography, it also explores a variety of nontraditional photographic processes. Challenges the student to "leave the photographic tradition of representation and enter a broader area of creative control." (2067-201, 202) **Lec. 2, Critique 2, Lab 4, Credit 5**

**2067-378 Photojournalism: Color Seminar**

An exploration of the aesthetic and technical evolution of color in photojournalism. Students research the work of contemporary photojournalists, experiment with a variety of color films to identify potential applications and complete a series of shooting assignments. Personal portfolios of color photographs are produced by the students. (Second-, third- or fourth-year status) **Credit 5**

**2067-379 Photojournalism for Newspapers**

For students in, or curious about, a career in newspaper photojournalism. The content is both theoretical and practical. Students are required to shoot according to newspaper standards and needs on a weekly basis. In addition, students have the opportunity to "shadow" photographers and editors from the Gannett newspapers. Shooting sports, spot news, features and special essays are part of the course. Special processing and printing skills are covered as well as specialized camera and lens handling techniques. An excellent opportunity for those seeking to improve portfolio for newspaper internship possibilities. (Permission of instructor) **Credit 5**

**2067-383 Hand-Held Electronic Flash**

Flash photography provides a means of consistent and precise exposure control in the most demanding of lighting situations and/or in rapidly changing environments where many exposures of different views are necessary. Course is an introduction to the application and aesthetics of hand-held electronic flash photography for students wishing to further their knowledge, understanding and experience with hand-held electronic flash for small-format photography. Students produce a series of commercial or personal images while learning to use flash as an aesthetic tool. Students are required to have their own flash units. (2067-201, 202) **Lec. 2, Critique 2, Lab 4, Credit 5**

**2067-388 Picture Editing and Layout Design**

Image selection, usage and design for the printed page. Using images from sources other than your own photographs, we 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 scaling, proportion and sizing are related to page design. We discuss typography and its function with photos, including captions and block text. Students lay out a number of assignments from single pages to essays of varying length. A variety of picture sources is used. A student need not use his or her photos in this course. (Second-, third- or fourth-year status) **Credit 5**

**2067-393 Beginning Underwater Photography**

An introduction to underwater photography for second- through fourth-year students. The equipment and techniques necessary to successfully complete an underwater shooting assignment with both black-and-white and color films are covered. The curriculum emphasizes the technical and aesthetic aspects of visual problem solving in an alien environment. The underwater landscape, aquatic creatures, human models and still life set up are some of the themes explored. A field trip to the dive site is at student expense. In lieu of the field trip a special project with student/teacher agreement can be substituted. (2067-201, 202, 208; must be certified Open Water Diver; instructor approval required) **Credit 5**

**2067-401, 402 Contemporary Photojournalism I**

Introduction to photojournalism. Topics include news and editorial sources, news "sense," photographing single events as well as extended picture stories, and ethics. Skills involved include control of color, portable electronic flash and an introduction to electronic processes and contemporary publication. The emphasis is not to produce a news photographer but to give students the opportunity to explore visually the concerns and curiosities of the social world around them. Careers in magazine and corporate photography, picture editing and research, as well as those created by developing electronic technologies—prepress, pagination, archiving, desktop publication—are introduced and encouraged.

**2067-411, 412 Advertising Photography**

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 are covered. (2067-302) **Class 4, Studio 5, Credit 5**

**2067-422 Professional Operations and Management**

A one-quarter business survey course for all applied photo department students. Covers the basic business concepts necessary for the operation of a small studio or free-lance business on a practical level. Job search methods, self-promotion, bookkeeping and legal aspects of business are addressed. (2067-411, 412 or by instructor's permission) **Class 4, Credit 4**

**2067-453 On-Location Photography**

Covers the techniques and equipment necessary to complete an "on-location" assignment for a corporate report, brochure or audiovisual presentation. Students are encouraged to meet professional standards while developing a strong personal point of view. (2067-302 or equivalent) **Credit 5 (SU)**

**2067-454 Introduction to Electronic Still Photography**

Hands-on activities permit each student to discover the applications of electronic photography. In addition to studio/location/laboratory exercises, there are presentations on the basics of the technologies in use, interdisciplinary integration of the communications and graphic arts fields, and an introduction to "hard copy" output devices. Students are 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. **Class 2, Lab 4, Credit 5**

**2067-457 Propaganda and Photography**

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.

Course examines photographs and films that have very often shaped our view of the world and explores the positive and negative effects of such images. The period from the Crimean War to the present is covered. Special emphasis is 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, are studied, some of which are "faked" photographs. A larger question studied is "Why were these photographs faked?" Included in lectures are the historical and cultural forces behind the work. (No prerequisites) **Class 4, Credit 4**

2067-458

**Food**

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 range from simple raw-ingredient shots to pour shots to building a sandwich to making a salad. (Third- or fourth-year status) **Credit 5**

2067-460

**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 are dealt with, such as public and personal events, cultural, social, personal and intercultural symbols. The written word and its effect and influence on the photograph are covered. Layout and presentation and their effect on the audience the work is designed to serve are included. (2067-302, or permission of instructor) **Credit 7 (SU)**

2067-462

**Portrait Photography I**

Lectures are devoted to discussion of the current portrait approaches in commercial, documentary and fine-art photography. Because a successful portrait requires a synthesis of aesthetic and technical skills, the technical elements of portraiture—including camera, lighting, background and posing—are discussed and demonstrated. Students work primarily with studio strobes and are encouraged through weekly assignments and critiques to apply what they've learned. (2067-301 or equivalent) **Credit 4**

2067-463

**Advanced Portraiture**

Encourages the student to develop a personal approach to portrait photography through a term-long, self-directed project. Critiques are held weekly to provide feedback on work in progress. (2067-462) **Credit 4**

2067-464

**Advanced Portrait Photography**

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. (2067-463 or equivalent) **Class 2, Studio 4, Credit 4 (S only)**

2067-468

**Self-Promotion and Business**

Contemporary marketing and business issues for free-lance photographers are the principal subjects and include calculating a creative fee, client negotiations, invoicing and copyright for assignment and stock photography, and client research methods for photographers. Students will create self-promotion materials, including mailers, business cards and letterheads. (Junior or senior status or instructor's permission and 2067-422) **Lec./critique 4, Credit 4**

2067-593

**Advanced Still Life**

Introduces the student to advanced concepts of visual communication and studio techniques. Students are encouraged to work on projects in which they have a significant interest. Assignment content is open to student input. Work is shown to various audiences for criticism and experience. Evaluation of these criticisms is an important part of the experience. The tools and techniques of studio still-life photography are discussed and demonstrated as appropriate. (Photojournalism I or Advertising I or permission of instructor) **Lec. 2, Critique 2, Studio 5, Credit 5**

2067-469

**Environmental Portraiture**

A course involving the selection of various persons as subjects and learning of their skills and specialties. The student interviews subjects, defines what they do and where they do it, and designs a photograph that shows the viewer the subject's job or avocation and the environment in which the subject operates. **Lec. 1, Critique 2, Studio/Location 4, Credit 5**

2067-470

**Studio Photo/Still Life**

Still life as a medium for creative expression and visual experimentation. Assignments cover a range of professional experiences particular to advertising and editorial still-life photography. They introduce the student to the tools and techniques of studio still-life photography and to concepts of visual communication inherent to the still life. This course is an alternate to the first quarter of Advertising I core course and also may be taken as a photo elective. (Third-year status or permission of instructor) **Credit 7 (SU)**

2067-473

**Portfolio Development (Photojournalists, Documentary and Editorial Photographers)**

Designed for third- and fourth-year students who are ready to present themselves and their work to potential employers. Weekly assignments move the students closer to their stated goals. To begin this course students must be able to answer two career-related questions: what is it they wish to do, and where do they wish to do it? **Credit 5**

2067-474

**Studio Skills (nonstudio majors)**

General studio course for nonadvertising 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, nonadvertising majors) **Credit 4**

2067-475

**Digital Photography**

Hands-on activities will permit each student to investigate the applications of applied digital and hybrid photography. In addition to studio, location and laboratory exercises, there will be presentations on trends in contemporary imaging. Students will be expected to capture images using both digital and film-based cameras, process digital images, create picture files and participate in project-related critiques. (Junior, senior or graduate class level and Introduction to E.I. for Photographers, or equivalent, or instructor's approval) **Lec. 2, Critique 1, Lab 4, Credit 5**

2067-480

**Studio Photo/People**

Introductory study of people photography focusing on the development of the photographic and psychological skills of the studio photographer. Assignments cover a range of professional experiences particular to advertising and editorial people photography. They include the selection and direction of models, orchestration of the tangible and intangible studio environments, as well as studio lighting, camera techniques and business practices particular to people photography. This course is an alternate to the second quarter of the Advertising I core course and also may be taken as a photo elective. (Third-year status or permission of instructor) **Credit 7 (SU)**

2067-488

**People Illustration/Studio**

Advanced study of people photography focusing on the development of the photographic and social skills of the studio photographer. Learning to orchestrate the tangible and emotional studio environment is a major goal of the course. Studio lighting, camera techniques, and the selection and direction of models are the subjects of lectures, demonstrations and assignments. Many of the course assignments are open ended, which gives the student freedom to generate independent projects. (2067-411, 412 or permission of the instructor) **Credit 5**

2067-493

**Problems and Projects in Still Life: A Collaboration**

The still life as a medium for creative expression and visual experimentation. The tools and techniques particular to the still-life photographer are 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—are discussed, demonstrated and applied to assignments. Projects are in a practical vein, relating to actual typical problems that are part of a working studio's daily life. Assignments investigate the overlapping relationships of fine-art, editorial and commercial still-life photography. Large- and small-format cameras may be used; assignments are done both in and out of the studio. **Credit 5**

2067-498

**Picture Researching**

Introduction to 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 are produced by each student. (Third- or fourth-year status) **Credit 5**

2067-550, 551, 552, 553

**Special Topics**

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. **Credit variable** (Not offered every quarter. Consult coordinator of the professional photographic illustration program.)

2067-554

**Advanced Electronic Photography**

This lecture and laboratory course gives the advanced student of electronic photography an in-depth look at the tools and techniques of electronic imaging systems. Students pursue research projects in either the visual communications or technical aspects of electronic photography. The student's final project is self-defined. (2067-454 or permission of the instructor) **Class 2, Lab 3-, Credit 4**

2067-563

**Senior Thesis/Photo and Design**

Brings together graphic design and photography students. The students are 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 set up during the sixth or seventh week of the winter quarter. Enrollment is limited. (Fourth-year status and permission of instructor) **Credit 5**

2067-564

**Advanced Color Seminar**

Portfolio preparation course concentrating 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 nonspecific in nature, allowing the student the freedom of his or her own direction. As part of the course requirements, each student chooses an appropriate portfolio format and begins to show a portfolio. (Fourth-year standing or instructor's permission; 2067-412 or instructor's permission) **Class 3, Studio 4, Credit 4 (W, S)**

2067-573

**Macintosh Workstation Installation and Maintenance (Mac I.M.)**

Trains students to install and maintain Macintosh-based imaging workstations. Selected components of hardware and software maintenance are taught. Students receive hands-on instruction in the use and installation of peripheral devices, virus checking and disk maintenance software, system and application software installation, and safety procedures. Methods of hardware operation and optimization are included. (Survey of Computer Science 0602-200, Beginning Electronic Photography 2067-454, instructor approval [significant experience with Macintosh]) **Lec./Lab 4, Credit 3**

2067-574

**Portfolio Seminar/Illustration**

Provides an opportunity to reshoot and refine existing ideas, create new images and develop self-promotion materials. Emphasis is on presentation, editing and organizing a personal portfolio. Interviews, your first job, defining the marketplace/commercial photography, billing/pricing and how to take charge of your career in photography are a few of the topics discussed. Students have an opportunity to share their work with professional designers, art directors and photographers. **Credit 5**

2065-588

**Advanced People Illustration**

An advanced study of people photography, this course is a continuation of People Illustration/Studio with emphasis on the continued development of the photographic and social skills of the studio photographer of people. Another specific subject is the development of the photographer's portfolio. Course assignments are open ended, giving the student freedom to generate independent projects specific to his/her portfolio format. A completed mini-portfolio is required for successful completion of the course. (Completion of People Illustration/Studio 2067-488, a similar course or instructor's permission [by portfolio review]). **Critique/Lec. 2, Lab 5, Credit 5**

2067-599

**Independent Study**

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**

**Imaging Systems Management**

2068-364

**Survey of Production Processing and Finishing**

Provides the nonphotographic processing and finishing major with an opportunity to become knowledgeable in the operational procedures and services of a processing and finishing laboratory. **Class 2, Lab 3, Credit 2 (S)**

2068-400

**Basic Photo Lab Operations**

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 (2076-210) concurrently. **Class 6, Lab 18, Credit 12 (SU)**

2068-401

**Basic Imaging Laboratory Operations I**

Introduction to photographic processing and production systems and their operation and control. Topics will include semi-automatic production processing systems for C-41 color negative film, E-6 color transparency film, process control charts and mini-lab production printers. Students will be introduced to both theoretical principles and experiments in a production environment. **Class 2, Lab 6, Credit 4**

2068-402

**Basic Imaging Laboratory Operations II**

Introduction to digital image processing and production systems and their operation and control. Topics covered through theory and experiment will include principles of digital imaging, PhotoCD, film recording, digital color printing, image scanning and color management in a production environment. **Class 2, Lab 6, Credit 4**

**2068-403** **Basic Imaging Laboratory Operations III**  
Introduction to custom photographic printing techniques, including enlargements, RA-4 and R-3 print processing, internegatives, slide duping and photographic restoration using digital imaging techniques. **Class 2, Lab 6, Credit 4**

**2068-421** **Photographic Systems Process Control**  
A variety of analytical methods of studying the chemical and physical factors required to obtain data, adjust and maintain photographic processing systems in a control status will be explored through theory and experiment. Students will also be introduced to the tools and techniques of total quality that document and help to identify root causes of process problems. **Class 3, Lab 3, Credit 4**

**2068-423** **Applied Statistical Quality Control**  
The basic concepts of quality control and the role of applied statistics are addressed using examples from the photographic and graphic arts industries. Examples include the use of such statistical tools as process capability studies, conformance to specification analysis, control charts, and attribute and acceptance sampling plans. (2068-513) **Credit 4**

**2068-499** **Co-op**  
Provides the student with industry experience in the photo processing and imaging industry. Department staff assists the student with placement. **Credit 0 (F, W, S, SU)**

**2068-501** **Advanced Imaging Laboratory Operations I**  
Explores the application of spreadsheets, databases, computer graphics and desktop publishing systems and software as they relate both to enhancing managerial effectiveness and to identifying emerging areas of business opportunity for imaging services providers. These techniques will be used to explore the application of quantitative methods of decision analysis to problems of scheduling, inventory and project management. (2068-513, 1016-319) **Class 3, Credit 4**

**2068-502** **Advanced Imaging Laboratory Operations II**  
Strategic issues affecting the imaging industry structure and the marketing strategies and tactics of manufacturers of equipment and materials and providers of image production and processing services will be studied through lectures, case studies and projects. Tactical marketing in the imaging industry will be explored through the development of marketing plans, market research studies, promotional campaigns and new product development concepts. The impact of rapid innovation in imaging technology on strategic marketing issues will be explored. (2068-501) **Class 3, Credit 4**

**2068-511** **Imaging Laboratory Systems Analysis**  
Introduces students to the theoretical and practical principles of the operational components used in imaging laboratory production systems. The objective is to achieve an understanding of the electrical, optical and mechanical components of photographic and digital production systems in order to develop skill in basic diagnostic procedures and equipment repair. (2068-403, 0606-411) **Credit 2**

**2068-513** **Imaging Laboratory Operations Management**  
Designed to give the student the background necessary to address work-flow analysis, facilities layout, production costing and planning, scheduling, project management, forecasting and inventory management issues in an imaging laboratory through lectures, case studies and projects. (0101-302, 1016-225, 2068-402) **Credit 4**

**2068-550, 551, 552, 553** **Special Topics in Photographic Processing and Finishing Management**  
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 (F, W, S, SU)**

**2068-561, 562, 563** **Advanced Production Processing and Finishing**  
This course, taken during the last year of study, provides the student with an opportunity to study in depth, on an independent basis, those areas of processing and finishing the student finds most interesting. This course also may be used to strengthen those areas of interest in which the student feels a weakness. **Credit 4**

**2068-599** **Independent Study**  
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by department chairperson and director of the school. **Credit variable (F, W, S, SU)**

## Imaging and Photographic Technology

**2076-200** **Photography I—2067/2060 (summer transfer)**  
An intensive 9-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 2061-201, 202, 203 and 2076-201, 202, 203. Since this course is such an intensive offering, previous photographic experience is highly advisable. **Class 10, Lab 20, Credit 12**

**2076-201, 202, 203** **Photography I**  
An intensive three-quarter sequence concentrating on the fundamentals of black-and-white and color photography. Small-, medium- and large-format cameras are utilized as problem solving tools beginning with 35mm and 4x5 in the first quarter. Professionally equipped upper-class studios are used all three quarters as well as black-and-white labs and color printing in the third quarter. Principles of creativity, craftsmanship, visual communication, presentation, preproduction planning and postproduction analysis are taught. Concepts learned in Materials and Processes of Photography are put to practical application in this class.

**2076-210** **Materials and Processes of Photography**  
An intensive 10-week summer course for students entering a transfer program in biomedical photographic communications or imaging and photographic technology. Replaces 2076-211, 212, 213. (Either this course or the 2076-211, 212, 213 sequence is also a requirement in the professional photographic illustration program.) **Class 9, Credit 6 (SU)**

**2076-211, 212, 213** **Materials and Processes of Photography**  
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**

**2076-221, 222, 223** **Survey of Imaging and Photographic Technology**  
Provides students with information concerning career opportunities within the field of imaging and photographic technology and subdivisions of specialization. Includes presentations by experienced professionals representing a variety of positions. **Class 1, Credit 1**

**2076-301** **Photographic Sensitometry**  
This is a course about *quantitative photographic image quality*. The photographic imaging system—from light source to output—will be investigated, component by component, for the effects each has on system image quality. Students will characterize the image quality of various photographic components, such as exposure, film, paper and processing. Input-output relationships for each component subsystem will be investigated. Component responses will be collectively used to determine system image quality (based on tone reproduction). Related topics—radiometry, photometry and color sensitometry—will also be covered. (2076-211, 212, 213; 2076-201, 202, 203) **Lec. 2, Lab 4, Credit 4**

**2076-302** **Technical Photographic Chemistry**  
Provides both a fundamental and advanced treatment of the photographic process at the molecular level. Light-sensitive emulsion chemistry and formulation, latent image theory and the associated dynamic processes, as well as developer formulation and mechanisms of chemical action, will be treated. Extension and comparisons to solid state and digital imaging processes and materials are investigated. An intensive laboratory component will emphasize application of concepts covered in lectures. (2076-211, 212, 213) **Lec. 2, Lab 4, Credit 4**

**2076-303** **Photographic Optics**  
Provides both fundamental and advanced treatment of the optical processes related to image formation. Particular emphasis on photographic lenses and their element design, as well as mechanical considerations. Treatment will extend to reflective and fiber optics in the context of imaging and communications applications. An intensive laboratory component will emphasize application of classroom concepts. (2076-211, 212, 213, 1016-204, 1017-211, 212, 271, 272) **Lec. 2, Lab 4, Credit 4**

**2076-311** **Color Photo Design**  
Exploration of color images through the application of visual elements, principles and attributes, including the key and quality of light in the making of photographs. Color contrast and rendition, and comparison of rendition with different photo materials. **Class 2, Lab 4, Credit 4**

- 2076-312** **Color Printing Theory**  
Introduction to color theory and the exploration of color processes utilizing practical laboratory procedures and photographic color reproduction processes. Supports 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**
- 2076-313** **Color Measurement**  
Equipment and methods used for the measurement of color are discussed and demonstrated in the laboratory. Topics covered include light sources, radiometry, spectrophotometry, color order systems, color difference formulas and reproduction of color. (2076-321 or equivalent) **Class 2, Lab 4, Credit 4**
- 2076-321** **Applied Computing for Photo Technology**  
An applications-oriented computing course that requires students to integrate software and hardware with new and existing imaging systems and technologies. Students are introduced to concepts associated with machine vision, instrument control, quality management, virtual reality and other situations requiring the interfacing of computers, imaging technology, and the analysis and display of information. (0602-208, 0602-210) **Class 2, Lab 2, Credit 3**
- 2076-356** **Portrait Retouching**  
The study and application of different techniques, materials and processes used in portrait retouching of negatives and prints. Projects making use of these techniques, materials and processes are required. **Class 2, Lab 4, Credit 3**
- 2076-357** **Commercial Retouching**  
The study and application of the techniques, materials and processes used in commercial retouching. Projects making use of these techniques, materials and processes are required. **Class 1, Lab 4, Credit 3**
- 2076-376** **Law Enforcement Photography II**  
Applies photographic techniques to the field of forensic science and law enforcement in general. Emphasizes the recording and visualization of visible and invisible evidence of criminal activities. Among the topics are the use of special techniques, such as infrared and ultraviolet luminescence for forgery analysis, close-up and photomacrography, photomicrography of physical evidence, traffic accident and crime scene photography and the admissibility of photographs in courtroom proceedings. (Law Enforcement Photography I or one of the 2076-201, 202, 203 courses and/or , with permission of instructor, equivalent photo background) **Lec. 2, Lab 1, Credit 4**
- 2076-381** **Introduction to Photography for Publications**  
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. (2067-302, 2076-312 or the permission of instructor) **Class 2, Lab 4, Credit 4**
- 76-401** **Imaging Systems Design**  
Study of the hardware and software needed to effectively design computer graphic images. Workstation labs provide hands-on experience with MS-DOS and Mac computer platforms. (2076-203) **Class 2, Lab 2, Credit 3**
- 2076-454** **Holography I**  
Introduction to holographic and diffractive imaging. Lectures and demonstrations cover the materials, processes and applications of the fundamental types of holograms. Laboratory investigations provide hands-on experience with the construction and playback or transmission, reflection and white-light holograms. (Algebra and physics) **Class 2, Lab 4, Credit 4**
- 2076-455** **Applications of Holography**  
Gives 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. (2076-454) **Credit 4**
- 2076-458** **Architectural Photography**  
An image-making course for advanced students with a specific interest in interior and exterior architectural photography. Assignments emphasize the development and exploration of professional attitudes and techniques while providing a comprehensive study of the subject. All required work is on color transparency materials. (2067-302, 2076-312 or permission of the instructor) **Class 3, Credit 9 (SU only)**
- 2076-461, 462, 463** **Photoinstrumentation Applications Seminar**  
The student is exposed to a variety of technical, industrial and/or applied photographic experiences in order to gain a fuller understanding of the scope of photography and its applications. Simplified approaches to photographic instrumentation applications are emphasized. Photographic topics are discussed that emphasize scientific and technical applications where photography functions as a tool of measurement and visualization of events that are beyond the range of normal photographic equipment. **Class 1 1/2, Lab 4, Credit 4**
- 2076-464** **Reversal Color Printing**  
A one-quarter course on reversal color printing procedures, printing and processing. Students gain proficiency in using reversal print material. (2076-312 or permission of the instructor) **Class 1, Lab 4, Credit 3**
- 2076-468** **Introduction to Dye Transfer**  
An introduction to the dye transfer process using pan matrix film with emphasis on understanding its theoretical principles and on mastering basic transfer techniques. This includes the preparation of transfer prints from the student's color negatives. (2076-312 or equivalent) **Class 1, Lab 6, Credit 4**
- 2076-470** **Summer Nature Photography**  
Students 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 are required to spend several hours per week shooting in natural environments. (2076-201, 202, 203 or permission of instructor) **Class 4, Field 4, Credit 4 (SU only)**
- 2076-471, 472, 473** **Nature Photography**  
Students 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 are required to spend a minimum of several hours per week shooting in natural environments. (2076-201, 202, 203 or instructor permission) **Class 4, Field 4, Credit 4**
- 2076-479** **Introduction to Scientific and Technical Applications of Photography**  
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**
- 2076-481** **Advanced Color Printing**  
This course advances the student's basic knowledge of color printing and assists in the preparation of a color portfolio. Students print their own portfolio-quality images using one or a combination of color-printing avenues. Students can print from negative using RA-4 processing and from transparencies using R-3 or the state-of-the-art P-4 Ilford process. The instructor works with each student to tailor his or her portfolio.
- 2076-486** **Photographic Scanning Systems**  
The student receives instruction and makes 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 is demonstrated and used. Primary emphasis is 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 2076 students; others with permission of the instructor) **Class 2, Lab 4, Credit 4**
- 2076-487** **Special-Effects Photography**  
A course 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 covered are stroboscopic, peripheral, scanning, high-speed flash, matte box and combination flash/tungsten photographic techniques. (For upper-division SPAS students) **Class 2, Studio 4, Credit 4**
- 2076-491** **Introduction to Digital Image Processing**  
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 are covered. Applications such as contrast enhancement, edge sharpening and smoothing are included. (2076-210, 213, and 321 or 0602-208) **Class 2, Lab 4, Credit 4**

2076-499

**Co-op**

Provides students with on-the-job experience in the field of imaging and photographic technology. The student seeks and acquires a school-approved co-op position in business or industry. The working environment provides the forum for learning more about the student's chosen career. A final interview with the co-op coordinator assists the student in evaluating the experience.

**Credit 0**

2076-501

**Introduction to Research**

Prepares the student for the senior research project (2076-502). Covers basic research methods, including experimental design, unobtrusive evaluation and selection of an appropriate statistical treatment for the research to be conducted. Chi-square, two-tailed *t* test, linear regression and nonparametric statistics are taught as pertinent evaluation tools. (Senior status or permission of department chair) **Class 3, Credit 3**

2076-502

**Research Project**

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. (2076-501) **Class 1, Lab 4, Credit 3**

2076-503

**Survey of Nonconventional Imaging**

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 nonsilver applications. (For upper-division 2076 students, others with permission of the instructor) **Class 2, Lab 2, Credit 3**

2076-511

**High-Speed/Time-Lapse Photography**

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 2076 students, others with permission of the instructor) **Class 2, Lab 4, Credit 3**

2076-550, 551, 552, 553

**Special Topics in Imaging and Photographic Technology**

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**

2076-560

**Color Photography Workshop**

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 are 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 (SU)**

2076-562

**Managing Quality in the Graphic Arts and Photographic Industries**

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 are reviewed. **Class 3, Credit 3**

2076-572

**Scanning Electron Microscopy**

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. (2076-211, 212, 213 and 2076-303 or 2061-403 or permission of instructor) **Class 2, Lab 4, Credit 4**

2076-580, 581

**Senior Project**

A two-quarter sequence of formal research investigation in areas of applied, technical or scientific photography, involving camera and/or laboratory-computer work. Project topics are selected and approved in course 2076-50X. The course requires students to plan, organize and execute a research project under the direction of a faculty adviser. Students are responsible for the technical content, experimental design, statistical analysis, accountability for accuracy and the integrity of the investigative process for the project. Requirements for completion of the course are an evaluation of experimental results and a formal written research paper; may include a formal oral presentation. (2076-50X) **Class 2, Lab 2, Credit 2**

2076-599

**Independent Study**

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**

## School of Printing Management and Sciences

2080-001

**Student Seminar**

A required seminar course for incoming freshmen and transfer students. Discussion, presentations and student activities to help students adjust to college-level studies and college life. Individual and group activities to develop or enhance career-related needs and skills, such as group communication, career-path information, personal style, assertiveness and leadership needed for success in the graphic arts industry. Journal writing each session. **Class 1.5, Credit 0**

### Management Courses

2080-211, 212, 213

**Newspaper Seminar I, II, III**

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 include the technological and management considerations unique to newspaper production. This course also serves as an introduction to the technology and procedures applied in the Newspaper Production Laboratory (NewsLab), which plays a major role in the other required newspaper courses. **Class 1, Credit 1 (each quarter)**

2080-NNN

**Management Overview of the Graphic Communications Industry**

An introduction to the major business functions and the structure of the graphic communications industry. Topics include the financial, marketing and production areas of firms in different segments of the industry. **Class 3, Credit 3**

2080-301

**Printing Financial Controls**

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**

2080-302

**Printing Planning Concepts**

A required professional course that provides the student with the basic principles of price determination as it relates to marketing. Special emphasis on estimating links those marketing concepts with practice to arrive at a selling price for printed materials. Class discussions, readings and problems are directed toward a better understanding of the relationship of marketing and planning in a printing environment. **Class 4, Credit 4**

2080-311

**Graphic Software Tools I**

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 and communications software to generate, analyze and present information relevant to the printing industry. **Class 1, Credit 1**

2080-313

**Technical Writing**

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. (2080-312) **Class 3, Credit 3**

**2080-317 Professional and Technical Writing**  
 Develops writing skills for business correspondence, proposals and reports considering techniques, organization, format and style to achieve desired writing purposes. Uses the computer as a writing, editing and rewriting tool. A formal technical research report is required. Class sessions consist of lectures on research techniques, documentation, audience analysis, writing formats and grammatical topics. (0502-220) **Class 3, Credit 3**

**2080-319 Electronic Communications in the Printing and Publishing Industries**  
 Presentation of an overview of electronic communication theory and its application to the publishing industry. Provides the student with the background necessary to relate publishing requirements to electronic system parameters. Several practical newspaper systems are discussed. (1016-225, 226) **Class 4, Credit 4**

**2080-323 Management Overview of the Graphic Communications Industry**  
 Introduces the major business functions and the structure of the graphic communications industry. Topics include the financial, marketing and production areas of firms in different segments of the industry. **Class 3, Credit 3**

**2080-357 Magazine Writing and Design**  
 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 part of the course is devoted mainly to writing techniques and the second to design techniques. **Class 3, Credit 3 (SU)**

**2080-371 Estimating Practice**  
 A detailed study of the practice of estimating that provides 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 are analyzed to determine their importance in the pricing structure of printed materials. (2080-302) **Class 4, Credit 4**

**2080-376 Introduction to Magazine Publishing and Management**  
 A survey course that gives 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 three-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. **Class 3, Credit 3**

**2080-383 Economics of Production Management**  
 A study of the economic factors in printing production systems and the ways in which the industry incorporates those factors into its costing, estimating and pricing practices. **Class 4, Credit 4**

**2080-387 Supervision in the Graphic Arts**  
 Enables 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. **Class 4, Credit 4**

**2080-404 Dynamics of Personal Leadership in Printing**  
 Required for third-year students in the JPRP 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 than can be provided in larger lecture-hall concepts courses. The purpose is to facilitate applications of management theory in career-related situations. Helps students understand the nature of the printing industry and the personal skills, habits, etc., that will improve their effectiveness in an industry position. **Class 5, Credit 3**

**2080-421 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**

**2080-471 Computer Estimating Systems**  
 A continuation of 2080-371 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. (2080-371) **Class 4, Credit 4**

**2080-499 Co-op**  
 Provides students with on-the-job experience in the graphic communications industry. The student seeks and acquires a school-approved co-op position in business or industry. The working environment provides the forum for learning more about career choices within the industry and gives the student the opportunity to test his or her skills in a competitive environment. A final report on the student's work experiences must be submitted to the co-op coordinator. **Credit 0**

**2080-501 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**

**2080-502 Systems Planning**  
 An introduction to problem-solving techniques utilizing applied statistical tools in management situations. **Class 4, Credit 4**

**2080-503 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**

**2080-550, 551, 552, 553 Special Topics—Printing**  
 A management, or management-related, course used to present and investigate on a "one-time" basis special topics not normally covered in the curriculum. Guest lecturers, such as industry leaders, as well as regular faculty conduct this course. Subject to be covered is announced in advance. **Credit variable**

**2080-581 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, coworkers and themselves. **Class 4, Credit 4**

**2080-582 Management of Training in the Graphic Arts Industry**  
Students examine the role of 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. (2081-416) **Class 3, Credit 3**

**2080-587 Establishing a Graphic Arts Operation**  
An elective course for seniors only, with permission of the instructor. A study of the problems to be encountered in the establishment of a graphic arts operation. Students 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**

**2080-591 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. Benefits 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**

**2080-592 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**

**2080-599 Independent Study**  
Student selects and develops, with approval from a faculty sponsor, an independent study project of his or her own design. Project and amount of credit assigned must have final approval from the director of the School of Printing Management and Sciences. (Generally seniors with qualifying GPA) **Credit 1-5**

### Technical Courses

**2081-202 Information Formatting**  
An introductory course that acquaints 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 are shown. **Class 3, Credit 3**

**2081-203 Imaging Technology**  
Required professional course that gives 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 consist of lectures interspersed with films and other audiovisual aids. Homework assignments 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 are required. **Class 3, Credit 3**

**2081-216 Graphic Software Tools I**  
Laboratory introduction to computer basics and the fundamental tools and concepts of "management" software programs, specifically Microsoft Office. Features of Microsoft Office are stressed during structured laboratory time and homework assignments. **Lab 3, Credit 1**

**2081-217 Graphic Software Tools II**  
Laboratory introduction to the fundamental tools and concepts of "page makeup" software programs, specifically QuarkXPress. Features of QuarkXPress are stressed during structured laboratory time and homework assignments. (2081-216) **Lab 3, Credit 1**

**2081-218 Graphic Software Tools III**  
Laboratory introduction to the fundamental tools and concepts of "paint" software programs, specifically Adobe Photoshop. Features of Photoshop are stressed during structured laboratory time and homework assignments. The laboratory assignments reinforce imaging theory discussed in 2081-203, Imaging Concepts. (2081-216 and 2081-217) **Lab 3, Credit 1**

**2081-225 Design and Typographic Fundamentals**  
An introductory course that provides students with the underlying principles of two graphic arts disciplines—printing design and typography. Extensive use of slides, overhead transparencies, handouts and other audiovisual materials are combined with lab assignments on Macintosh computers. **Class 2, Lab 3, Credit 3**

**2081-254 Introduction to the Graphic Communications Industry**  
Introduces the graphic communications industry through history and culture, technology, markets and people. Establishes a conceptual foundation for understanding the current industry by examining the technologies and the businesses that employ them. Students emerge with a sophisticated understanding of the various businesses and roles that exist in the industry. Students are expected to publish a set of brief articles on subjects by the instructor. **Class 3, Recitation 1, Credit 3**

**2081-256 Principles of Copy Preparation**  
A basic course involving fundamental methods and techniques of electronic preparation of copy for reproduction from desktop computers. Stresses the digital formatting of copy for various reproduction methods and compares likenesses and differences. Lectures cover all aspects of copy as used in electronic assembly and formatting for reproduction. Lab projects incorporate basic principles of electronic copy preparation on desktop computers using a variety of software programs. **Class 2, Lab 3, Credit 3**

**2081-306 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**

**2081-307 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**

**2081-308 Advanced Concepts of Newspaper Production Systems**  
The production of a newspaper by photocomposition methods and the offset process. A continuation of 2081-320, in more depth, with special emphasis on prepress operations and the production of special editions. Also, emphasis on the use of color in newspaper production. (2081-307) **Class 2, Lab 3, Credit 3**

**2081-316 Ink and Substrates**  
Provides a basic understanding of the many different kinds of ink and substrates utilized by the various printing processes. Substrate composition, run-ability, 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**

**2081-317 Graphic Communication Distribution Systems**  
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 an introduction to prepress planning for print finishing and distribution. The emphasis is on cost-effective planning and management, familiarization with the mechanical limitations in print production and modern tools and methods in distribution technologies. **Class 3, Credit 3**

**2081-321 Imaging Technology**  
Introduces fundamental imaging concepts in the graphic communications industry. Provides opportunities to develop and exercise written communication skills using a variety of media, both print and electronic. **Class 3, Recitation 1, Credit 3**

**2081-356 Copy Preparation**  
Preparation of copy for reproduction: working from layouts and analysing and deciding on electronic format requirements. Use of type and illustrative copy to create properly assembled and formatted electronic files for output from desktop computers as films or plates and for electronic transmission. Scanning resolutions, trapping considerations, output resolutions and file formats (e.g., EPS, TIFF, PICT, etc.) are some of the areas covered in lectures and incorporated into lab projects. (2081-202, 203) **Class 2, Lab 6, Credit 4**

**2081-358 Calligraphic Forms**  
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**

- 2081-359** **Bookbinding**  
An introduction to the skills of bookbinding and contemporary preservation procedures used to save our printed heritage. Covers 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, good dexterity is desirable. Students should bring several books of their own for rebinding. **Class 3, Credit 3**
- 2081-361** **Introduction to Book Production**  
Introduces 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**
- 2081-363** **Introduction to Book Design**  
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. (2081-202) **Class 2, Lab 3, Credit 3**
- 2081-364** **Flexographic Process**  
A fundamental course based on the principles and practices of the flexographic printing process. Continues on from the basic information given in 2081-201. 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. (2081-201 or 2081-254) **Class 2, Lab 3, Credit 3**
- 2081-366** **Techniques of Image Assembly**  
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 Micro-modifier for spreads and chokes. Other automated prepress imposition systems are covered in the form of slide-lectures. (2081-203) **Class 2, Lab 3, Credit 3**
- 2081-367** **Lithographic Process**  
Builds upon the material encountered in 2081-201. 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. (2081-201 or 2081-254) **Class 2, Lab 3, Credit 3**
- 2081-368** **Screen Printing Process**  
Acquaints 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, photo-mechanical stencil systems, screen printing inks, substrates, and 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. (2081-201 or 2081-254) **Class 2, Lab 3, Credit 3**
- 2081-372** **The Printed Book in America**  
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. **Class 3, Credit 3**
- 2081-373** **Art of the Printed Book 1455-1955**  
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 a new perspective for today's graphic artisan and book printer. **Class 2, Lab 6, Credit 4**
- 2081-374** **Electronic Composition Systems**  
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. (2081-202, 203) **Class 2, Lab 3, Credit 3**

- 2081-381** **Applications of Typographic Concepts**  
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 is expected to produce finished typographic projects. Builds self-confidence in students and sharpens their ability to judge and produce works of a typographic nature. (2081-202) **Class 2, Lab 3, Credit 3**
- 2081-382** **Applications of Printing Design Concepts**  
An elective course that introduces students to the application of digital technology as a tool for creating visual solutions to printing design problems. Emphasis on the arrangement of typographic and pictorial elements to illustrate and expand on the concepts gained from the prerequisite course. Design solutions are developed through thumbnails and roughs, then refined with the appropriate digital software. Typographic mark-up is also incorporated into projects. (2081-202) **Class 2, Lab 3, Credit 3**
- 2081-386** **Gravure Process**  
Building upon concepts of the gravure process learned in 2081-201, this course expands on the theories and practices of the gravure process. Includes both cylinder imaging and press work and involves information on related techniques, equipment, materials and supplies. Includes 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. (2081-201 or 2081-254) **Class 2, Lab 3, Credit 3**
- 2081-401** **Image Capture and Analysis for Graphic Reproduction**  
Introduces students to the theory and practice of image capture methodology for graphic reproduction of monochrome images and provides students with opportunities to perform fundamental lab experiments—using conventional photographic and desktop systems—to promote understanding of their operations and provide data for analysis. Students develop problem-solving and analytical skills using practical and scientific techniques to assess printability of monochrome images. (2081-203) **Class 2, Lab 3, Credit 3**
- 2081-408** **Newspaper Presses**  
An introduction to the printing processes and press designs used in the production of newspaper products. Letterpress, offset and flexographic presses are considered along with modified processes now being adopted and tested for newspaper applications. (2081-307) **Class 2, Lab 3, Credit 3**
- 2081-409** **Color Separation Systems**  
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 prepress systems. (2081-401 or 2081-563) **Class 2, Lab 3, Credit 3**
- 2081-411** **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**
- 2081-414** **Web Offset**  
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. (2081-367) **Class 2, Lab 2, Credit 3**
- 2081-416** **Quality Control in the Graphic Arts**  
A study of what quality is and the importance of quality control in printing. Emphasis is 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. (1016-319) **Class 3, Credit 3**

**2081-454** **Print Finishing Management**  
Planning for successful print finishing requires in-depth knowledge of production phases from design through prepress planning, press, bindery and distribution. 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. (2081-317) **Class 2, Lab 3, Credit 3**

**2081-458** **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**

**2081-464** **Advanced Flexography**  
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. (2081-364) **Class 2, Lab 6, Credit 4**

**2081-467** **Lithographic Press Problems**  
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. (2081-367) **Class 2, Lab 6, Credit 4**

**2081-468** **Screen Printing II**  
Further study of the theory and practice of screen printing that includes 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. Concentration within 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. (2081-368) **Class 2, Lab 3, Credit 3**

**2081-474** **Electronic Composition Workshop**  
An advanced course in 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. Includes lectures, discussions and supervised laboratory assignments with individualized projects. (2081-374 and instructor's permission) **Class 2, Lab 6, Credit 4**

**2081-481** **Development of Printing Types**  
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. (2081-381) **Class 3, Credit 3**

**2081-482** **Layout and Print Design II**  
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 thumbnails to rough to comprehensive layout. The laboratory problems incorporate traditional rendering techniques with desktop digital output to assemble "dummy" presentation comprehensives. (2081-382) **Class 2, Lab 6, Credit 4**

**2081-486** **Advanced Gravure**  
Building upon 2081-366, 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. Includes lectures, laboratory exercises, guest speakers and plant tours. (2081-386) **Class 2, Lab 3, Credit 3**

**2081-550, 551, 552, 553** **Special Topics—Printing**  
Presents and investigates technological topics that 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**

**2081-561** **Foundations of Desktop Prepress Technology**  
Presents how PostScript-based desktop publishing technology is used as a front end to graphic arts prepress systems through an intensive study of the PostScript language and the algorithms used to convert PostScript programs into physical images. Students who take this course gain a deep understanding of how a modern desktop publishing system works and how to approach the task of establishing efficient workflows between clients who are originating work on desktop systems and the printer who deals with it in digital form. (2081-203) **Class 2, Lab 3, Credit 3**

**2081-562** **Color Perception and Measurement in the Graphic Arts**  
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 a combination of lectures, discussions and labs. Guest lecturers and videotapes also are utilized. (2081-416) **Class 2, Lab 3, Credit 3**

**2081-563** **Reproduction Photography**  
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**

**2081-572** **Electronic Color Imaging and Color Control**  
An analytical study of color reproduction systems will give data to consistently produce good-quality color reproduction. Requirements and capabilities of electronic prepress integrated color systems are studied to help in the design and management of a color system, whether it be in-house or part of a network. (Grade of B or higher in 2081-409) **Class 2, Lab 3, Credit 3**

**2081-573** **Typographic Workshop**  
Allows students to create and solve typographic problems of their own choice. Complete freedom is given, and experimentation is encouraged, giving students opportunities to satisfy their own objectives. **Class 2, Lab 6, Credit 4**

**2081-574** **Electronic Publishing**  
Introduces the student to the rapidly evolving concepts, technologies and practices in electronic publishing and provides the student with opportunities to perform fundamental experiments with electronic publishing technology and to discover its application within the printing and publishing industries. (2081-203, 2081-561) **Class 3, Credit 3**

**2081-576** **Digital Printing and Publishing**  
Introduces the rapidly evolving concepts, technologies and practices in digital printing and publishing. Provides opportunities to perform fundamental experiments with digital printing technology and to discover its application within the printing and publishing industries. (2081-321 and 2081-561) **Lec. 2, Lab 3, Credit 3**

**2081-577** **Test Targets and Their Evaluation for Graphic Arts Imaging**  
Students study theories and practices of test targets to help characterize components and, thereafter, to optimize the color reproduction process. Emphasis on understanding and choosing appropriate test targets, such as microlines and halftone patterns, for characterization and determination of control settings among devices. (2081-340 and 2081-510 or instructor's approval) **Class 2, Lab 3, Credit 3**

**2081-729** **Computer-aided Printing Design and Copy Prep**  
A prerequisite to 2081-727, this course introduces the student to the aspects of developing a corporate identity for internal and external publications. Design and produce a corporate-style manual that identifies and specifies all typographic considerations for the publications. Produce samples that demonstrate the application of the corporate style specifications. Extensive use of the desktop computer and appropriate software (i.e., "draw" and "page makeup" programs) is included. Reproduction and transmission concerns are also addressed. The second part of the class continues the development of the manual to its completion. (2081-713) **Class 2, Lab 3, Credit 3**

# College of Liberal Arts

## Criminal Justice

### Major Required Courses

**0501-201** **The Criminal Justice System**  
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 also is given to specific problems within the branches of the criminal justice system. **Class 3, Credit 4**

**0501-203** **Criminology**  
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. Also may be taken as a liberal arts elective. **Class 3, Credit 4**

**0501-204** **Public Administration**  
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, are offered to the student. (0501-201, sophomore or junior status) **Class 3, Credit 4**

**0501-207** **Corrections**  
Introduction to the basic organizations of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, are discussed within the context of historical and contemporary philosophy. Attention also is focused on decision-making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness are surveyed. (0501-201) **Class 3, Credit 4**

**0501-301** **Concepts in Criminal Law**  
An introduction to the fundamental principles upon which substantive criminal law is based. The basic characteristics and requirements of criminal conduct are examined. Included 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. (0501-201, sophomore status) **Class 3, Credit 4**

**0501-303** **Law Enforcement in Society**  
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. (0501-201, junior status) **Class 3, Credit 4**

**0501-304** **The Judicial Process**  
Provides the student with an overview of the structure and function of the federal and state court systems. Emphasis is on the relationship between the federal and state courts, judicial review, judicial decision making and the courts as interpreters of constitutional rights. Part of the liberal arts American politics concentration and also may be taken as a liberal arts elective. (0501-201 required of criminal justice majors; 0513-211 or 0513-215 required of concentration students) **Class 3, Credit 4**

**0501-309** **Juvenile Justice**  
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. Also may be taken as a liberal arts elective. **Class 3, Credit 4**

**0501-401** **Scientific Methodology**  
A foundation in the uses of quantitative social science research methods with special reference to utilization of databases and examples from criminal justice, human services and public policy. Stress is on deducting 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**

**0501-403, 404** **Field Experience and Field Seminar**  
Internship practicum for all preservice criminal justice students. Gives the student first-hand experience in the field of criminal justice in an appropriate organization that meets the needs of the student's career objectives. Students are closely supervised at selected organizations, developing their professional skills while learning the organization's programs and methods. The student also is required to attend a seminar that runs concurrently with field work. (0501-401, senior status) **Class variable, Credit 4 each (F, W)**

**0501-411** **Seminar in Corrections**  
Sequel to Corrections. 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 that provide direction to the correction system today and on the theoretical positions that may affect the future of corrections. (0501-201, 207) **Class 3, Credit 4**

**0501-514** **Planning and Change in the Criminal Justice System**  
Exposes the student to issues of planning within the criminal justice system. Police, courts and corrections are discussed in view of current and proposed changes. The planning of change is emphasized with regard to organizational issues. In addition, attention is given to surveying various strategies for accomplishing change. Gives the advanced student the opportunity to intensely scrutinize the prospective shape of the criminal justice system. (0501-204, senior status) **Class 3, Credit 4**

**0501-526** **Seminar in Law Enforcement**  
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 are explored. (0501-303, junior status) **Class 3, Credit 4**

**0501-528** **Etiology of Crime**  
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 undertakes a historical review of criminality theory and progress to present-day concerns of both etiological origins. (0501-201, 203) **Class 3, Credit 4**

**0501-541** **Research Methods in Criminal Justice**  
Through lecture, discussion and activities associated with a research project, the techniques and methods of data collection and analysis are presented. Students 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. (0501-401) **Class variable, Credit 4**

### Professional Electives

**0501-206** **Administrative Concepts in Law Enforcement**  
Provides the student with an overview of the fundamental concepts of organization and administration and also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively. (0501-203, 303 and sophomore status or higher) **Class 3, Credit 4 (offered occasionally)**

**0501-302** **Organized Crime**  
Provides a critical assessment of the structures of organized crime, its historical development and the areas in which organized crime operates. Special emphasis is 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 are studied and evaluated. (0501-201, 203 and sophomore status or higher) **Class 3, Credit 4 (offered occasionally)**

**0501-306** **Para-Legals**  
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. (0501-201, junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-307 Investigative Techniques**  
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. (0501-303) **Class 3, Credit 4 (offered periodically)**

**0501-405 Major Issues in the Criminal Justice System**  
Focuses on contemporary issues and topics not otherwise distinctly incorporated in established criminal justice courses. Concentrates on student discussion and interaction surrounding required readings on topics such as deviance, crime prevention, issues in the prosecution/court system, deterrence, female criminality and computer applications. Recent examples: Art, Theft and Fraud; Crime and Justice in the Community; International Crime; Legal Controversies in the Law, Seminar in Sexual Violence; Stress in the CJ System; Substance Abuse; Terrorism and Hostage Taking; Legal Research. (Junior or senior status) **Class 3, Credit 4**

**0501-406 Computer Application in Criminal Justice**  
Introduces students to the use of computer-related terminology; historical, current and potential uses of computers; and the classification and use of various types of computer application programs on both super mini- and micro-computers. Standard application software packages and computer hardware systems are discussed as they can be utilized in criminal justice settings. In addition, students have practical experience, including the use of text processing, database and spreadsheet software commonly used in criminal justice agencies and academic settings. **Class 3, Credit 4**

**0501-409 Legal Rights of Convicted Offenders**  
Presents 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 parolees are reviewed. In addition, the various remedies for enforcement of these rights are discussed, including direct appeals, collateral attacks and a variety of postconviction remedies. 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. (Junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-410 Management in Criminal Justice**  
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 that have been effective in business, industry and government, with the intention of discussing their applicability throughout the criminal justice system. (0501-204 or permission of the instructor; junior or senior status) **Class 3, Credit 4**

**0501-412 Social Control of Deviant Behavior**  
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 is 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. (0501-201, 203 and junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-413 Civil Disobedience and Criminal Justice**  
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 "noncriminals," civil disobedience with the criminal justice system and the role of riot commissions. (0501-201, 203 and junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-415 Domestic Violence**  
For social work students, criminal justice students and professionals who are interested in examining the problems related to domestic conflict and violence. Included is a study of the dynamics of violence as reflected in child abuse, incest, marital rape, spouse and parental abuse, and violence among siblings. (Junior or senior status) **Credit 4 (offered periodically)**

**0501-416 Forensic Photographic Evidence**  
Basic photographic techniques applicable to the law enforcement profession or other investigative applications. Covers photographic fundamentals as they apply to the investigative photographer. This leads 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. (Junior or senior status) **Class 3, Credit 4**

**0501-452 Advanced Research Topics**  
Intended for students interested in research applications beyond basic scientific analysis and design. Included are advanced statistical techniques of criminal justice data and qualitative field methods. Three projects are required. First, an analysis of a multi-group design experiment must be performed using an available criminal justice database. Second, an ongoing qualitative field study must be completed utilizing classical observation methodology. Third, the student must complete a draft of a formal research proposal for a sponsoring agency. A group field visit to the research foundation is included in this assignment. The course is in seminar format and includes case discussion and method critiques. Only students who have taken scientific methodology and research methods should apply to this course. **Class 3, Credit 4**

**0501-457 Constitutional Law**  
Provides 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. Part of the liberal arts American politics concentration and also may be taken as a liberal arts elective. (0501-201, 301 and junior or senior status required of criminal justice majors; 0513-211 or 0513-215 required of concentration students) **Class 3, Credit 4**

**0501-505 White Collar Crime**  
An examination of the extent and character of white collar crime with special emphasis upon business and professional deviance. (0501-201, 203 and junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-506 Evidence**  
Provides the student with an awareness of what types of evidence are admissible in a criminal trial. Includes a comprehensive analysis of the most frequently used rules of evidence. There are readings and discussions pertaining to the nature of real, testimonial, hearsay and circumstantial evidence. Examines rules concerning the cross-examination of witnesses, exceptions to the exclusion of hearsay evidence, the burden of proof, the provinces of the judge and of the jury, legal presumptions and the exclusion of illegally obtained evidence. (0501-201, junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-507 Computer Crime**  
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. (Junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-510 Counseling in the Criminal Justice System**  
Instructs the student in the various accepted contemporary dynamics of interviewing and counseling criminal justice and related human service clients. Issues discussed revolve around counseling and supervision strategies and conflicts among agencies, between administrators and staff, and clients. Presents both the practical and theoretical aspects of these issues as well as devotes attention to surveying prospective counseling strategies for accomplishing desired behavioral change. (0501-201, junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-511 Alternatives to Incarceration**  
Analyzes possible sentencing options available to the criminal courts as well as preadjudicatory alternatives for both adults and juvenile offenders. The variety of dispositions evaluated include probation, parole, halfway houses, work-release, study-release, prison furloughs, pretrial release, preprobation 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 nontraditional programs are typically included in the course. (0501-207, 411 and junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-516** **Court Administration**  
 Explores 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 receive significant attention. (Senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-517** **Comparative Criminal Law**  
 Examines, in a comparative analysis, the criminal system and the penal methods of Europe and the United States. Major emphasis is 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. (0501-201, junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-518** **Criminal Justice/Community Relations**  
 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 is on inter-group responsibilities in exploring strategies to reduce conflict in the solving of public problems within the sphere of the criminal justice system. (0501-201, junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-520** **Sentencing Process**  
 Provides the student with a broad overview of the law of sentencing and the alternatives presently available in this area. Emphasis is on the traditional methods of punishment now available in the courts, including, but not necessarily restricted to, fines, imprisonment, probation and suspended sentences. Course also looks to the power of the court in exercising its discretion in the sentencing process. (0501-201, 207, 304 and senior status) **Class 3, Credit 4 (offered on sufficient demand)**

**0501-522** **Victimless Crime and the Law**  
 Familiarizes the student with many of the implications and ramifications of efforts to control "victimless" crimes. Discussions concentrate on the illegal activity associated with prostitution, gambling, homosexuality, drug use and pornography. The social, moral, legal and practical consequences of legalizing such activities are examined and evaluated. (0501-201, 203, 301 and junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-523** **Crime and Violence**  
 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. (0501-201, junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-527** **Seminar in Law**  
 Focuses on the nature, function and limits of the rule of law. Attention is paid to areas of substantive and procedural criminal law to illustrate the nature and limits of the idea of law. Readings draw from both the classical and modern view of law. (0501-301, 304 and senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-529** **Physical Security and Safety**  
 Examines, through survey techniques, the complex problems confronting business and industry in the protection of assets. The use of electronic and nonelectronic anti-intrusion systems and other hardware is examined and evaluated. Safety and accident prevention, health hazard prevention methods, and fire prevention and control also are examined. (0501-201, junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-530** **Women and Crime**  
 Deals with women as criminal offenders and as victims of crime, focusing upon theories about women in crime, types of crimes committed, patterns of criminality and the treatment of women offenders. Also examines the role of women as law enforcement officers, judges, lawyers and correctional officers in the criminal justice system. (Junior or senior status) **Class 3, Credit 4 (offered periodically)**

**0501-532** **Retail Security**  
 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 nonsecurity personnel. Warehousing and cargo controls are examined. Emphasis is on methods, techniques and programs to protect assets. (Junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-535** **Security Management**  
 Focuses on the management skills required in the security function and the corresponding administrative, legal and technical problems. Emphasis is given to purchasing, cost benefit analysis, proprietary versus contract guard forces, personnel management and the relationship between security and nonsecurity employees, and security awareness training programs. (Junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-536** **Seminar in Security**  
 For seniors completing criminal justice degree requirements with a concentration in security. Focuses 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. (Junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-537** **Legal Aspects of Security**  
 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. (Junior or senior status) **Class 3, Credit 4 (offered occasionally)**

**0501-542** **Advanced Research Topics**  
 For students interested in research applications beyond basic scientific analysis and design. Included in the course are advanced statistical techniques of criminal justice data and qualitative field methods. Three projects are required. First, an analysis of a multi-group design experiment must be performed using an available criminal justice database. Second, an ongoing qualitative field study must be completed utilizing classical observation methodology. Third, the student must complete a draft of a formal research proposal for a sponsoring agency. A group field visit to the research foundation is included in this assignment. The course is in seminar format and includes case discussion and method critiques. Only students who have taken scientific methodology and research methods should apply to this course. **Class 3, Credit 4**

**0501-599** **Independent Study**  
 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**

## Economics

The following courses are required for the BS degree. See listings under Service Course area for full course descriptions, unless otherwise indicated.

**0511-301** **Principles of Economics I**

**0511-401** **Principles of Economics II**

**0511-452** **Monetary Analysis and Policy**  
 The study of monetary behavior and the role of monetary institutions in the modern economy. 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. Concludes with an evaluation of the neo-Keynesian and Monetarist positions. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302 or equivalent) **Class 3, Credit 4**

**0511-453 Intermediate Microeconomic Theory**  
Helps develop the tools of analysis utilized in contemporary economics to study the process of price formulation in a capitalist society. Topics covered include the theories of consumer behavior, cost and production, alternative market structures and the pricing of factors of production. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302 or equivalent) **Class 3, Credit 4**

**0511-454 International Trade and Finance**  
Introduces the students to the theory and practical issues of the export/import markets, the international flow of capital and international investment decisions. In addition, students study the foreign-exchange and the Euro-dollar markets and the investment opportunities in them. The role of multinational corporations in international trade and finance also is discussed. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-301 and 0511-302 or equivalent) **Class 3, Credit 4**

**0511-455 Intermediate Macroeconomic Theory**  
The central question of macroeconomics is the determination of output, employment and prices. This course develops models that incorporate behavioral assumptions concerning consumption, investment and the role of money and their relationship to macroeconomic variables. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302 or equivalent) **Class 3, Credit 4**

**0511-456 Industrial Organizations**  
The study of the structure, conduct and performance of contemporary American industry. Involves the application of the tools of microeconomic analysis and empirical evidence to aid in understanding the behavior of modern industry. In addition, the course considers the historical determinants of contemporary market structure and the public policy measures designed to preserve a competitive market structure. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302 or equivalent) **Class 3, Credit 4**

**0511-457 Applied Econometrics I**  
Provides students in the economics program with an opportunity to develop their skills in applied regression analysis. Covers 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. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302, 0106-330, 1016-226) **Class 3, Credit 4**

**0511-458 Applied Econometrics II**  
Introduction to one of the major functions contemporary economists perform—economic forecasting. Students are exposed to alternative theories and the manner in which economists in both the private and public sectors use these frameworks of analysis, data and quantitative methods to generate economic forecasts. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-410) **Class 3, Credit 4**

**0511-459 Managerial Economics**  
A further elaboration of the elementary principles of economic analysis in Principles I and II. Particular emphasis is on the application of these principles to the decision-making process of the firm. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302) **Class 3, Credit 4**

**0511-460 Math Methods: Economics**  
Develops the mathematical skills used by the applied economist in computer-based research. Exercises and research projects for the course are chosen to illustrate the kind of problems actually dealt with by the contemporary applied economist. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302, 1016-226) **Class 3, Credit 4**

**0511-461 Seminar in Applied Economics**  
A senior-level course emphasizing applications of economic analysis and quantitative methods to economic decision making. Cases are drawn from both the private and public sectors of the economy. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. **Class 3, Credit 4**

## Professional and Technical Communication

The following courses are offered by the professional and technical communication department.

### Core Courses

**0502-444 Technical Writing**  
Develops in students those skills necessary for completing technical writing tasks, such as instructional memos, letters of inquiry, reports (trip, progress/status, accident research, feasibility), problem analyses, specifications, flow charts, technical manuals. Students enrolling Technical Writing should have command of clear and logical standard written English prose. Required PTC course. Part of the language concentration and also may be taken as an elective. (0502-220 or equivalent) **Class 3, Credit 4**

**0535-200 Foundations of Communication**  
An introduction to the theoretical and conceptual underpinnings of oral, visual and written communication. Introduces basic communication models, the role of language in communication, symbols and symbolmaking, issues of audience analysis and the development of different modes of discourse. Also explores the history of communication and introduces students to basic research in communications studies. Required PTC course. **Class 3, Credit 4**

**0535-210 Interpersonal Communication**  
Analysis and application of the major theories of interpersonal communication in various situations. 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 PTC course. **Class 3, Credit 4**

**0535-230 Written Argument**  
Develops in students the language and reasoning skills necessary to create responsible and effective written arguments. Required PTC course. (0502-220) **Class 3, Credit 4**

**0535-311 Rhetoric and Public Discourse**  
Analyzes rhetorical discourse as spoken, symbolic human action intending to influence the formation of public opinion and public policy. Various critical perspectives, including classical origins, modern rhetorical theorists and contemporary critical approaches, are applied to public discourse in the United States. Students have the opportunity to apply appropriate critical methods to selected historical and contemporary rhetoric from the American experience. Research and writing are stressed. Required PTC course. **Class 3, Credit 4**

**0535-315 Quantitative Research Methods**  
An introduction to the methods and ethics of scientific, scholarly communication research, including methods of locating, analyzing and critiquing communication research literature. Focuses on empirical methods and leads to the development of a research project proposal. Required PTC course. (0535-200, 210, 221, 310) **Class 3, Credit 4**

**0535-316 Qualitative Research Methods**  
Examines methods of studying communication that rely on the researcher's personal observation skills. Qualitative research seeks to understand the behaviors, beliefs, values, attitudes, assumptions, rituals and symbols that guide people's understanding of their relationships and organizations. Data-gathering techniques include participant observation, naturalistic study, focus group interviewing, phenomenology and ethnography. Students engage in various qualitative data-gathering activities and prepare a research project proposal. **Class 3, Credit 4**

**0535-317 Critical Research Methods**  
An opportunity to design and complete a research proposal using critical research methods. Critical studies interpret and evaluate intentional symbolic communication acts situated in a social-historical context. By selecting and applying objective criteria, the critic's research generates a systematic analysis of specific relationships between source, message, media and/or audience. Messages may be composed of verbal, nonverbal or visual symbols. Typically, research tools are centered on texts, documents, archives and libraries. **Class 3, Credit 4**

**0535-445 Theories of Communication**  
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 are covered. Required PTC course. (0535-200, 201) **Class 3, Credit 4**

**0535-450** **Visual Communication**  
Examines communication processes and principles that use the visual mode. Through a survey of 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 aesthetic, technical or skills approach. Discussion primarily depends on, but is not limited to, photographic images. Required PTC course. (0535-200, 210) **Class 3, Credit 4**

**0535-481** **Persuasion**  
An in-depth study of the theories, practices, effects and ethics of persuasion. Persuasion is defined as human communication designed to influence one's beliefs, values, attitudes and actions. Required PTC course. Part of the language concentration and also may be taken as an elective. (0535-220 or equivalent) **Class 3, Credit 4**

**0535-482** **Mass Communication**  
An introduction to the study of the mass media focusing on the history, development, and law and regulation of the mass media in the United States. Required PTC course. Part of the language concentration and also may be taken as an elective. (0535-200) **Class 3, Credit 4**

**0535-501** **Effective Speaking**  
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. Required PTC course. **Class 3, Credit 4**

**0535-532** **Professional Writing**  
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 should have command of clear and logical standard written English prose. Required PTC course. (0535-200, 230) **Class 3, Credit 4**

**0535-595** **Senior Thesis in Communication**  
A guided research seminar culminating in a major project that brings together the student's communication studies and substantive work in his or her professional core. Focuses on designing, conducting and completing an independent research project. The progress of each project is shared with the class for discussion and critiques. Required PTC course. (0535-410, 411, 445) **Class 3, Credit 4**

### Professional Elective Courses

**0502-445** **History of the English Language**  
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. Designed for anyone who is curious about the English language. May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4**

**0502-446** **Advanced Technical Writing**  
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 is taught with a Macintosh microcomputer.) May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4**

**0502-451** **Creative Writing/Poetry**  
An exploration of the techniques of writing poetry in both open and closed forms. May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4**

**0502-452** **Creative Writing/Prose Fiction**  
An exploration of some of the most important contemporary techniques of prose fiction in the short story form. May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0502-453** **Advanced Creative Writing**  
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 are 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 is determined on the basis of its intrinsic literary merit and its potential value to the student's development as a writer. May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0502-524** **Communication and Documentary Film**  
An examination of the documentary film and video as case studies in communication media. Focuses on film techniques used as argument, persuasion, propaganda and reconstruction of reality. Such elements as director, subject, shooting style and editing techniques are analyzed in terms of message, purpose and audience. PTC elective **Class 3, Credit 4**

**0535-324** **Interviewing**  
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. PTC professional elective. **Class 3, Credit 4**

**0535-415** **Organizational Communication**  
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. (0535-305) **Class 3, Credit 4 (offered occasionally)**

**0535-420** **Advanced Public Speaking**  
Blends classical and modern public address theory in an attempt to produce the speaker who is both wise and eloquent. 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. (0535-221) **Class 3, Credit 4 (offered occasionally)**

**0535-421** **Public Relations**  
An introduction to the study of public relations. Topics include history, research areas, laws, ethics and social responsibilities as they relate to the theory and practice of public relations. Professional elective. (0535-200, 230) **Class 3, Credit 4 (offered occasionally)**

**0535-425** **Teleconferencing Communication Management**  
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. PTC professional elective. (0602-200, 0535-310) **Class 3, Credit 4 (offered occasionally)**

**0535-452** **Uses and Effects of Mass Media**  
An analysis of the "effects" and the "uses and gratifications" of mass communication research with focus on building mass communication theory. PTC professional elective. (0535-482) **Class 3, Credit 4 (offered occasionally)**

**0535-483** **Small Group Communication**  
Practice in analysis of a variety of small group discussion techniques, focusing on phenomena such as processes of interaction, decision making, norms structure and development, membership and theory of group development. PTC professional elective. Part of the language concentration and also may be taken as a liberal arts elective. (0502-220 or equivalent) **Class 4, Credit 4**

**0535-490** **Persuasion and Social Change**  
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. PTC professional elective. Part of the peace studies concentration and also may be taken as a liberal arts elective. (0535-481) **Class 3, Credit 4 (offered occasionally)**

**0535-502** **Speechwriting**  
An advanced elective course in communication for those who wish to increase their abilities to write professional public speeches for themselves or others. The course uses "real life" situations as a context for speech writing assignments in a variety of genres. Professional elective. **Class 3, Credit 4**

**0535-520 Intercultural Communication**  
An examination of the role of culture in face-to-face interaction. Students may find a basic background in communication, anthropology or psychology useful. PTC professional elective. (0535-200) **Class 3, Credit 4**

**0535-525 Special Topics in Communication**  
A focused, in-depth study and analysis of a selected advanced topic in communication and associated issues. Specific topic varies according to faculty assigned and is published when the course is offered. Topics may include: semiotics, communication technologies, gender differences in communication, legal communication, rhetoric of race relations, group dynamics, and censorship and propaganda. PTC professional elective. (For junior and senior PTC students; non-PTC students must receive permission of the instructor) (0535-200) **Class 3, Credit 4 (offered occasionally)**

**0535-550 Film and Society**  
An inquiry concerning the relationship between motion pictures and society that uses historical, humanistic and social science research to achieve an understanding of movies as a social force, industry and art form. PTC professional elective. (0535-482) **Class 3, Credit 4 (offered occasionally)**

**0535-580 Special Topic: International Media**  
A study of print and electronic media outside of the United States, this course explores major international theories and practice of the media, including regional media, especially in Africa, Asia, Europe and Latin America. Assignments include class-led presentations through peer teaching; papers, both practical and theoretical; and a small-group Socratic oral exam. **Class 3, Credit 4**

**0535-581 Special Topic: Civic Discourse in the United Nations**  
A study of communication in the United Nations General Assembly and Security Council, especially through addresses made there. Assignments include a historical understanding of UN addresses, a simulation of the Security Council, assistance in leading an annual Global Awareness Day on the United Nations for high school students and a final exam crisis simulation of the Security Council. Students may have the opportunity to represent RIT as delegates to the North American Model United Nations in Toronto. **Class 3, Credit 4**

**0535-582 Special Topic: Communication and National Development**  
Viewing society and national development from a humanistic perspective, this course deals with communication, social change, developmental ethics, social justice, oppression and liberation, plus various minor issues such as mythologies of development, sustainable development, literacy, interpersonal vs. mass communication, adult education, health care and education, and humanistic vs. humanitarian aid. Assignments include peer teaching of course material, practical and theoretical papers, and a small-group oral Socratic final exam. **Class 3, Credit 4**

**0502-445 History of the English Language**  
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. Designed for anyone who is curious about the English language. May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4**

**0502-446 Writing Technical Manuals**  
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 is taught with a Macintosh microcomputer.) May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4**

**0502-451 Creative Writing/Poetry**  
An exploration of the techniques of writing poetry in both open and closed forms. May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4**

**0502-452 Creative Writing/Prose Fiction**  
An exploration of some of the most important contemporary techniques of prose fiction in the short story form. May be taken as a PTC elective, part of the language concentration or as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0502-453 Advanced Creative Writing**  
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 are 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 is determined on the basis of its intrinsic literary merit and its potential value to the student's development as a writer. PTC writing elective, part of the language concentration or a liberal arts elective. **Class 3, Credit 4**

**0502-517 Newswriting**  
Practicum in basic techniques of newswriting and gathering for the daily press. Emphasis is primarily on writing for the print media and on frequent writing against a deadline. PTC writing elective and also may be taken as a liberal arts elective. **Class 3, Credit 4**

**0502-524 Communication and Documentary Film**  
An examination of the documentary film and video as case studies in communication media. Focuses on film techniques used as argument, persuasion, propaganda and reconstruction of reality. Such elements as director, subject, shooting style and editing techniques are analyzed in terms of message, purpose and audience. PTC elective. **Class 3, Credit 4**

## Psychology

### Core Courses

**0514-201 Freshman Seminar**  
Acquaints students with career opportunities available to psychology majors, assists in exploration of individual career goals and aids students in planning a curriculum strategy that will match their goals. **Class 3, Credit 1**

**0514-210 Introduction to Psychology**  
Introduction to the scope and methodology of psychology. Topics 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)**

**0514-310 Experimental Psychology**  
An introduction to the logic of experimental research and the application of the methods of science to the study of behavior. Emphasis on stating empirically testable hypotheses, experimental design and analysis of data. Requires writing research reports. (Introduction to Psychology and Introduction to Statistics) **Class 3, Credit 4**

### Professional and Elective Core Courses

**0514-440 Childhood and Adolescence**  
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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-441 Growth Psychology**  
Examines the major assumptions, theories and implications of "growth" or humanistic psychology. Students 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 why human persons need to grow psychologically and what societal conditions seem to foster such growth. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-442 Adulthood and Aging**  
Encompasses the psychology 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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-443 Learning and Memory**  
Focuses on the environmental forces that are responsible for the outcome of human development. How learning shapes and changes individuals almost from the moment they are born and how it continues to be all pervasive throughout their lives is studied. The complexity of memory process that is an essential element of learning and learning theories and their application in real-life situations is examined. Part of this psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-444** **Social Psychology**  
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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-445** **Psychology of Perception**  
Covers topics of all sense modalities with emphasis on visual perception. 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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-446** **Psychology of Personality**  
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. Part of the psychology concentration and also may be used as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-447** **Abnormal Psychology**  
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. Part of the psychology concentration and also may be used as an elective (0514-210 or equivalent) **Class 3, Credit 4**

**0514-448** **Industrial/Organizational Psychology**  
Consideration of principles as well as application of and current research in industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership and communication. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-449** **Behavior Modification**  
Students learn the skills of changing their behavior by controlling their environment and the consequences of their behavior. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-450** **Psychology of Altered States of Consciousness**  
Covers such topics as the specialized consciousness in the two halves of the brain, dreaming, hypnosis, meditation, systematic relation and parapsychology. Combines discussion and demonstration. Part of the psychology concentration and also may be taken as an elective (0514-210 or equivalent) **Class 3, Credit 4**

**0514-451** **Psychology of Motivation**  
Surveys basic motivational concepts and provides a fair representation of many different areas of motivational research, relating these to each other where possible. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0514-452** **Psychology of Creativity**  
A psychological investigation of the creative process and creative individuals with a focus on techniques that stimulate creativity. (0514-210 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0514-480** **Psychology of Women**  
Examines the relevance and applicability of present psychological theory and research 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 sociocultural factors, women's place in society, women and their bodies, and women and mental health. Part of the women's studies concentration and also may be taken as an elective. **Class 3, Credit 4**

**0514-483** **Social Psychology of Religion**  
Examines religions as cultures that, 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. Examines the way religions use education, ritual, rewards, punishment, symbols and other mechanisms of social control and cohesion formation to build and nurture their flock. Examines the ways in which religious organizations and their individual members reconcile conflicts between religious and secular norms, world views, loyalties and problem-solving strategies. Suggests 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. Part of the perspectives in religion concentration and also may be taken as an elective. **Class 3, Credit 4**

**0514-504** **Attitude Formation and Persuasion Techniques**  
Focuses on current theories of attitude formation and seeks to apply them to contemporary events to achieve an understanding of how those who wish to shape or change attitudes do so. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-515** **Psychology of Human Adjustment**  
Students learn the skills of coping with a variety of everyday experiences. Particular attention is given to the areas of self-validation, interpersonal tactics and interpersonal relations. (0514-210 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0514-517** **Death and Dying**  
Views death from a social-psychological perspective. After dealing with topics such as the leading causes of death, attitudes toward death, suicide and American funeral practices, focuses on such questions as how people can better cope with their own mortality and that of loved ones, help others face death and help themselves and others during periods of bereavement. (0514-210 or equivalent) **Class 3, Credit 4**

**0514-521** **Psychology and Politics**  
Examines how political attitudes are acquired and altered, how politicians and ordinary citizens satisfy psychological needs through participation in politics and how principles of learning can illuminate processes of political leadership, persuasion and control. (0514-210 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0514-530** **Attention and Pattern Perception**  
One of the most formidable bottlenecks in human information processing is the limitation of human attention. Failures of attention are described in terms of categories. Various characteristics of attention and perception are described. The broader issue of divided attention as it relates to time-sharing of activities is examined. Presentation of experimental findings of selective, focused and divided attention in perception and their relevance to display layout. Both serial and parallel characteristics of attention are addressed. Also includes Gestalt principles and pattern perception. Required information processing track course. **Class 3, Credit 4**

**0514-531** **Language and Problem Solving**  
The structure and function of language, the relationship of language to thought and its role in human problem solving are examined. Perhaps the most significant cognitive capacity of human beings is their use and understanding of language. The possibilities and limitations of computers to comprehend natural language and to replicate human problem-solving abilities are explored. Required information processing track course. **Class 3, Credit 4**

**0514-532** **Judgement and Decision Making**  
Explores judgement and decision-making processes and focuses on the social and cognitive aspects of complex information processing. Topics include selective perception, memory and hindsight biases, framing effects, heuristics and biases, social influences, group processes and common errors. Required information processing track course. **Class 3, Credit 4**

**0514-540** **Visual System**  
This course attempts to treat vision as an integrated one, in part by blending anatomy, physiology and psycho-physics. Central topics are presented in historical context, underscoring the contemporary study of visual perception as part of an unfolding intellectual process. Coverage of rapidly developing topics such as how vision is affected by the nature of the retinal mosaic and the sensory system's amazing plasticity. It stresses the most recent work showing that visual perception is a living and growing field. Required visual perception track course. **Class 3, Credit 4**

**0514-541** **Color Perception**  
Presents important characteristics of color perception and explains how human color experiences depend on the light reflected from objects, the properties of eyes and the nervous system. A goal is to show that perception helps observers to detect and discriminate objects besides giving us more than unending wonder and beauty. It certainly influences many facets of our lives. Applications of color perception to photography, images and color-coding display are discussed. Required visual perception track course. **Class 3, Credit 4**

**0514-542** **Spatial Vision and Pattern Perception**  
How an object's spatial properties influence detection and discrimination are examined. Spatial properties refer to those attributes of an object that jointly determine the perceived size and shape of the object. Traditional views of form perception and the contemporary multichannel model derived from measurements of contrast sensitivity functions are discussed. Measurements of image transferred through the lens and perceived image are compared. The material is prepared within the context of form perception of multiple scales. Required visual perception track course. **Class 3, Credit 4**

**0514-543** **Depth and Motion Perception**  
Cues that the visual system uses to generate the experience of depth are covered. The course goes into more detail in some of the so-called monocular depth cues, particularly those cues that are of great interest to researchers probing machine vision. Discussion of the perception of visual direction is included. Motion perception, including coverage of the latest work on the cortical regions that play special roles in the analysis of global motion is examined. The treatment of eye movements, reafference and structure from motion are included. Required visual perception track course. **Class 3, Credit 4**

**0514-597** **Seminar in Psychology**  
The context and focus of the seminar changes from year to year. It always directs student attention toward an issue or problem in psychology and equips students to understand that issue or problem more fully, enables students to investigate one facet of it in depth and provides an advanced experience of problem-solving. **Class 3, Credit 4**

## Social Work

### Core Courses

**0515-218** **Computer Literacy for Social Work**  
Covers most of the computer literacy requirements for graduation from the social work program. Students must take this course during one of their first two matriculated quarters and are expected to utilize the RIT VAX computer system immediately in other courses. Expected formats for word-processed assignments in other social work courses are covered. Course contents include basic DCL commands, the VAX NOTES conference system, electronic mail, the EVE editor, wordprocessing using WordPerfect, Internet communication between universities, and using communication software between personal computers and the VAX. **Class 1, Credit 2**

**0516-210** **The Professional Social Work Role**  
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, W)**

**0516-212** **Self-Awareness in the Helping Role**  
Develops 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 or 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, S)**

**0516-302** **History of Social Welfare**  
Acquaints 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 examines 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. **Class 3, Credit 4 (F, S)**

**0516-305** **Structure and Function of Social Welfare**  
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. Also explores organization theory as it applies to the structure of these services, as well as major patterns and sources of funding. (0516-302 or concurrent) **Class 3, Credit 4 (F)**

**0516-354, 355** **Human Behavior and the Social Environment I, II**  
A two-course sequence designed to give students a basic knowledge of human development over the entire life cycle. Students 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 is placed in the context of the developmental family life cycle and the ecological perspective of social work practice. Attention is given to effects of racism, poverty and discrimination on the development of individuals in our society. Changing gender roles, sexism and sexual orientation are discussed extensively. Attention also is given to human diversity.

The two courses in the sequence form the foundation on which future 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 (F, W)**

**0516-357** **Mental Health and Mental Illness From a Social Work Perspective**  
Gives social work students a basic understanding of mental health and mental illness from a social work perspective. The role of the social worker in working with individuals and their families is included. Students are given a general understanding of our current mental health systems. The medical model and alternative systems of diagnosis are considered. (0516-354, 355, 0514-210) **Class 3, Credit 4 (S)**

**0516-405** **The Family from a Social Work Perspective**  
Gives the social work student a basic understanding of the family as client. Students 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 also learn about changes that 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. (0516-354, 355 or concurrent) **Class 3, Credit 4 (W)**

**0516-435** **Computer Applications to Social Work Research**  
Introduction to the methodology of research in behavioral and social sciences. Emphasis is 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—to data processing and report writing. (1016-301, 302, 303) **Class 3, Credit 4 (S)**

**0516-456** **Group Theory in Social Work**  
The theoretical foundations of group dynamics and group behavior within the context of social work. Such concepts as types of groups (prevention, rehabilitation), group development, composition, group processes (problem solving, decision making, affection), program, leadership, communication, structure and modes of intervention are covered. Provides the knowledge and initial experiential base for the development of practice skills in working with groups. (Third-year standing) **Class 3, Credit 4 (F, W)**

**0516-465** **Assessing Community Needs**  
Students learn about communities and study assessment techniques for identifying the strengths and weaknesses of services provided within a community. Topics include program evaluation, quality assurance procedures and community networking. Attention is given to programs for minority groups, the disabled, the elderly, youth, persons with mental health problems and other special populations. (0516-405, 456, third-year standing) **Class 3, Credit 4 (S)**

**0516-475 Interviewing and the Helping Relationship**  
The first in a three-course sequence (including 0516-505, 550) 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 interventive skills in a variety of client systems.

Through lectures, discussions, reading, lab simulations and case analysis, the sequence provides 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. (0516-405, 456) **Class 3, Credit 4 (S)**

**0516-505 Assessment and Problem Solving**  
See 0516-475. (0516-435, 465, 475; corequisite with 0516-506, 535, 552) **Class 3, Credit 4 (F)**

**0516-506 Field Instruction I**  
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. (0516-435, 465, 475; corequisite with 0516-505, 527, 535) **Field 300, Credit 5 (F)**

**0516-535 Advanced Social Work Research**  
The first of a two-course sequence in which students conduct research on one or more aspects of professional social work practice during their concurrent field experience. Students 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 is studied, with emphasis on the application of MINITAB®. Specific research designs and statistical analyses applicable to data generated during field-work experience are reviewed. Major focus is 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. (0516-435) **Class 3, Credit 2 (F)**

**0516-540 Evaluation of Practice**  
The second of a two-course sequence is built on material learned in Advanced Social Work Research and its prerequisite. Students learn about baseline assessments, the ethics of research and experimental research. They also learn about report writing, grant writing and the politics of research. Concerns and issues in research with special populations and cross-cultural research also are explored. (0516-535) **Class 3, Credit 2 (W)**

**0516-550 Social Intervention**  
See 0516-475. (0516-505, 506, 535, 552; corequisite with 0516-551, 553) **Class 3, Credit 4 (W)**

**0516-551 Field Instruction II**  
See 0516-506. (0516-505, 506, 535, 552; corequisite with 0516-540, 550, 553) **Field 300, Credit 5 (W)**

**0516-552 Field Seminar I**  
A practicum seminar taken during the first quarter of field instruction. Students and instructor discuss topics related to field experiences and concerns. They study the supervisory process, and topics to be analyzed include staff structure, workloads 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 prefield course content and the concurrently taken courses. (0516-435, 465, 475; corequisite with 0516-505, 506, 535) **Class 2, Credit 3 (F)**

**0516-553 Field Seminar II**  
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, focus is on students' experiential and professional needs. Community service agency management issues are 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 is made by faculty to ensure that students in the field education sequence successfully integrate course content and objectives. (0516-505, 506, 535, 552; corequisite with 0516-540, 550, 551) **Class 2, Credit 3 (W)**

**0516-555 Policy and Planning Processes**  
Explores 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. (Fourth-year standing) **Class 3, Credit 4 (S)**

**0516-598 Professional Seminar**  
For social work students who have completed field instruction. Serves as a capstone in the student's social work education and facilitates 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. (0516-550, 551, 553) **Class 3, Credit 4 (S)**

## Professional Elective Courses

**0516-314 The Social Worker as Advocate**  
Examines 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 is related to examining techniques for achieving change. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-321 Alcoholism: Interventive Skills and Techniques**  
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 are included. (Third-year standing) **Class 3, Credit 2 or 4 (every other year)**

**0516-330 Rural Social Services**  
Identifies the historical development, cultural makeup, family lifestyles, and work habits of the nation's migrant population and the rural poor. Examines and critically analyzes the differences between migrants and the rural poor and compares them to the characteristics of the urban poor found in contemporary American cities. Considers governmental rural policies and service-delivery systems directed to the rural areas that 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. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-340 Deafness: Fundamental Aspects**  
Provides 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. (Third-year standing) **Class 3, Credit 4 (offered every other year)**

**0516-342 Deafness: Intervention Strategies**  
Helps 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. (Third-year standing) **Class 3, Credit 4 (every other year)**

**0516-360 Social Work with the Disabled**  
An examination of the psychosocial aspects of disabilities. 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 or his needs. Intervention strategies and critical times for intervention by the social worker are examined. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-370 Child Protective Services**  
Examines the concepts and knowledge base of child abuse and neglect. Topics 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. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-380 Social Work and the Law**  
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. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-440 Alcohol and the Family**  
Living in an alcoholic family, in which chronic alcoholism is the central theme, can have profound effects on family members, both drinkers and non-drinkers. These effects can be carried from generation to generation in complex ways. This course provides a comprehensive look at alcoholism as a family issue. Includes focusing on the progression within family systems, as well as codependency and adult children of alcoholics. Intervention, treatment and recovery of the alcoholic family also are discussed. (Third-year standing) **Class 3, Credit 2 or 4**

**0516-441 Alcoholism and Human Sexuality**  
Provides the student with a basic understanding of human sexuality and its relationship to alcohol abuse and chemical dependency. Gives the student exposure to skills needed to take a sexual history in an alcoholism treatment facility and to referral sources for the patient. (Third-year standing) **Class 3, Credit 2 or 4 (offered every other year)**

**0516-442 Poly Addiction**  
Gives 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 also takes into consideration ACOAs and EAP and the assessment, treatment, evaluation and consequent training required of professionals in the field. (Third-year standing) **Class 3, Credit 2 or 4 (offered every other year)**

**0516-455 Contemporary Issues in Social Work**  
Offers students an opportunity to examine and discuss contemporary issues in the field of social work. Course content varies from quarter to quarter depending on current issues and student interest. Areas related to expressed student interest, faculty expertise and developments in the field are examined. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-509 Services for Children and Their Families**  
Gives 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 is 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 also is considered. (Third-year standing) **Class 3, Credit 4 (every other year)**

**0516-512 Advanced Intervention with Individuals**  
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 is made of case studies and role playing to further develop the students' skills in this area. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-513 Advanced Intervention with Families**  
For students who have completed the practice sequence and field instruction and have learned the theories and concepts of generalist social work intervention. 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. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-522 Advanced Intervention in Communities**  
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. Investigates specific applications of community intervention theory to political influence processes, coalition, neighborhood associations and regionalization. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-523 Advanced Intervention with Groups**  
Examines social treatment as one form of group work practice. There are different service procedures and approaches that may be applied to client groups, and each may have utility in pursuing distinct service objectives. Investigates the scope, techniques and functions of generalist social work practice in such diverse settings as social service agencies, business, correctional institutions and communities. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-525 Grant Writing**  
Provides the student with a series of readings and experiential exercises necessary for writing a grant proposal. Focus is on funding sources that provide money for social welfare programs and for research into social work. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-536 Aging and Society**  
Concepts, issues and research techniques in the behavioral and biological aspects of aging. Examines the interaction of group processes in the family and community that influence society's attitudes toward the aging process. Further examines the culture, environmental and institutional changes as they relate to an increasing population of older people. (Third-year standing) (May also be taken for liberal arts elective credit under 0515-508) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-537 Social Policy and the Aging**  
Culture and values as the context for policy formulation. Special attention is given to the process of policy analysis and implementation. Several specific policy areas are 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. (Third-year standing) (May also be taken for liberal arts elective credit. See 0515-515.) **Class 3, Credit 4 (offered on sufficient demand)**

**0516-538 Family Violence**  
Acquaints social work students and practitioners with the problem of family violence. The causes and dynamics of various forms of violence in the family are 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 are included. (Third-year standing) **Class 3, Credit 4 (offered every other year)**

**0516-539 Services for the Aging**  
Deals with the variety of existing community-based services available for the elderly. Also examines the tactics, assessment, coordination and evaluation of various direct and indirect services for the elderly. Particular attention is given to such service groups as nursing homes, home health care, mental health, and other formal and informal support systems. (Third-year standing) **Class 3, Credit 4 (offered on sufficient demand)**

0516-599

**Independent Study**

A combined student/faculty effort on a chosen topic beyond the normal course selections. Provides the self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth, and achievement. May include independent work in an agency setting or other field work away from the Rochester area. **Credit variable (F, W, S, SU)**

## Liberal Arts Courses

### Language

0502-220

**English Composition**

Develops the language skills needed to write effectively. Should be taken in the freshman year. **Class 3, Credit 4 (offered quarterly)**

0502-443

**Written Argument**

Seeks to develop in students the language and reasoning skills necessary to create responsible and effective written arguments. Part of the language communication concentration and may also be taken as an elective. (0502-220 or equivalent) **Class 3, Credit 4**

0502-444

**Technical Writing**

Develops in students those skills necessary for completing technical writing 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. Part of the language concentration and may also be taken as an elective. (0502-220 or equivalent) **Class 3, Credit 4**

0502-445

**History of the English Language**

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. Designed for anyone who is curious about the English language. Part of the language concentration and also may be taken as an elective. (0502-220 or equivalent) **Class 3, Credit 4**

0502-446

**Writing Technical Manuals**

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 is taught with a Macintosh microcomputer.) Part of the language concentration and may also be taken as an elective. (0502-220 or equivalent) **Class 3, Credit 4**

0502-449

**Worlds of Writing**

Introduces students to the varieties of popular writing produced by specialists in a particular professional field or academic discipline—for example, business, medicine, engineering, architecture, photography, physics, etc. Includes reading assignments that introduce issues, ideas, problems and personalities from a particular field to readers who are not specialists in that field. Also includes writing assignments in which each student introduces topics from his or her own field to readers unfamiliar with the field. Part of the language concentration and also may be taken as an elective. **Class 3, Credit 4**

0502-450

**English Composition II**

Builds on the writing skills developed in English Composition (0502-220) or its equivalent. Neither a remedial course nor a technical or business writing course, English Composition II is designed for the student who wants to develop writing skills beyond the level attained in English Composition. Part of the language concentration and also may be taken as an elective. (0502-220 or equivalent) **Class 3, Credit 4**

0502-451

**Creative Writing/Poetry**

An exploration of the techniques of writing poetry in both open and closed forms. A writing elective for the professional and technical communication program. Part of the language communication concentration and also may be taken as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4**

0502-452

**Creative Writing/Prose Fiction**

An exploration of some of the most important contemporary techniques of prose fiction in the short story form. A writing elective for the professional and technical communication program, part of the language concentration and also may be taken as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4 (offered occasionally)**

0502-453

**Advanced Creative Writing**

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 are 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 is determined on the basis of its intrinsic literary merit and its potential value to the student's development as a writer. A writing elective for the professional and technical communication program. Part of the language communication concentration and also may be used as a liberal arts elective. (0502-220 or equivalent) **Class 3, Credit 4 (offered occasionally)**

0502-517

**Newswriting**

Practicum in basic techniques of news writing and gathering for the daily press. Emphases is primarily on writing for the print media and on frequent writing against a deadline. **Class 3, Credit 4 (offered occasionally)**

0502-524

**Communication and Documentary Film**

An examination of the documentary film and video as case studies in communication media. Focuses on film techniques used as argument, persuasion, propaganda and reconstruction of reality. Such elements as director, subject, shooting style and editing techniques are analyzed in terms of message, purpose and audience. **Class 3, Credit 4**

## Communications

0535-480

**Human Communication**

An overview of the field of communication, including the contexts of interpersonal, group, mass and public communication. Part of the language concentration and also may be taken as an elective. (0502-220 or equivalent) **Class 4, Credit 4**

0535-481

**Persuasion**

An in-depth study of the theories, practices, effects and ethics of persuasion. Persuasion is defined as human communication designed to influence one's beliefs, values, attitudes and actions. Part of the language concentration and also may be taken as an elective. Required PTC course. (0502-220 or equivalent) **Class 3, Credit 4**

**0535-482** **Mass Communication**  
An introduction to the study of mass media. The focus of the course is on the history, development and law and regulation of the mass media in the United States. Required PTC course. Part of the language concentration and also may be taken as an elective. (0502-200) **Class 3, Credit 4**

**0535-483** **Small Group Communication**  
Practice in the analysis of a variety of small-group discussion techniques, focusing on phenomena such as processes of interaction, decision making, norms structure and development, membership and theory of group development. May be taken as a PTC elective, part of the language concentration or as an elective. (0502-220 or equivalent) **Class 4, Credit 4**

**0535-490** **Persuasion and Social Change**  
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. May be taken as a PTC elective, part of the peace studies concentration or as an elective. (0535-481) **Class 3, Credit 4 (offered occasionally)**

## Foreign Languages

**0503-400, 440, 441** **American Sign Language I, II, III**  
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. Not part of any concentration. **Class 3, Credit 4**

**0503-405, 445-50, 498** **Beginning Arabic I, II, III, IV, V, VI, VII, VIII**  
A sequence of courses 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 introduce students with no prior exposure to the language to modern standard Arabic. Arabic I introduces the phonology and script. Throughout, the emphasis is on acquiring oral skills. Arabic II, III and IV are part of the foreign language/culture concentration and also may be taken as electives. (Permission of the foreign language coordinator) **Class 2, Credit 4**

**0503-408, 451-57** **Beginning Chinese I, II, III, IV, V, VI, VII, VIII**  
A sequence of courses 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 introduce students with no prior exposure to the language to elementary spoken Mandarin. The Chinese writing system is 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**

**0503-412, 472, 473** **Beginning German I, II, III**  
This sequence of courses gives students with no prior exposure to the language a sound basic knowledge of German as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. In addition to language, students study contemporary life and culture in the German-speaking countries. Courses II and III are part of the foreign language/culture concentration and may also be taken as electives. **Class 4, Credit 4**

**0503-420, 480, 481** **Beginning Japanese I, II, III**  
This sequence of courses is designed to give students with no prior exposure to Japanese a sound introduction to the language as it is spoken and written today. Students learn the Katakana and Hiragana syllabaries in level I, supplemented by Kanji at successive stages. A strong emphasis is placed on oral proficiency. These courses are a prerequisite for the KIT-RIT Summer Program in Kanazawa, Japan. Courses II and III are part of the foreign language/culture concentration and also may be taken as electives. **Class 4, Credit 4**

**0503-464, 465** **Beginning French II, III**  
This sequence of courses gives 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. In addition to language, students also study contemporary life and culture in the French-speaking countries. Part of the foreign language/culture concentration and may also be taken as electives. **Class 4, Credit 4**

**0503-466, 467, 468** **Intermediate French I, II, III**  
This sequence of courses at the intermediate level gives students more advanced practice in the skills of speaking, reading, comprehending and writing French. The courses also include segments of the use of French for business. In addition to language, students 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**

**0503-474, 475, 476** **Intermediate German I, II, III**  
This sequence of courses at the intermediate level gives students advanced practice in speaking, reading, comprehending and writing German. Also includes segments on the use of German for business. In addition to language, students 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 3, Credit 4**

**0503-482, 483, 484** **Intermediate Japanese I, II, III**  
This sequence of courses at the intermediate level is designed to give students more advanced instruction and practice in the skills of speaking, reading, writing and comprehending Japanese. A strong emphasis is placed on oral proficiency. These courses are a prerequisite for the KIT-RIT Summer Program in Kanazawa, Japan. This intermediate sequence is part of the language requirement for international business majors. This sequence is part of the foreign language/culture concentration and also may be taken as an elective. **Class 4, Credit 4**

**0503-430, 490, 491** **Beginning Spanish I, II, III**  
This sequence of courses gives students with no prior exposure to the language a sound basic knowledge of Spanish as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. In addition to language, students study contemporary life and culture in the Spanish-speaking countries. Courses II and III are part of the foreign language/culture concentration and may also be taken as electives. **Class 4, Credit 4**

**0503-492, 493, 494** **Intermediate Spanish I, II, III**  
This sequence of courses at the intermediate level gives students more advanced practice in speaking, reading, comprehending and writing Spanish. Also includes segments on the use of Spanish for business. In addition to language, students 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**

## Literature

**0504-332** **Literature**  
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 quarterly)**

**0504-440** **Drama/Theatre**  
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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4**

**0504-441** **The Art of Poetry**  
Emphasizes the enjoyment and study of poetry with primary attention to major poetry in English. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-442** **Short Story**  
A study of a collection of short stories with critical commentary in order to provide source materials on the nature and development of this genre. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4**

**0504-443** **The Novel**  
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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4**

**0504-444** **Film as Literature**  
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. A nontechnical, non-chronological study of film with a balance of roughly 50 percent literature and 50 percent film. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4**

**0504-449** **Great Authors: Mark Twain and the American Dream**  
Consists 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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-450** **Great Authors: Ibsen—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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-451** **Great Authors: Chaucer and His Times**  
A close reading of the major poetry of Geoffrey Chaucer and *The Pearl* poet in modern English translation and a brief introduction to the history of the English language. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-452** **Great Authors: James Joyce**  
Careful study of three of James Joyce's major works: *Dubliners*, *A Portrait of the Artist as a Young Man* and *Ulysses*. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-453** **Great Authors: Henry James**  
Survey of the writings of Henry James, examining 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." Also examines James's contributions to literary theory and his experiments with literary form. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-454** **Great Authors: Shakespeare—Tragedy and Romance**  
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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-455** **Great Authors: Shakespeare—Comedy and History**  
Several of Shakespeare's comedy and history plays are read and analyzed to reveal their literary excellence and theatrical power. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-456** **Great Authors: Dostoevsky**  
A study in the style, themes and purposes of one of the world's greatest novelists. At least one long novel is read, along with several shorter works. The writer is studied in the context of nineteenth-century Russia and for the implications his works and life continue to have for twentieth-century Western culture. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-457** **Great Authors: Tolstoy**  
A study in the style, themes and purposes of one of the world's greatest novelists. At least one long novel is read, along with several shorter works. The writer is studied in the context of nineteenth-century Russia and for the implications his works and life continue to have for twentieth-century Western culture. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-458** **Great Authors: Walt Whitman**  
In 1967, the Nobel Laureate poet Pablo Neruda said, "We live in a Whitmanesque Age." Course attempts to show Whitman as the "representative man" of his time and to assess the validity of his claim that he initiated the poetry of democracy. Also considers his living and influential presence in our time. Students read Whitman's poetry and some of his (unjustly neglected) prose; selected works by his contemporaries, such as Tennyson and Longfellow; and some works by our contemporaries, such as Neruda and Allen Ginsberg. Part of the literature concentration and also may be taken as an elective. (0504-322 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-460** **Modern Literature: Modern Poetry**  
A close examination of the poems of important English and American poets of the 19th and 20th centuries, including several living poets. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-461** **Modern Literature: Latin American Literature**  
Reading short stories, novels and poetry of modern Mexico and 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. Part of the literature concentration and the foreign language/culture concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-462** **Literature and Technology**  
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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-463** **Literature Topics: Literature of the Bible**  
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. Part of the literature concentration and perspectives on religion concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-464** **Literature Topic: Myth, Legend, Folklore**  
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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-465** **Literature Topic: Viking Myth and Saga**  
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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-466** **Literature Topic: Black Literature before 1920**  
Traces the literary contributions of selected black writers in the various genres from their roots in the African heritage through slavery to the Harlem Renaissance. Part of the literature concentration and the minority relations concentration. Also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-467** **Literature Topic: Black Literature after 1920**  
Traces the literary contributions of selected black writers in the various genres from the Harlem Renaissance to the present day. Part of the literature concentration and the minority relations concentration. Also may be taken as an elective. (0504-332) **Class 3, Credit 4 (offered occasionally)**

**0504-468** **Literature Topic: The American Spirit in Literature**  
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. Part of the literature concentration and also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-469** **The New American Literature**  
Walt Whitman described America as a “teeming nation of nations.” Such diversity has not always been represented in American literature. This course explores the contested and complex cultural history of the United States. Beginning with the idea of “discovering” an inhabited land, we examine issues of identity, migration, difference and work in literature presented in historical context. The emphasis is on underrepresented voices in writing by African American, Caribbean, Puerto Rican, Chicano/a, Native and Chinese Americans. This course looks at both the struggle and the possibilities of forging a genuinely democratic literary tradition. Part of the literature concentration and also may be taken as an elective (0504-332 or equivalent) **Class 3, Credit 4**

**0504-470** **Literature Topic: Tolkien and Mythlore**  
J. R. R. Tolkien’s major works are analyzed to see how fantasy and myth are significant vehicles for dealing with major issues of our contemporary world. Tolkien’s mythlore is 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. Part of the literature concentration and also may be taken as an elective. (0504-332) **Class 3, Credit 4 (offered occasionally)**

**0504-448** **Biographical Literature**  
Students develop skills to critically read one of the 20th century’s most popular literary genre—the various forms of biographical literature. The course distinguishes between biographical and autobiographical literature and asks students to examine and critique the strengths and weaknesses of various forms. Selections attempt to explore lives lived within a variety of cultures. Part of the literature concentration and also may be taken as an elective. (0504-332) **Class 3, Credit 4**

**0504-480** **Women in Literature**  
Concentrates on literature by women, about women, primarily from the early 19th century to the present. 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. Part of the women’s studies concentration and also may be taken as an elective. **Class 3, Credit 4**

**0504-481** **Literature of War and Peace**  
Gives students an awareness of the different views on war and peace in world literature and cinematic works. Part of the peace studies concentration, the literature concentration, but also may be taken as an elective. (0504-332 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0504-484** **Literature and Religion**  
Exploration of the complexity of religious experience, both personal and cultural, as it is portrayed by writers from biblical times to our own day. The literature is supplemented by readings from such disciplines as psychology, philosophy, history and theology. Part of the perspectives on religion concentration, the literature concentration, and also may be taken as an elective. **Class 3, Credit 4**

**0504-516** **Literature and Society**  
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)**

**0504-524** **Contemporary Film**  
A study of contemporary world films, to be drawn from those presently showing in the Rochester area (theaters, television, film festivals). Emphasis is on both technical and aesthetic aspects of the films. **Class 3, Credit 4**

## Science and Humanities

### Fine Arts

**0505-213** **Fine Arts: Visual Arts**  
Students develop ability in perceiving worth in objects of art through consideration of fundamental concepts in painting, sculpture and architecture, involving analysis, interpretation and principles of aesthetics. **Class 3, Credit 4 (offered quarterly)**

**0505-214** **Fine Arts: Musical Arts**  
An introduction to music as a fine art. Students develop skills in listening, evaluation and analysis through an examination of music’s forms, constituent elements, and stylistic and historical development. **Class 3, Credit 4 (offered quarterly)**

**0505-215** **Fine Arts: Film Arts**  
Students develop ability to view analytically and evaluate the film arts, both still and moving (motion) pictures, through consideration of their technologies, histories, aesthetics and critical writings. **Class 3, Credit 4**

**0505-441** **American Architecture**  
A survey of American architecture from the seventeenth century to the present. Stress is placed on a visual as well as historical and social analysis. Part of the American artistic experience concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-442** **Music in the United States**  
A survey of music in the United States from the time of European colonization to the present. Particular emphasis is placed upon the question of what makes music distinctively “American.” Part of the American artistic experience concentration and the music concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-443** **Images of American Life**  
Students examine images of American life in the 19th and 20th century in the visual arts, particularly photography, to analyze and evaluate the influences of American political, social and cultural events on imagery and perception. Part of the American artistic experience concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-444** **American Painting**  
A survey of the style and meaning in American paintings from the colonial limners to contemporary artists. Centers on what distinguishes painting of the colonies and of the United States from its European counterpart. Part of the American artistic experience concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-445** **Issues in American Art**  
A comprehensive overview of American attitudes and philosophies as they have shaped and been embodied in our artistic heritage. Emphasis is placed on American art from 1850 to the present. Part of the American artistic experience concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-446** **American Film**  
Students develop an understanding of theories, styles and trends in American film through a historical and sociological study of the medium. Part of the American artistic experience concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-447** **The American Musical Theatre**  
Survey of the development of American opera and the American musical theatre, highlighting representative works, composers, librettists and performers of both the “cultivated and vernacular traditions.” Part of the American artistic experience concentration and the music concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-448** **20th Century American Music**  
Survey of both the cultivated and vernacular traditions of American music in the 20th century, taking into account its political, social and historical frameworks. Part of the American artistic experience concentration and the music concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-449** **Music Theory I**  
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 is given to the analysis of form and style. Part of the music concentration and also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

**0505-450** **Music and the Stage**  
Survey of the development of opera and the American musical theatre, highlighting representative works, composers, librettists and performers. Part of the music concentration and also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

**0505-451** **Music Performance**  
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 prepares significant musical compositions for public performance. Credit: one hour per quarter; a total of four such credits may count as a liberal arts elective. Part of the music concentration and also may be taken as an elective. **Class 1, Credit 1 (offered quarterly)**

**0505-452** **Special Topics in American Art**  
A critical examination of issues and/or artistic developments in American art. The topic may have been briefly covered in another concentration course. Provides a unique opportunity to expose the student to an in-depth analysis of one selected aspect of American art. Examples of likely topics are: American landscape painting; American portraiture; pop art of the '60s; jazz; Robert Venturi and post-modern architecture in America; criticism and theory; or other topics dealing with American painting, sculpture, architecture, music and film. Part of the American artistic experience concentration and also may be taken as an elective. Prerequisites, if any, are determined by the instructor. **Class 3, Credit 4 (offered occasionally)**

**0505-453** **Theatre in the United States**  
A broad survey of theatre in the United States, designed to acquaint students with the main figures, companies, plays, productions and stylistic currents that have defined the American stage since the Revolution. Emphasizes the native and multicultural features of our theatre's development, while taking due note of the influences from Europe. Also introduces students to some of the impulses, both traditional and avant garde, that have characterized the American theatre since mid-century. Part of the American artistic experience concentration and also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

**0505-480** **Women and the Visual Arts**  
Examines the image of women in the visual arts and the role of women as image makers. Major topics 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 by 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. Part of the women's studies concentration and also may be taken as an elective. **Class 3, Credit 4**

**0505-481** **Oriental Art**  
A survey outlining the development of art in India, China and Japan, examining the philosophical circumstances that distinguish Eastern artistic traditions. There is opportunity for each student to pursue special interests in depth. Part of the foreign language/culture concentration and also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

**0505-482** **Beethoven**  
Introduction to 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, focuses on the development of the "Dionysian" personality in Beethoven's compositions and the creation of the sublime in music. 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)**

**0505-483** **Bach and the Baroque**  
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 are 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." 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)**

**0505-484** **Romanticism in Music**  
Survey of the rise of German Romanticism from Beethoven to Strauss in the context of the development of 19th century musical styles in general. Part of the German language culture concentration and the music concentration and also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

**0505-485** **Music Theory II**  
For the student who has completed Music Theory I or a comparable program of study. In addition to the continuing study of melodic construction and development, thematic development in two-part counterpoint, four-part harmony, and analysis of form and style, emphasis is placed on the development of individual musical skills. Part of the music concentration and also may be taken as an elective. (0505-449) **Class 3, Credit 4 (offered occasionally)**

**0505-501** **Craftsmanship in Gothic Art**  
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)**

**0505-509** **Impressionism to Analytical Cubism**  
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. 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)**

**0505-512** **Master Drawings Since the Renaissance**  
A study of drawings from the 15th to the 20th centuries, including the works of Leonardo da Vinci, Michelangelo, Durer, Rembrandt and Picasso. **Class 3, Credit 4 (offered occasionally)**

**0505-514** **Cubism to the Present**  
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 are discussed. **Class 3, Credit 4 (offered occasionally)**

**0505-519** **Rembrandt Van Rijn: His Art and Times**  
A study of the life, art and times of the Baroque master. Emphasis is 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)**

**0505-520** **Picasso**  
The life and work of one of the most influential artists of our century. **Class 3, Credit 4 (offered occasionally)**

**0505-530** **Art and Human Values**  
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)**

**0505-532** **African Tribal Art**  
After an investigation of the world of "primitive" man and the function of art in a tribal environment, this course focuses on preliterate societies of sub-Saharan Africa. **Class 3, Credit 4 (offered occasionally)**

**0505-534** **Renaissance and Baroque Art**  
Examines the stylistic development of painting in Europe from 1420 to 1650. The Renaissance style is 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 are discussed from the point of view of the Renaissance style to investigate concepts of stylistic continuity, evolution and change. Paintings also are discussed within their culture and political contexts. **Class 3, Credit 4 (offered occasionally)**

**0506-483** **The Biblical Tradition**  
An examination of Judaism and Christianity as they are presented in the Old and New Testaments. Part of the perspectives on religion concentration and also may be taken as an elective. **Class 3, Credit 4**

**0506-484** **Introduction to the New Testament**  
Provides 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, is applied. Part of the perspectives on religion concentration and also may be taken as an elective. **Class 3, Credit 4**

## History

**0507-301** **History: Modern America**  
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)**

**0507-302** **History: Modern European**  
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)**

**0507-440 United States Social and Intellectual History**  
Examines 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 that shape American history and helps to explain the present. Instead of detailing day-to-day chronology, this study highlights the sweep of major trends and movements over longer periods of the American experience. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-441 20th Century American Diplomatic History**  
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. Part of the history concentration and the global studies concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-442 The Contemporary Middle East**  
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. Part of the history concentration, the international relations concentration and the foreign language/culture concentration. Also may be taken as an elective. (0507-301 or 302 or equivalent for the history concentration; 0513-211 or 215 or equivalent for the international relations concentration) **Class 3, Credit 4**

**0507-443 European Social Intellectual History Since 1600**  
An analysis of social events and intellectual movements in Europe since 1600. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-444 Strategy and Diplomacy: Europe, 1871-1945**  
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. Part of the history concentration and the international relations concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-445 Modern Latin America**  
Survey of the historical development of the Hispanic and Portuguese areas of the Americas from independence to the mid-20th 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. Part of the history concentration and the foreign language/culture concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-446 Europe Since 1945**  
An analysis of the political, economic, social and cultural events that have shaped the new system of Europe since 1945. Part of the history concentration and the global studies concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-447 The United States Since 1945**  
An analysis of the major themes characterizing post-World War II United States history. Investigates the specific characteristics of America as a modern state. Selected themes have an intellectual, cultural and political history focus. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-448 The History of Russia to 1917**  
A study of the historical context and development of Russian society and the factors leading to the emergence of the Soviet regime. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-449 The History of Russia Since 1917**  
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 Russia. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-450 Europe of the Dictators: Stalin, Mussolini, Hitler**  
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, détente and contemporary Europe. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-451 United States Community History**  
Students study the lives of Americans in various communities (such as families, working, ethnic and political communities) from 1850 to the present. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-452 Race and Society**  
A social, historical, political, religious and anthropological appraisal of the factors that have produced the differences between social appearances and social attainments of the world's population. Primary emphasis is on the fact that such differences are not sufficient reason for believing that there are underlying disparities or innate capacities among races. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-453 United States-Latin American Diplomatic Relations**  
The emphasis is on analyzing the United States' relations with Latin America from independence to the present. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-454 Crime, Violence and Urban Crisis**  
Analyzes 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. A comparative study on America's and the world's problems of violence, crime and urban crisis. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-455 The Italian American Experience**  
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. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-456 The United States and The Third World Revolutions in the 20th Century**  
One of the dominant features of the 20th century has been the revolution of rising expectations in the countries of the Third World. Students 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. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-457 The History of Popular Culture in America**  
American myths, icons, heroes and institutions as represented in American popular culture from the late nineteenth century to the present. Examines the history of popular entertainment and the mass media in the United States. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-458 Civil Liberties in American History**  
Teaches the history of civil liberties in America. Emphasis is on the current state of civil liberties. Students make philosophical as well as historical analyses of cases. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-459 Social Justice and the Constitution in American History**  
Analyzes how well the Constitution has met the social and political expectations of citizens. Emphasis is on analyzing Supreme Court cases that explain the current state of social justice. A companion course to 0507-532, Civil Liberties in American History. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-460** **Revolutionary Leaders in Latin America**  
In this course three movements are 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, the student comes to an understanding of the historical perspective and nature of social discontent in Latin America. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-461** **The Renaissance World**  
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. Part of the history concentration and also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-480** **History of American Women**  
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. Part of the women's studies concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-483** **Christianity in the West**  
Traces the development of Christian thought in the broad historical context of Western Civilization. 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 the Christian tradition. Part of the perspectives on religion concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-485** **Foundations of Asian Civilizations**  
A study of the Confucian/Buddhist world in East Asia, focusing on China and Japan, their origins and cultural characteristics. Part of the foreign language/culture concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-486** **China and Japan in the 20th Century**  
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. Part of the foreign language/culture concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-487** **History of Chinese Communism**  
An analysis of the main characteristics of Chinese Communism, its native roots, Marxist/Leninist elements and Maoist innovations. Also examines 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 are examined. Part of the foreign language/culture concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-488** **Modern Germany**  
A study of Germany in the 19th and 20th centuries, beginning with the unification of Germany in 1871 and tracing the political evolution of the nation to the present. Special emphasis is placed on the rise of Nazism. Pertinent social and cultural factors are considered as well. Part of the history concentration, the international relations concentration and the foreign language/culture concentration. Also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-489** **Japan in the Modern World**  
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. Part of the foreign language/culture concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-490** **History of Mexico**  
The historical development of Mexico, including the colonial period, independence movement, the liberal-conservative class and the revolution of 1910. Part of the foreign language/culture concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered alternate years)**

**0507-491** **Black Experience in America**  
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. Part of the minority relations concentration and the history concentration; also may be used as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-492** **Selected Problems in Black History**  
A seminar approach to the thought of key black leaders (Washington, Garvey, King) and the study of civil rights and black-power movements. Part of the minority relations concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4 (offered occasionally)**

**0507-493** **History of Social Discrimination**  
A study of the discriminatory practices, present and historical, found in the United States. Includes the cultural values and problems of acculturation for the American Indian, Black, Puerto Rican, Chicano, Asian, women and religious groups, with emphasis on their implication to social work. Part of the minority relations concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-494** **The Immigrant in American History**  
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. Part of the minority relations concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-495** **Black Civil Rights in the 20th Century**  
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. Compares his views with those of the recent Black Power Movement. Part of the minority studies concentration and the history concentration; also may be taken as an elective. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-496** **Survey of African History**  
Provides an overview of African history and politics in three phases: precolonial times, colonialism and the postcolonial era. Part of the history concentration, global studies concentration and minority relations concentration. (0507-301 or 302 or equivalent) **Class 3, Credit 4**

**0507-507** **World at War 1914-45**  
Gives continuity (interpretation of cause and effect relationships) to the major developments of the period 1914-45. 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. Considers the causes of World War I and examines the military operations in some detail. **Class 3, Credit 4 (offered occasionally)**

**0507-530** **19th Century American Diplomatic History**  
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**

**0507-550** **The Ascent of Man**  
A multidisciplinary study in societal, historical, intellectual, technological and scientific perspectives of man's development from prehistoric times to the present. Partially based on the television series, "The Ascent of Man," created and narrated by J. Bronowski. **Class 3, Credit 4 (offered occasionally)**

**0507-552** **War and Crises, 1945-Present**  
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, détente, multinational business, the press and crises in the Middle East. Background is developed for decisions of the 1990s. **Class 3, Credit 4 (offered occasionally)**

0507-557

**Communism, Fascism and Democracy  
in Their Theoretical Foundations**

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**

0508-211

**Science, Technology and Values**

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 quarterly)**

0508-440

**History of Science**

A study of the origins, nature and development of Western science and its social, economic and cultural context. Part of the social impacts of science and technology concentration; also may be taken as an elective. **Class 3, Credit 4**

0508-441

**Science and Technology Policy**

Examines how local, state, Federal and international policies are developed to influence innovation, the transfer of technology and industrial productivity in the United States and other selected nations. Part of the social impacts of science and technology concentration; also may be taken as an elective. **Class 3, Credit 4**

0508-442

**History of American Technology**

An examination of the cultural context of American technology and its influence on American social, economic, political and cultural institutions. Part of the social impacts of science and technology concentration; also may be taken as an elective. **Class 3, Credit 4**

0508-443

**Face of the Land**

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 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. Part of the social impacts of science and technology concentration; also may be taken as an elective. **Class 3, Credit 4**

0508-444

**Social Consequences of Technology**

Modern society is increasingly based on technology. With each advance due to technology, unanticipated problems are also introduced. Society must define and solve these problems or the advances may be diluted or lost. In this course we study several interactions between technology and the world in which we live. We investigate how various technologies developed and compare the expected effects of the new technologies with the actual results. Part of the social impacts of science and technology concentration; also may be taken as an elective. **Class 3, Credit 4**

0508-445

**Biomedical Issues in Science and Society**

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. Part of the social impacts of science and technology concentration; also may be taken as an elective. **Class 3, Credit 4**

0508-446

**Makers of Modern Science**

Helps 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. Part of the social impacts of science and technology concentration; also may be taken as an elective. **Class 3, Credit 4**

0508-447

**Special Topics in the Social Impacts  
of Science and Technology**

Offered periodically in the social impacts of science and technology concentration. Topic and specific content and methods vary from year to year or term to term. Allows examination of a special problem or area relevant to the other courses in this area of study. Also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

0508-481

**Introduction to Environmental Studies**

Makes students aware of the environmental consequences of modern technology by investigating to what degree various technological systems conflict with the basic ecological principles. Part of the environmental studies concentration and also may be taken as an elective. **Class 3, Credit 4**

0508-482

**Energy and the Environment**

Students look at the current situation with 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 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 look especially at the role of government policy in the energy area. Part of the environmental studies concentration and also may be taken as an elective. **Class 3, Credit 4**

0508-483

**Environmental Values**

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. Part of the environmental studies concentration and also may be taken as an elective. **Class 3, Credit 4**

0508-484

**Environmental Policy**

Public compliance with environmental regulations has become increasingly complicated as a result of many laws and regulations instituted since the mid 1960s. Students study the consequences of major environmental legislation and regulations and examine the actions of both citizens and the corporate sector as they comply with these laws. They also focus on the economic and social implications and value of environmental regulation and enforcement and identify current developments in the area. Part of the environmental studies concentration and also may be taken as an elective. **Class 3, Credit 4**

0508-485

**Development of U.S. Energy Policy**

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 aids in understanding some of the current energy conflicts and debates. Part of the environmental studies concentration and also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

0508-486

**Modern Warfare Technology  
and Arms Control Problems**

Study of the importance of science and technology to defense matters. Investigates 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. Also how scientists, by providing their expertise, have been able to influence national security and attempts to control arms. Part of the peace studies concentration and the social impacts of science and technology concentration; also may be taken as an elective. **Class 3, Credit 4**

0508-487

**Special Topics in Environmental Studies**

Offered periodically in the environmental studies concentration. Topic and specific content and methods vary from year to year or term to term. Allows examination of a special problem or area relevant to the other courses in this area of study. Also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

0508-503

**Technology and the Individual**

A study of the effects on the life of the individual due to the acceleration of technological change. **Class 3, Credit 4 (offered occasionally)**

0508-506

**Space, Time and Reality**

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. Students 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)**

0508-507

**Community Energy Planning**

Allows 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)**

**0508-512** **Science as a Humanity**  
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)**

**0508-514** **History of American Medicine**  
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)**

**0508-515** **Community Environmental Issues**  
Explores 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 is on events and issues relating primarily to Monroe County, the topics are prevalent in any community in the United States today. The student learns 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 (offered occasionally)**

### **Philosophy**

**0509-210** **Philosophy: Selected Issues**  
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)**

**0509-211** **Philosophy: Ethics**  
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)**

**0509-213** **Philosophy: Critical Thinking**  
An introduction to philosophical analysis, especially as it may be applied in contexts other than professional philosophy. **Class 3, Credit 4 (offered quarterly)**

**0509-440** **Philosophy of Religion**  
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. Part of the philosophy concentration and the perspectives on religion concentration; also may be taken as an elective. **Class 3, Credit 4**

**0509-441** **Logic**  
An introduction to the basic principles of logic. The main emphasis is on symbolic, or formal, logic but some attention may be paid to informal logic as well. Part of the philosophy concentration and also may be taken as an elective. **Class 3, Credit 4**

**0509-442** **Aesthetics**  
Introduces students to thinking philosophically about the nature of art and its relation to other human experiences. Among the topics considered are the aesthetic experience, the relation between morality and art, ugliness in art and truth in art. Part of the philosophy concentration and also may be taken as an elective. **Class 3, Credit 4**

**0509-443** **Philosophy of Science**  
An examination of the nature of the scientific enterprises; possible discussion topics include the presuppositions of science, its logic, its claims to reliability, and its relationships to society and to problems of human values. Part of the philosophy concentration and also may be taken as an elective. (At least one prior course in either philosophy or one of the natural sciences—physics, chemistry, biology) **Class 3, Credit 4**

**0509-444** **The Great Thinkers**  
Introduces the student to the thought of some of those philosophers who have been most influential in the history of ideas. An attempt is made to cover in some depth the works of one or more of those "great thinkers." The student will begin to recognize the enduring nature of some of our most pressing problems, as well as the intellectual foundation of proposed solutions. Part of the philosophy concentration and also may be taken as an elective. **Class 3, Credit 4**

**0509-445** **Social and Political Philosophy**  
An examination of some of the main problems of social and political philosophy through analysis, comparison and critical examination of various views concerning the natures of individuality and society, the relations between them and the dependence of one on the other. Part of the philosophy concentration and also may be taken as an elective. (At least one prior course in philosophy, political science or sociology) **Class 3, Credit 4**

**0509-446** **Philosophy of Law**  
An introduction to philosophical analysis centering on the nature, extent and justification of law; the nature of legal thought; and the problems and theories of justice. Part of the philosophy concentration and also may be taken as an elective. **Class 3, Credit 4**

**0509-447** **Contemporary Moral Problems**  
Presents moral issues which arise in the professions and other areas of technical expertise. These problems in applied ethics are 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 applies moral theory to one of a number of professional areas, such as business, communications, medicine and bioethics, public policy and technology. Part of the philosophy concentration and also may be taken as an elective. (0509-211) **Class 3, Credit 4**

**0509-448** **Philosophy of Peace**  
An introduction to some of the philosophical dimensions of the search for world peace, including the elements that would constitute a just and lasting peace, nations as moral entities, justice and national self-interest, force and violence, the morality of the use of force, peace-making and peace-keeping groups. Part of the peace studies concentration and philosophy concentration; also may be taken as an elective. **Class 3, Credit 4**

**0509-449** **Special Topics in Philosophy**  
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. Part of the philosophy concentration and also may be taken as an elective. **Class 3, Credit 4 (offered occasionally)**

**0509-450** **Undergraduate Seminar in Philosophy**  
Examines some area of philosophy at an advanced undergraduate level. The area examined may 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. 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**

0510-210

**Cultural Anthropology**

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 4, Credit 4 (offered quarterly)**

0510-440

**Culture in Crisis**

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. Part of the social change in a technological society concentration and also may be taken as an elective. (0510-210 or 0515-210) **Class 4, Credit 4**

0510-441

**American Culture: The Anthropology of Us**

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. Part of the social change in a technological society concentration and also may be taken as an elective. (0510-210 or permission of instructor) **Class 4, Credit 4 (offered occasionally)**

0510-483

**The Anthropology of Religion**

Provides 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 is studied from a cross-cultural, anthropological perspective. Emphasis is on primitive and peasant societies. Part of the perspectives on religion concentration and also may be taken as an elective. **Class 4, Credit 4 (offered occasionally)**

0510-501

**Anthropological Research Methods:  
Explorations in Subcultural Diversity**

Exposes students from a variety of backgrounds to an alternative means of understanding human behavior through the methods of the cultural anthropologist and demonstrates that variations in cultural patterning exist in our presumably homogeneous society. The primary emphasis is 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 4, Credit 4 (offered occasionally)**

0510-502

**American Culture: The Archaeology of Us**

American history and contemporary American society are examined through the only unexpurgated record of our behavior, the material remains. Illustrates how the techniques of archaeology can throw new light on the lives of our Pilgrim forebearers, 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 4, Credit 4 (offered occasionally)**

0510-505

**Cultural Diversity**

Diversity of cultures is a pervasive fact of life in America in the second half of the 20th century. The dynamics of intergroup relations will have a profound impact on American economic, social, political and cultural life in the 21st century. 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, are used in order to assist students in understanding and adjusting to diversity. **Class 4, Credit 4**

**Psychology**

0514-210

**Introduction to Psychology**

Introduces the student to the scope and methodology of psychology. Topics include aims and methods, sensation and perception, learning and memory, emotion and motivation, normal and abnormal personality, and social psychology. **Class 4, Credit 4 (offered quarterly)**

0514-440

**Childhood and Adolescence**

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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-441

**Growth Psychology**

Examines the major assumptions, theories and implications of “growth” or humanistic psychology. Students 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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-442

**Adulthood and Aging**

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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-443

**Learning and Memory**

Focuses on the environmental forces that are responsible for the outcome of human development. 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. Examines the complexity of memory process, which is an essential element of learning and learning theories and their applications in real-life situations. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-444

**Social Psychology**

Gives 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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-445

**Psychology of Perception**

Covers topics of all sense modalities with emphasis on visual perception. 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. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-446

**Psychology of Personality**

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. Part of the psychology concentration and also may be used as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-447

**Abnormal Psychology**

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. Part of the psychology concentration and also may be used as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-448

**Industrial Psychology**

Consideration of principles as well as application of, and current research in, industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership and communication. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4**

0514-449

**Behavior Modification**

Students learn the skills of changing their behavior by controlling their environment and the consequences of their behavior. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4 (offered occasionally)**

**0514-450 Psychology of Altered States of Consciousness**  
Covers such topics as the specialized consciousness in the two halves of the brain, dreaming, hypnosis, meditation, systematic relaxation and parapsychology. Combines discussion and demonstration. Part of the psychology concentration and also may be taken as an elective (0514-210 or equivalent) **Class 4, Credit 4**

**0514-451 Psychology of Motivation**  
Surveys basic motivational concepts and provides a fair representation of many different areas of motivational research, relating these to each other where possible. Part of the psychology concentration and also may be taken as an elective. (0514-210 or equivalent) **Class 4, Credit 4 (offered occasionally)**

**0514-452 Psychology of Creativity**  
A psychological investigation of the creative process and creative individuals with a focus on techniques that stimulate creativity. (0514-210 or equivalent) **Class 4, Credit 4 (offered occasionally)**

**0514-480 Psychology of Women**  
Examines the relevance and applicability of present psychological theory and research 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 sociocultural factors, women's place in society, women and their bodies, and women and mental health. Part of the women's studies concentration and also may be taken as an elective. **Class 4, Credit 4**

**0514-483 Social Psychology of Religion**  
Examines religions as cultures that, 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. Examines the way religions use education, ritual, rewards, punishment, symbols and other mechanisms of social control and cohesion formation to build and nurture their flocks. Examines the ways in which religious organizations and their individual members reconcile conflicts between religious and secular norms, world views, loyalties and problem-solving strategies. Suggests 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. Part of the perspectives on religion concentration and also may be taken as an elective. **Class 4, Credit 4**

**0514-504 Attitude Formation and Persuasion Techniques**  
Focuses on current theories of attitude formation and seeks to apply them to contemporary events to achieve an understanding of how those who wish to shape or change attitudes do so. (0514-210 or equivalent) **Class 4, Credit 4 (offered occasionally)**

**0514-515 Psychology of Human Adjustment**  
Students learn the skills of coping with a variety of everyday experiences. Particular attention is given to the areas of self-validation, interpersonal tactics and interpersonal relations. (0514-210 or equivalent) **Class 4, Credit 4 (offered occasionally)**

**0514-517 Death and Dying**  
Views death from a social-psychological perspective. After dealing with topics such as the leading causes of death, attitudes toward death, suicide and American funeral practices, focuses on such questions as how people can better cope with their own mortality and that of loved ones, help others face death, and help themselves and others during periods of bereavement. (0514-210 or equivalent) **Class 4, Credit 4**

**0514-521 Psychology and Politics**  
Examines how political attitudes are acquired and altered, how politicians and ordinary citizens satisfy psychological needs through participation in politics and how principles of learning can illuminate processes of political leadership, persuasion and control. (0514-210 or equivalent) **Class 4, Credit 4 (offered occasionally)**

## **Sociology**

**0515-210 Foundations of Sociology**  
Introduces students to the way sociologists interpret social reality, the major elements of the field and the most important research findings. Included are such topics as cultural differences and ethnocentrism, socialization, social statuses and roles, group dynamics, social institutions, stratification, collective behavior. **Class 4, Credit 4 (offered quarterly)**

**0515-441 The Changing American Family**  
This sociology course examines contemporary patterns in the courtship, marital and family systems of the United States, with special reference to gender role definitions, participation in the workplace and variations in social class. Part of the social change in a technological society concentration and also may be taken as an elective. (0515-210 or 0510-210) **Class 4, Credit 4**

**0515-442 The Urban Experience**  
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. Also examines the issues of neighborhoods, subareas, ghetto enclaves, metropolitan regions, urban social and political structures, problems, services and planning. Part of the social change in a technological society concentration and also may be taken as an elective. (0515-210 or 0510-210) **Class 4, Credit 4**

**0515-443 Sociology of Work**  
Analyzes the essential properties of work, its structure, the group processes involved in it and its social meaning. Treats work as emerging, like other social realities, out of social relationships between individuals and groups. Looks at ways in which people can develop a positive self-regard or a sense of alienation in their occupations or professions and various types of work organizations. Also considers leisure as a complement to work. Part of the social change in a technological society concentration and also may be taken as an elective. (0515-210 or 0510-210 or instructor's permission) **Class 4, Credit 4**

**0515-444 Social Change**  
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. This course helps students understand and deal with change rather than to simply react to it. Part of the social change in a technological society concentration and also may be taken as an elective. (0515-210 or 0510-210 or equivalent) **Class 4, Credit 4**

**0515-446 Sociology of Health**  
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 is 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. Part of the social change in a technological society concentration and also may be taken as an elective. (0515-210 or 0510-210 or equivalent) **Class 4, Credit 4**

**0515-447 Women in Contemporary U.S. Society**  
This sociology course examines three major social institutions that shape the lives of women in contemporary U.S. society: the family, the workplace and political structure. Part of the social change in a technological society concentration and the women's studies concentration; also may be taken as an elective. (0515-210 or 0510-210) **Class 4, Credit 4**

**0515-448 Minority Group Relations**  
Deals 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 are analyzed as forms of conflict resolution. Part of the social change in a technological society concentration and the minority group relations concentration; also may be taken as an elective. **Class 4, Credit 4**

**0515-449 Population and Society**  
Study of demographic variables of mortality, fertility and migration as they affect the rise and quality of population. Part of the social change in a technological society concentration and also may be taken as an elective. (0515-210 or 0510-210) **Class 4, Credit 4**

**0515-482 African American Culture**  
Analyzes past, present and future social policies, programs and practices from their actual and predictable effects on black people. These analyses and solutions 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. Presents a systematic means of facilitating change in people's attitudes and behaviors. Part of the minority relations concentration and also may be taken as an elective. **Class 4, Credit 4**

0515-483

**Hispanic American Culture**

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 are 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 are specifically selected for analysis. Helps 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. Part of the minority relations concentration and also may be taken as an elective. **Class 4, Credit 4**

0515-506

**Social Inequality**

A survey course that examines different dimensions of stratification in the U.S. and elsewhere. Explanations for the existence of inequality are addressed at individual, group and institutional levels. **Class 4, Credit 4 (offered occasionally)**

0515-507

**Complex Organizations**

Analyzes the structure and dynamics of a wide variety of social organizations (government bureaucracies, corporations and voluntary groups). Topics include theories of organization, organizational processes, technological impact, and organizational change and development. An examination of the internal operation of large organizations includes sources of power and authority, modes of communication and division of labor, as well as tension, stress and strain. **Class 4, Credit 4 (offered occasionally)**

0515-508

**Aging and Society**

Considers concepts, issues and research techniques in the behavioral and biological aspects of aging. Examines the interaction of group processes in the family and community that influence society's attitudes toward the aging process. Further examines the cultural, environmental and institutional changes as they relate to an increasing population of older people. **Class 4, Credit 4**

0515-509

**Social Policy**

An examination of social policy formulation in a variety of contexts from local government to national government. Special attention is given to the strategies, choices and priorities in the formulation of social policy. Deals with historical development of social policies, including the issues of health, aging, poverty, family and children. Also examines the question of how social values and economy influence policy development. **Class 4, Credit 4 (offered occasionally)**

0515-510

**Juvenile Justice**

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**

0515-513

**Criminology**

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**

0515-515

**Social Policy and the Aging**

Course work is organized around culture and values as context for policy formulation. Special attention is given to the process of policy analysis and implementation. Several specific policy areas are 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 4, Credit 4**

0515-524

**Applied Sociology**

Provides 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 4, Credit 4**

0515-529

**Deaf Culture in America**

An introductory survey of culture among various groups of deaf people in the United States. Students study the scholarly literature dealing with these groups and have contact with members of this community. Familiarizes students with the characteristics of deaf culture as well as general perceptions of deafness and the deaf community within the dominant hearing society. Students should come to recognize and appreciate this segment of American cultural diversity. (0515-210 or 0510-210) **Class 4, Credit 4**

0515-569

**Human Sexuality**

This course is sex positive in its approach to the study of human sexual behavior. It focuses upon basic physiology, sexual awareness, sexual development throughout the life cycle, sex roles, sexual myths, legal and social issues, premarital and marital sexual behavior, and alternative sexual choices. Frequently these issues raise questions of sexual attitude and value, and these are examined and clarified. **Class 3 + 2-hr. weekly seminar, Credit 4 (offered occasionally)**

## Social Science

**Economics**

0511-440

**Urban Economics and Public Policy**

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 that explain the location behavior of consumers and businesses in cities. The second part is issue oriented, applying the insights gained in the first part to a number of urban problems. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

0511-441

**Economics of Human Resources**

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. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

0511-442

**Contemporary International Economic Problems**

Prepares the student to deal with foreign exchange market, international trade decisions, the macroeconomic effects of trade on domestic economics, and the effects of domestic business fluctuations on international trade and finance of each country. Though basically a theory course in economics, emphasizes the applied aspects of international trade and finance. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

0511-443

**Current American Macroeconomic Problems**

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. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

0511-444

**Public Finance**

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. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

0511-445

**Survey of Economic Thought**

A survey of the various schools of thought that 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. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

**0511-446 Economics, Public Policy and Competition**  
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. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

**0511-448 Economics of Less Developed Countries**  
Introduction 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. Part of the global studies concentration and the economics concentration; also may be taken as an elective. (0511-301) **Class 3, Credit 4**

**0511-449 Comparative Economic Systems**  
A comparative analysis of different economic systems. The three major economic systems studied are the Capitalist Mode of Production, the Planned Economy and the Mixed Economy. The student studies 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 is 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. Part of the global studies concentration and the economics concentration; also may be taken as an elective. (0511-301) **Class 3, Credit 4 (offered occasionally)**

**0511-450 Benefit-Cost Analysis**  
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. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

**0511-451 Forensic Economics**  
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 is the foundation of this course. Part of the economics concentration and also may be taken as an elective. (0511-301) **Class 3, Credit 4**

**0511-452 Monetary Analysis and Policy**  
The study of monetary behavior and the role of monetary institutions in the modern economy. 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. Concludes with an evaluation of the neo-Keynesian and Monetarist positions. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302 or equivalent) **Class 3, Credit 4**

**0511-453 Intermediate Microeconomic Theory**  
Helps develop the tools of analysis utilized in contemporary economics to study the process of price formulation in a capitalist society. Topics include the theories of consumer behavior, cost and production, alternative market structures and the pricing of factors of production. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302 or equivalent) **Class 3, Credit 4**

**0511-454 International Trade and Finance**  
Introduces the students to the theory and practical issues of the export/import markets, the international flow of capital and international investment decisions. In addition, students study the foreign-exchange and the Euro-dollar markets and the investment opportunities in them. The role of multinational corporations in international trade and finance also is discussed. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-301 and 0511-302 or equivalent) **Class 3, Credit 4**

**0511-455 Intermediate Macroeconomic Theory**  
The central question of macroeconomics is the determination of output, employment and prices. This course develops models that incorporate behavioral assumptions concerning consumption, investment and the role of money and their relationship to macroeconomic variables. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302 or equivalent) **Class 3, Credit 4**

**0511-456 Industrial Organizations**  
The study of the structure, conduct and performance of contemporary American industry. Involves the application of the tools of microeconomic analysis and empirical evidence to aid in understanding the behavior of modern industry. In addition, the course considers the historical determinants of contemporary market structure and the public policy measures designed to preserve a competitive market structure. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302 or equivalent) **Class 3, Credit 4**

**0511-457 Applied Econometrics I**  
Provides students in the economics program with an opportunity to develop their skills in applied regression analysis. Covers 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. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302, 0106-330, 1016-226) **Class 3, Credit 4**

**0511-458 Applied Econometrics II**  
Introduction to one of the major functions contemporary economists perform—economic forecasting. Students are exposed to alternative theories and the manner in which economists in both the private and public sectors use these frameworks of analysis, data and quantitative methods to generate economic forecasts. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-410) **Class 3, Credit 4**

**0511-459 Managerial Economics**  
A further elaboration of the elementary principles of economic analysis presented in Principles I and II. Particular emphasis is on the application of these principles to the decision-making process of the firm. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302) **Class 3, Credit 4**

**0511-460 Math Methods: Economics**  
Develops the mathematical skills used by the applied economist in computer-based research. Exercises and research projects for the course are chosen to illustrate the kind of problems actually dealt with by the contemporary applied economist. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. (0511-302, 1016-226) **Class 3, Credit 4**

**0511-461 Seminar in Applied Economics**  
A senior-level course emphasizing applications of economic analysis and quantitative methods to economic decision making. Cases are drawn from both the private and public sectors of the economy. Required course for economics degree. Part of the economics concentration and also may be taken as an elective. **Class 3, Credit 4**

**0511-480 The Economic Role of Women**  
Analyzes the economic role of women in today's society. 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)**

**0511-481 Environmental Economics**  
Examines the relationship and apparent conflict between economic growth and environmental quality, the economics of environmental issues and policy, the environment as a resource and a public good, and the ability and lack of ability of free markets and the government to deal adequately with pollution and other environmental problems. Part of the environmental studies concentration and the economics concentration; also may be taken as an elective. (0511-301) **Class 3, Credit 4**

### **Political Science**

**0513-211 American Politics**  
A study of the American national political system, its theoretical foundations and institutions, and the contemporary issues that confront it. **Class 3, Credit 4 (offered quarterly)**

**0513-215 Political Ideologies**  
Examines the major political ideologies, their idea sets and accompanying action plans across the political spectrum and clarifies students' political preferences for them. **Class 3, Credit 4 (offered quarterly)**

**0513-440 International Relations**  
A critical analysis of 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. Part of the international relations concentration, the global studies concentration and the peace studies concentration; also may be taken as an elective. (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

**0513-441 Politics in China**  
Provides students with the political dynamics of the People's Republic of China. Major emphasis is given to the historical background, major aspects of the political systems and the foreign relations of China. Part of the international relations concentration and the foreign language/culture study concentration; also may be taken as an elective. (0513-211 or 0513-215) **Class 3, Credit 4**

**0513-442 Government and Politics of Russia**  
An analysis of the politics and governmental systems in Russia. Emphasis is on the dynamics of political, economic and social change, as well as political leadership and contemporary issues. Part of the international relations concentration and also may be taken as an elective. (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

**0513-443 Foreign Policy of Russia**  
A critical examination of the fundamental elements of the foreign policy of Russia from the Soviet era to the present. Special emphasis is 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 the "Near Abroad." Part of the international relations concentration and also may be taken as an elective. (0513-211 or 0513-215) **Class 3, Credit 4**

**0513-444 The Cold War and Diplomacy**  
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. Part of the international relations concentration and also may be taken as an elective. (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

**0513-445 Comparative Politics**  
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. Part of the international relations concentration, the American politics concentration and the global studies concentration; also may be used as an elective. **Class 3, Credit 4**

**0513-481 Women in Politics**  
A study of feminist thought as it applies to the political, economic and social status of women and how it has been expressed through the women's political movement. Students study a number of public policies as they apply to and affect women and examine the opportunities for women to participate in the political process. Part of the American politics concentration and the women's studies concentration; also may be taken as an elective. **Class 3, Credit 4**

**0513-450 State and Local Politics**  
A study of politics and government on the state and local levels and the relationships between these levels and the federal government. It illustrates differences in state governments by comparing other states to New York and uses the Rochester area for comparisons with local governments found elsewhere. Part of the American politics concentration and also may be taken as an elective. (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

**0513-451 The Legislative Process**  
Examines the role of the legislature in the U.S. political process. The primary emphasis is the study of the U.S. Congress, but some attention also is directed to state legislatures. Topics studied include elections, party organization, committees, interest-group activities and executive-legislative relations. Part of the American politics concentration and also may be taken as an elective. (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

**0513-452 The American Presidency**  
A study of the role of the presidency in the American political system. Among the topics 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. Part of the American politics concentration and also may be taken as an elective. (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

**0513-453 American Foreign Policy**  
A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures and philosophies shaping the development and implementation of foreign policy. Part of the American politics concentration and the international relations concentration; also may be taken as an elective. (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

## Service Courses

**0513-454 Political Parties and Voting**  
 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. Overall emphasis is on the degree to which parties perform or fail to perform as links between citizens and government. Part of the American politics concentration and also may be taken as an elective. (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

**0513-455 Politics and Public Policy**  
 A study of the politics of the policy process covering these basic questions: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government implement public policy? How does government evaluate public policy? Part of the American politics concentration and also may be taken as an elective (0513-211 or 0513-215 or equivalent) **Class 3, Credit 4**

**0513-456 The Judicial Process**  
 Examines the structure and function of the state and federal courts in the American political system. Part of the American politics concentration and also may be taken as an elective. (0513-211 or 0513-215) **Class 3, Credit 4**

**0513-457 Constitutional Law**  
 Provides 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. Part of the American politics concentration and also may be taken as an elective. **Class 3, Credit 4**

**0513-502 Politics of Developing Countries**  
 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. Focuses on the political problems of the developing countries that occupy roughly the southern half of the earth's land mass. **Class 3, Credit 4 (offered occasionally)**

**0513-514 Theories of Political Systems**  
 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)**

## Senior Seminar

**0520-501 Senior Seminar**  
 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 change from year to year, they 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 1, Credit 2 (offered quarterly)**

## Independent Study

**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, provided 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**

*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.*

**0502-301 College Writing**  
 This course develops college-level writing competencies. The credits earned, however, may not make up part of the student's normal liberal arts curriculum. Furthermore, this course may not be substituted for English Composition. **Class 1, Credit 1**

**0502-404 Communication with the Handicapped**  
 An examination of the communication difficulties with the handicapped, specifically the deaf, blind and others with physical handicaps. Includes interpersonal, family, social and rehabilitation modes of communication. (0514-210) **Class 3, Credit 4 (offered occasionally)**

**0511-301 Principles of Economics I**  
 The first course of a two-quarter sequence that introduces the student to the basic principles of economics. Focuses on basic economic concepts and macroeconomics. Topics of primary interest include economic methodology, 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 are selected by the instructor. **Class 3, Credit 4 (offered quarterly)**

**0511-401 Principles of Economics II**  
 The second course in a two-quarter sequence that introduces the student to the basic principles of economics. Focuses 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 are selected by the individual instructor. **Class 3, Credit 4 (offered quarterly)**

**0513-401 National Security Forces in Contemporary American Society I**  
 Examines the sociology aspects of officership and the military criminal justice system and introduces 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**

**0513-402 National Security Forces in Contemporary American Society II**  
 Examines 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**

**0519-201, 202, 203 History of Airpower**  
 A study of the development of airpower from its origins to the present, dealing with the impact of airpower upon 20th-century warfare. 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)**

**0520-201 Seminar: Academic Fields of Study (Tech. and Lib. Studies)**  
 Introduces 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 is 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 1, Credit 1**

**0535-403 Effective Technical Communication**  
 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**

## College of Science

## Biology

**1001-200** **Freshman Symposium**  
Introduction to academic and student life in the biology department. **Class 1.5, Credit 1 (F)**

**1001-201** **General Biology**  
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. (High school biology and chemistry) **Class 3, Credit 3 (F)**

**1001-202** **General Biology**  
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. (1001-201 or permission of instructor) **Class 3, Credit 3 (W)**

**1001-203** **General Biology**  
A study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology. (1001-202 or permission of instructor) **Class 3, Credit 3 (S)**

**1001-205, 206, 207** **General Biology Laboratory**  
Laboratory work to complement the lecture material of General Biology (1001-201, 202, 203). The experiments are designed to illustrate concepts; develop laboratory skills and techniques; and improve ability to make, record and interpret observations. (Corequisite 1001-201, 202, 203) **Lab 3, Credit 1 (F, W, S)**

**1001-230** **Introduction to Co-op Seminar**  
Exploration of cooperative education opportunities in the biological sciences. Practice in writing letters of application, résumé writing and interviewing procedures. **Class 1, Credit 1 (W)**

**1001-251** **Introductory Cell Biology**  
A study of the major concepts in cell biology that focuses on the molecular coordination within the cell that is necessary for life. Emphasis is on the evolution of structures and functions that permit cells to live and grow as single, independent organisms or as the fundamental subunits of complex multicellular organisms. Lab includes exercises on the theory of experimental design, applications of this theory in classical and investigative experiments, and observations on the diversity and complexity of cellular life. (High school biology and chemistry; biology or biotechnology major; or permission of instructor). **Class 3, Lab 3, Credit 4 (F)**

**1001-252** **Introductory Developmental Biology**  
Exploration of the major concepts in developmental biology using investigative laboratory techniques to illustrate principles of cell specialization and differentiation. Lab introduces students to biological systems that can be manipulated to study gene and cell functions at different levels of complexity. Students become familiar with experimental systems, discuss their initial results, develop new approaches to experimental design based on these results, and test their predictions of the outcomes. Lecture incorporates discussions of students' lab findings, background material and current research applications of the systems and techniques approach to scientific investigations. Modification of developmental mechanisms is examined as a fundamental process in bringing about evolutionary change. (Biology or biotechnology major and 1001-251, or permission of instructor). **Class 3, Lab 3, Credit 4 (W)**

**1001-253** **General Physiology**  
A study of the major concepts in physiology by exploring the evolutionary strategies employed by multicellular life forms to exploit environmental niches, with an emphasis on functional adaptation. Laboratory exercises include classical experiments in plant and animal physiology with an emphasis on investigative approaches to scientific problem solving. (Biology or biotechnology major and 1001-252, or permission of instructor). **Class 3, Lab 3, Credit 4 (S)**

**1001-301** **Invertebrate Zoology**  
Biology of invertebrate animals with emphasis on phylogeny and functional morphology. (1001-253 or equivalent or permission of instructor) **Class 3, Lab 3, Credit 4 (F)**

**1001-302** **Vertebrate Zoology**  
Morphology, physiology, behavior, classification and ecology of chordates. (1001-253 or equivalent or permission of instructor) **Class 3, Lab 3, Credit 4 (W)**

**1001-303** **Comparative Vertebrate Anatomy**  
A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes that occur during evolution. (1001-305, 306) **Class 3, Lab 6, Credit 5 (F)**

**1001-304** **Botany**  
Distribution of the major groups of plants and their adaptations to their particular environment. (1001-253 or equivalent or permission of instructor) **Class 3, Lab 3, Credit 4 (S)**

**1001-305** **Physiology and Anatomy**  
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 physiology experiments with human subjects. (1001-253 or equivalent or permission of instructor for nonscience majors) **Class 4, Lab 3, Credit 5 (F)**

**1001-306** **Physiology and Anatomy**  
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. (1001-305 or permission of instructor) **Class 4, Lab 3, Credit 5 (W)**

**1001-310** **Plant Physiology**  
Physiological phenomena in the growth and development of higher plants. Water relationships, photosynthesis, translocation, mineral nutrition, growth, hormonal control and reproduction. (1001-253 or equivalent and one year of organic chemistry) **Class 3, Lab 3, Credit 4 (W)**

**1001-311** **Cell Biology**  
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. (1001-253 or equivalent) **Class 4, Lab 0, Credit 4 (F)**

**1001-313** **Sports Biology**  
An introduction to the human physiology and anatomy of all types of sporting activities. Body systems studied include musculoskeletal, cardiovascular, neuromuscular and pulmonary. Motion, mobility, flexibility, strength, endurance and nutrition are other topics included in a comprehensive investigation of the biology of athletic performance. **Class 2, Lab 0, Credit 2 (F, S)**

**1001-320** **Histology**  
Detailed microscopic studies on the structure and function of normal human tissues. (1001-305, 306 recommended) **Class 3, Lab 3, Credit 4 (Not offered 1996-97)**

**1001-330** **Small-Animal Laboratory Techniques**  
Prepares the student for small-animal handling, biological administrations and preparations, minor surgery and autopsies. (Third-, fourth- or fifth-year status and permission of instructor) **Class 1, Lab 3, Credit 3 (S)**

**1001-340** **General Ecology**  
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, bio-geography and representative ecosystems. (1001-253 or equivalent) **Class 3, Lab 3, Credit 4 (F)**

**1001-350** **Molecular Biology**  
The study of structure, function and organization of proteins, nucleic acids and other biological macromolecules. (1001-253 or equivalent, 1013-233, second- or third-year status) **Class 3, Lab 3, Credit 4 (W)**

**1001-360** **Horticulture**  
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 (Not offered 1996-97)**

**1001-370****Biological Writing**

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, biology or biotechnology majors) **Class 1, Recitation 1, Credit 3 (F, W, S)**

**1001-380****Human Gross Anatomy**

Exposes students to details of human anatomy through cadaver dissection. Lecture material stresses functional and clinical correlates corresponding to laboratory exercises. (1001-305, 306 and permission of instructor) **Class 3, Lab 6, Credit 5 (W)**

**1001-390****Vertebrate Evolution**

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. (1001-253 or equivalent) **Class 4, Lab 0, Credit 4 (S)**

**1001-402, 702****Immunology**

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. (1001-253 or equivalent) **Class 3, Credit 3 (W)**

**1001-403****Cell Physiology**

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. (1001-350) **Class 3, Lab 3, Credit 4 (F)**

**1001-404****Introductory Microbiology**

Introduction to microorganisms and their importance. Principles of structure, metabolic diversity, taxonomy, environmental microbiology and infectious diseases of prokaryotes are discussed. Basic laboratory techniques, microscopy, staining, bacterial identification and food testing. (1001-350 and one year of organic chemistry) **Class 3, Lab 4, Credit 5 (F, S)**

**1001-407****Microbial and Viral Genetics**

The study of the molecular genetics of bacteria, bacteriophages, fungi and eucaryotic viruses. (1001-350, 421; one biochemistry course) **Class 3, Lab 3, Credit 4 (F)**

**1001-415****Functional Biology of Invertebrate Animals**

A study of the unifying features of the functional anatomy, physiology and behavior of invertebrates. Emphasis is on feeding, locomotion, gas exchange, regulation of internal composition, defense, reproduction and life histories, and control systems. (20 credits of biology majors' courses) **Class 3, Lab 3, Credit 4 (W)**

**1001-417****Industrial Microbiology**

Practical applications of yeasts, fungi and bacteria in industrial fermentations. Industrial aspects of fermentor design, pilot plant operations, strain development and recovery of fermentation end products. Microbiology, biochemistry and engineering of large-scale processes. (1001-404 and one biochemistry course) **Class 3, Lab 3, Credit 4 (W)**

**1001-420****Plant Ecology**

A consideration of the nature and variation of plant communities with a discussion of factors that limit, maintain and modify communities both locally and regionally. Laboratories involve field studies of various plant communities and the gathering and analysis of data. (1001-340) **Class 3, Lab 3, Credit 4 (Not offered 1996-97)**

**1001-421****Genetics**

Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal and population levels. (1001-253 or equivalent) **Class 3, Lab 3, Credit 4 (F)**

**1001-422****Developmental Biology**

Study of the processes of growth, differentiation and development that lead to the mature form of an organism. (1001-253 or equivalent) **Class 3, Lab 3, Credit 4 (Not offered 1996-97)**

**1001-424****Descriptive Embryology**

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. (1001-253 or equivalent) **Class 2, Credit 4 (Not offered 1996-97)**

**1001-430** **Radiation Biology**  
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, Credit 4 (W)**

**1001-431** **Histological Techniques**  
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. (1001-253 or equivalent) **Class 1, Lab 4, Credit 3 (Not offered in 1996-97)**

**1001-442** **Hybridoma Techniques**  
Designed to acquaint each student with the basic methods employed in the production of hybridoma cell lines and monoclonal antibodies. Includes preparation of viable cell suspensions, cell culture fusion techniques, cloning, and monoclonal antibody production and characterization. (1001-445) **Lab 3, Credit 2 (S)**

**1001-445** **Tissue Culture**  
Study of the techniques and applications of culturing cells, tissues and organs in vitro. Emphasis on mammalian systems. (1001-253 or equivalent) **Class 2, Lab 3, Credit 4 (W)**

**1001-446** **Plant Tissue and Cell Culture**  
Study of the techniques and applications of plant organ, tissues and cell culture in vitro, with emphasis on plant regeneration and protoplast manipulation. (1001-253 or equivalent) **Class 2, Lab 3, Credit 4 (W)**

**1001-450** **Genetic Engineering**  
Introduction to the theoretical basis, laboratory techniques and applications of gene manipulation. (1001-350) **Class 3, Lab 6, Credit 5 (S)**

**1001-451** **Microbial Pathogenesis**  
Mechanisms of bacterial, fungal, viral and parasitic diseases; host response to pathogen invasion; subversion of host defenses; virulence factors; examples of infectious diseases. (1001-404 required; 1001-334 recommended) **Class 3, Lab 0, Credit 3 (S)**

**1001-460** **Basic Pathology**  
Introduction to pathophysiology: the study of disease and its consequences. Major topics of lecture discussions and laboratory exercises deal with general pathologic processes, including cell injury/cell death, inflammation, immunological deficiencies, hemodynamic and fluid derangements and neoplasia. Clinical correlations are made as often as possible as examples of how physiological processes can go awry in the generation of a particular disease. (1001-251, 252, 253 or equivalent required; 1001-305, 306 strongly recommended) **Class 3, Lab 3, Credit 4 (S)**

**1001-471** **Freshwater Ecology**  
A study of the physics, chemistry and biology of inland waters. Emphasizes the physical and chemical properties of water and how these properties affect the associated biological communities. Planktonic, benthic and littoral communities are considered. Field trips to streams and lakes are conducted to gather physical, chemical and biological data. (1001-340 or permission of instructor) **Class 3, Lab 3, Credit 4 (W)**

**1001-472** **Introduction to Oceanography**  
An introduction to the study of the world ocean, with emphasis on fundamental principles, concepts and processes of biological, geological, chemical and physical oceanography. (1001-340 or permission of instructor) **Class 4, Lab 0, Credit 4 (W)**

**1001-473** **Marine Biology**  
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)**

**1001-480** **Laboratory Teaching Experience**  
Provides qualified undergraduate students the opportunity to gain experience in a laboratory instructional setting under the direct guidance of a faculty member. Students are required to prepare and present prelab discussions, assist in the design and set up of labs, answer enrolled-student questions, and perform lab demonstrations and other associated duties and responsibilities. (Contact faculty member for specific eligibility criteria.) **Class 0, Lab 3, Credit 1 (F, W, S)**

**1001-490** **Transmission Electron Microscopy**  
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 1996-97)**

**1001-491** **Scanning Electron Microscopy**  
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 1996-97)**

**1001-541, 542, 543** **Biology Research**  
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)**

**1001-550** **Biology Seminar**  
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 (F, W, S)**

**1001-559** **Special Topics: Biology**  
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 (Offered upon sufficient request) (F, W, S)**

**1001-599** **Independent Study: Biology**  
Faculty-directed study of appropriate topics on a tutorial basis. Enables an individual to pursue studies of existing knowledge available in the literature. (1001-253 or equivalent) **Class variable, Credit variable (F, W, S)**

*NOTE: The following courses can be used to satisfy the RIT Mathematics and Science General Education requirement.*

**1004-210** **Microbiology in Health and Disease**  
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)**

**1004-211** **Human Biology I**  
A general study of human anatomy and physiology. Includes discussions of cellular biology, skeletal, muscular, nervous and endocrine systems. **Class 3, Lab 3, Credit 3 (W)**

**1004-212** **Human Biology II**  
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)**

**1004-231** **Human Biology I Laboratory**  
Laboratory to complement the lecture material of 1004-211. Experiments are designed to illustrate the dynamic characteristics of cells, tissues and organ systems. **Lab 3, Credit 1 (W)**

**1004-232** **Human Biology II Laboratory**  
Laboratory for dietetic and medical illustration students complements the lecture material of 1004-212. Experiments are designed to illustrate the dynamic anatomy and physiology of major organ systems. **Lab 3, Credit 1 (S)**

**1004-289** **Contemporary Science: Biology**  
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, S)**

**1004-315** **Medical Genetics**  
A survey of selected human variations and diseases of medical importance, with emphasis on the underlying genetic principles. (1001-203 or equivalent) **Class 2, Credit 2 (S)**

**1005-250** **Galapagos: Evolution and Ecology**  
An 11-day field course in Ecuador and the Galapagos Islands. Students meet weekly on the RIT campus during the Spring Quarter to learn about the wildlife and geology of the islands, and about their influence on Darwin's Theory of Evolution. The difficulties of balancing human problems with environmental conservation are ongoing problems in the Galapagos. The actual field trip occurs in May, right after graduation. We charter a boat and cruise among the islands for one week. There are daily shore excursions and frequent snorkeling opportunities. The course provides outstanding opportunities for nature photography. Although this is a Spring Quarter offering, students *must* contact the instructor during the *previous* Fall Quarter. Enrollment is limited to 11 students. A travel fee is required. **Credit variable (S)**

**1005-475** **Marine Ecology Field Course**  
A field trip to a tropical or subtropical marine station, which serves as the base of operations. Snorkeling excursions to inshore habitats include rocky shore, sea grass meadows, mangrove, sandy beach, coral reef and embayments. Emphasis is on comparison of habitats and detailed class survey of one location. (1001-473) **Credit 3 (S)**

## Chemistry

**1008-261** **Quantitative Analysis I**  
Designed for chemistry, polymer chemistry and biochemistry majors or those interested in pursuing the major. Topics include theoretical introduction to quantitative methods, including gravimetric techniques, equilibria (weak acid/weak base, buffers, hydrolysis), solution chemistry and spectroscopy as related to the laboratory. (Corequisites 1008-265, 1010-252) **Lecture 3, Credit 3 (W)**

**1008-262** **Quantitative Analysis II**  
Designed for chemistry, polymer chemistry and biochemistry majors or those interested in pursuing the major. Topics include statistical methods, equilibrium for polyprotic acids, electrochemistry and redox reactions, potentiometry and electrogravimetric determinations. **Lecture 4, Credit 4 (S)**

**1008-265** **Quantitative Analysis I Lab**  
Designed for chemistry, polymer chemistry, biochemistry majors or those interested in pursuing the major. Experiments include statistics and calibration of equipment, spectroscopy, volumetric analyses and kinetics. (Corequisites 1008-261, 1010-252) **Lab 4, Credit 1 (W)**

**1008-266** **Quantitative Analysis II Lab**  
Designed for chemistry, polymer chemistry and biochemistry majors or those interested in pursuing the major. Experiments include statistics and calibration of equipment; determination of manganese in steel, Gram Plot, double endpoint titration (carbonate/bicarbonate), potentiometric titration, electrogravimetric and photometric determination of copper; water hardness. Lab report writing is emphasized. (Corequisite 1008-262) (1008-261, 1008-265, 1016-252) **Lab 6, Credit 2 (S)**

**1008-311** **Analytical Chemistry: Instrumental Analysis**  
Elementary treatment of instrumental theory and techniques; properties of light and its interaction with matter; ultraviolet, visible and infrared absorption spectroscopies; atomic absorption and molecular fluorescence spectroscopy; nuclear magnetic resonance spectroscopy. (Corequisite 1008-318) (1010-252 or equivalent) **Class 3, Credit 3 (F, W)**

**1008-312** **Analytical Chemistry: Separations**  
Inorganic and organic separations; phase rules; distillation; extraction; adsorption and surface effects; chromatography, including gas, liquid, column, paper, thin layer and ion exchange. (Corequisite 1008-319) (1008-262 or 1011-217 or equivalent) **Class 3, Credit 3 (S, SU)**

**1008-318** **Instrumental Analysis Laboratory**  
Lab accompanying 1008-311. Quantitative and qualitative experiments in ultraviolet, visible, infrared, fluorescence and atomic absorption spectroscopies. Laboratory report writing is emphasized. (Corequisite 1008-311) (1010-252 or equivalent) **Lab 4, Credit 1 (F, W)**

**1008-319** **Separations Laboratory**  
Lab accompanying 1008-312. 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 1008-312) (1008-262 or 1011-217 or equivalent) **Lab 4, Credit 1 (S, SU)**

**1008-620** **Building Scientific Apparatus**  
Basic skills associated with the construction of scientific laboratory apparatus—some of which is not commercially available are covered: machine shop skills, working with glass, vacuum technology, optics and electronics. Special emphasis on function-structure relationship between an instrument and its intended use. Several references on construction techniques are provided, and information about current manufacturers and suppliers of necessary components is given. (Corequisite 1018-621) (1014-441, 1017-212, 213 or 312, 313) **Class 3, Credit 3 (Offered upon sufficient request)**

**1008-711** **Instrumental Analysis**  
Theory, applications and limitations of selected instrumental methods in qualitative, quantitative and structural analysis. Topics include nuclear magnetic resonance, electrochemistry, surface methods and other modern instrumental methods. (1014-340, 1013-432) **Class 3, Credit 3 (F, W-X\*)**

**1008-720** **Instrumental Analysis Laboratory**  
Lab accompanying 1008-711. Experiments include AA, FT-IR, HPLC, ICP, GC/MS, electrochemistry, polymer characterization and thermal analysis. Problem solving and experimental design are emphasized. **Lab 6, Credit 2 (F-X\*, W)**

**1009-300** **Introduction to Biochemistry**  
Describes the field of biochemistry in relation to the traditional fields of biology and chemistry. Biochemical approaches to problems in medicine, industry and forensics are presented. Issues of ethical concern also are discussed. (1013-231 or 1013-431) **Class 1, Credit 1 (F, W)**

**1009-334** **Biochemistry**  
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. (1013-233) **Class 4, Credit 4 (F)**

**1009-502** **Biochemistry: Biomolecular Conformation and Dynamics**  
Provides a foundation for biochemistry course sequence and for participation in undergraduate research in biochemistry. The relationship between the three-dimensional structure of proteins and their function in oxygen transport and enzymatic catalysis is examined. In preparation for the next course in the sequence (1009-503, Biochemistry: Metabolism), membrane structure and the physical laws that apply to metabolic processes are also discussed. (1013-233 or 1013-433, 1014-340 or 1009-334 or permission of instructor) **Class 3, Credit 3 (F-X\*, W-X\*)**

**1009-503** **Biochemistry: Metabolism**  
Introduction to the metabolic pathways used for energy production and for the synthesis and degradation of the building blocks of living organisms. The pathways are presented individually, then integrated to show the balance between pathways; for example, the products generated by one pathway that are necessary for a second pathway. The efficiency of chemical synthesis in biological organisms is discussed. Finally, the metabolic basis of selected diseases is examined. (1009-334, 502 or permission of the instructor) **Class 3, Credit 3 (F, W-X\*)**

**1009-504** **Biochemistry: Nucleic Acids and Molecular Genetics**  
Nucleic acid structures, including the classical Watson-Crick DNA secondary structure, as well as more recently discovered forms, are described. Nucleic acid metabolism and the flow of genetic information—including replication of DNA, its transcription into RNA and the translation of messenger RNA into protein, as well as regulation of gene expression in prokaryotes—are presented. DNA sequencing and recombinant DNA techniques having practical applications in medicine, agriculture and forensics are described. The nucleic acid biochemistry of viruses and oncogenes is surveyed. (1009-334, 502) **Class 3, Credit 3 (S-X\*)**

\*X, extended day (after 5 p.m.)

**1009-505 Biochemistry: Experimental Techniques**

An introduction to the theory and practice of modern experimental biochemical laboratory techniques and concepts. For students in chemistry, biochemistry, clinical chemistry, biology, biotechnology and preprofessional (premedical, pre dental, preveterinary, etc.) programs.

**Lecture:** A weekly one-hour lecture provides a theoretical framework for the course. It includes a discussion of the properties of biomolecules and how those properties are exploited in the separation and characterization of the molecules. The theory underlying the various experimental techniques is also presented.

**Lab:** The principles presented in the lecture are applied and examined during two three-hour lab periods each week. Practical laboratory techniques, including the preparation of buffers and understanding of the role of pH and ionic strength in the behavior of biomolecules, are examined. Modern biochemical techniques, including centrifugation, gel exclusion chromatography, electrophoretic methods and UV/visible and fluorescence spectrophotometry, are applied to the isolation and characterization of both proteins and nucleic acids. The manipulation of genetic material in *E.coli* also is examined using the methods of modern molecular biology. (1009-502) **Class 1, Lab 6, Credit 3 (S)**

**1009-541, 542, 543 Biochemistry Research**

Faculty-directed student projects or research in biochemistry, usually involving laboratory work and/or calculations that would be considered original. (Permission of research adviser) **Class variable, Credit variable (F, W, S, SU)**

**1009-702 Biochemistry: Biomolecular Conformation and Dynamics**

The first course in our graduate sequence in biochemistry. Molecular transport and enzymatic catalysis are related to the three-dimensional structures of biomolecules and the laws of thermodynamics. Also provides an introduction to membrane structure as preparation for the next course in the sequence (1009-703; Biochemistry: Metabolism). (Baccalaureate degree or permission of instructor) **Class 3, Credit 3 (F-X\*, W-X\*)**

**1009-703 Biochemistry: Metabolism**

Metabolic processes involved in energy consumption and production as well as the synthesis and degradation of biomolecules are discussed. Metabolic pathways are described in terms of thermodynamic principles, cellular localization and regulation mechanisms. Finally, the metabolic basis of several diseases is presented. (Baccalaureate degree or permission of instructor) **Class 3, Credit 3 (F, W-X\*)**

**1009-704 Biochemistry: Nucleic Acids and Molecular Genetics**

Nucleic acid structures, including the classical Watson-Crick model for DNA, are introduced. The flow of genetic information by replication (DNA to DNA), transcription (DNA to RNA) and translation (RNA to protein) as well as gene expression and regulation in prokaryotes are discussed. The methodology of new techniques, such as DNA sequencing and recombinant DNA, and their role in medicine and forensics are presented. The genetic aspects of viruses and oncogenes are also reviewed. (Baccalaureate degree or permission of instructor) **Class 3, Credit 3 (S-X\*)**

**1009-705 Biochemistry: Experimental Techniques**

An introduction to the theory and practice of modern experimental biochemical laboratory techniques and concepts. For students in chemistry, biochemistry, clinical chemistry, biology, biotechnology and preprofessional (premedical, pre dental, preveterinary, etc.) programs.

**Lecture:** A weekly one-hour lecture provides a theoretical framework for the course. It includes a discussion of the properties of biomolecules, and how those properties are exploited in the separation and characterization of the molecules. The theory underlying the various experimental techniques is also presented.

**Lab:** Students apply the techniques presented in the lecture in a project-based laboratory exercise. They purify a protein from *E. coli* using modern chromatographic methods, characterize the same protein by spectroscopic methods (fluorescence and UV-visible), by electrophoresis and by HPLC. They then manipulate and analyze the gene responsible for coding for this protein. Finally, the students analyze the structure of the protein using the latest software tools available over the Internet. (Baccalaureate degree or permission of instructor) **Class 1, Lab 6, Credit 3 (S)**

**1010-200 Chemical Safety**

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, cryogenics, radioactive materials and other special chemicals. **Class 1, Credit 1 (F)**

**1010-230 Introduction to Co-op/Chemistry Career Seminar**

Exploration of cooperative education opportunities with practice in writing letters of application and résumés and in interviewing techniques. Careers related to chemistry and polymer chemistry are discussed, and career information resources at RIT are utilized. **Class 1, Credit 1 (F)**

**1010-251 General Chemistry I**

Designed for chemistry/polymer chemistry majors. Includes topics on measurement, atomic theory, periodicity, moles and stoichiometry, solutions, titrations, redox reactions, energy relationships, gas laws, kinetic theory of gases and LeChatelier's principle. (Corequisite 1010-255) **Class 3, Recitation 1, Credit 4 (F)**

**1010-252 General Chemistry II**

Designed for chemistry/polymer chemistry majors. Includes topics on atomic theory and electronic structure, chemical bonding, VSEPR and valence bond theory, molecular orbital theory, enthalpy and entropy, rate laws, catalysis and nuclear chemistry. (Corequisites 1008-265) (1010-251) **Class 3, Recitation 1, Credit 4 (W)**

**1010-255 General Chemistry I Laboratory**

Designed for chemistry/polymer chemistry majors to complement General Chemistry I (1010-251). Experiments involve inorganic chemistry (empirical formula, qualitative analysis of transition metal ions, synthesis of an inorganic complex ion), quantitative analysis (acid-base titrations, gravimetric analysis, visible spectroscopy) and an introduction to polymer chemistry. (Corequisite 1010-251) **Lab 3, Credit 1 (F)**

**1010-401 Chemical Literature**

Instruction is given on the use of chemical literature resources such as *Chemical Abstracts*, *Science Citation Index*, *Beilstein*, *Current Contents* and computerized information retrieval. Students prepare a library-based research paper and poster 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; preparing visuals, abstracts and letters of transmittal). **Class 2, Credit 2 (F-X\*, W)**

**1010-480 Laboratory Teaching Experience**

This course is designed to offer students teaching experience in an undergraduate laboratory setting. Evaluation by a faculty supervisor is based on teaching performance and preparation of materials required for the lab. (Must have completed the course and laboratory or equivalent experience under consideration with a grade of A or B; permission of instructor/laboratory coordinator and department head) **Class 3-6, Credit 1-2 (F,W,S, SU)**

**1010-499 Chemistry Co-op**

Cooperative education experience for undergraduate chemistry students. **Credit 0 (offered every quarter)**

**1010-541, 542, 543 Chemistry Research**

Faculty-directed student projects or research usually involving laboratory work and/or calculations that would be considered original. (Permission of research adviser) **Class variable, Credit variable (F, W, S, SU)**

**1010-559 Special Topics: Undergraduate Chemistry**

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)**

**1010-599 Independent Study: Chemistry**

Faculty-directed study of appropriate topics on a tutorial basis. Enables an individual to pursue studies of existing knowledge available in the literature. (Permission of independent study adviser) **Class variable, Credit variable (F, W, S, SU)**

**1010-772** **Special Topics**  
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 have specified prerequisites, contact hours and examination procedures. Recent courses taught as Special Topics include Nuclear Chemistry, Polymer Morphology, Advanced Chromatographic Methods, Applications of Computer Interfacing and Environment Chemistry. **Class variable, Credit variable**

**1010-799** **Graduate Chemistry Co-op**  
Cooperative education experience for graduate chemistry students. **Credit 0 (Offered every quarter)**

**1010-870** **Chemistry Seminar**  
Matriculated students are required to attend the weekly chemistry seminar series and to present a one-hour seminar on a topic in chemistry. **Credit 1**

**1010-877** **External Research**  
Industrial internship research. **Credit 1-16**

**1010-879** **Research and Thesis Guidance**  
Hours and credits to be arranged. Chemical research in a field chosen by the candidate, subject to approval of the department head and adviser. **Credit variable**

**1010-879-99** **Continuation of Thesis**  
**Credit 0 or 1**

**1010-899** **Independent Study: Chemistry**  
**Credit variable**

*NOTE: 1011 courses, except 1011-309, may not be taken by chemistry, biochemistry or polymer chemistry majors.*

**1011-201** **Survey of General Chemistry**  
One-quarter survey of general chemistry for nonscience majors with no previous background in chemistry. Fundamentals of matter and energy, the atomic theory, chemical structure and bonding, ionic species and solutions, and acid-base chemistry are covered. (Corequisite 1011-205) **Class 3, Credit 3 (F)**

**1011-202** **Survey of Organic Chemistry**  
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 1011-207) (1011-201 or equivalent) **Class 3, Credit 3 (W)**

**1011-203** **Biochemistry I**  
Structure and reactions of the major classes of biomolecules are studied. Topics include amino acids and proteins, lipids, carbohydrates and nucleic acids. (1011-202 or equivalent) **Class 4, Credit 4 (S)**

**1011-204** **Biochemistry II**  
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. (1011-203 or equivalent) **Class 4, Credit 4 (F)**

**1011-205** **Chemistry I Laboratory**  
Laboratory course to introduce basic laboratory techniques: gravimetric, volumetric, thermal and titration analyses. Experiments complement material in first-quarter lecture. (Corequisite 1011-201, 211, 215, or 271) **Lab 3, Credit 1 (F, W)**

**1011-206** **Chemistry II Laboratory**  
Laboratory course to introduce techniques of chemical analysis: spectrometry, calorimetry, separations, reaction schemes, titrations and kinetic studies. Experiments complement material in second-quarter lecture. (Corequisite 1011-212 or 216) (1011-205) **Lab 3, Credit 1 (W, S)**

**1011-207** **Introduction to Organic Chemistry Laboratory**  
An introduction to organic laboratory techniques. Methods of separating, purifying and characterizing organic compounds are covered. (Corequisite 1011-202 or 213) (1011-205) **Lab 3, Credit 1 (W, S)**

**1011-208** **College Chemistry I**  
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 (F, W)**

**1011-211** **Chemical Principles I**  
For science, microelectronics, and photo science 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. Occasionally offered in distance-learning format. (Corequisite 1011-205) **Class 3, Credit 3 (F, W)**

**1011-212** **Chemical Principles II**  
Problem-solving applications of chemical principles. Topics include thermodynamics and equilibrium, oxidation-reduction and chemical kinetics. Occasionally offered in distance-learning format. (Corequisite 1011-206) (1011-211) **Class 3, Credit 3 (W, S)**

**1011-213** **Introduction to Organic Chemistry**  
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 include spectroscopy, organometallics, polymers and biomolecules. (Corequisite 1011-207) (1011-201 or 1011-212) **Class 3, Credit 3 (S)**

**1011-215** **General and Analytical Chemistry I**  
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 1011-205) **Class 3, Recitation 1, Credit 4 (F)**

**1011-216** **General and Analytical Chemistry II**  
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 1011-206) (1011-215) **Class 3, Credit 3 (W)**

**1011-217** **General and Analytical Chemistry III**  
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 1011-227) (1011-216) **Class 3, Credit 3 (S)**

**1011-227** **General and Analytical Chemistry III Laboratory**  
Continuation of 1011-206 laboratory. Topics include pH measurement, buffers and pH indicators, polyprotic acid multi-endpoint titrations, spectrophotometric analysis of equilibrium constants, 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 1011-217. Emphasis is on independent laboratory analysis, experimental design and data analysis. (Corequisite 1011-217) (1011-206) **Lab 6, Credit 2 (S)**

**1011-271** **Fundamentals of Chemistry**  
Introduction to basic concepts of chemistry, assuming no prior experience. Topics include atomic theory, chemical bonding, stoichiometry, states of matter and the periodic table. Occasionally offered in distance-learning format. (Corequisite 1011-205) **Class 3, Credit 3 (F, W)**

**1011-272** **Chemistry of Water and Waste Water**  
Chemistry of water analyses, including solids, pH, alkalinity, acidity, chloride, phosphate, BOD, COD, nitrogen, metals, radioactivity, residual chlorine and chlorine demand. Polymers are also covered. (Corequisite 1011-276) (1011-271 or equivalent) **Class 3, Credit 3 (F)**

**1011-273** **Introduction to Chemistry of Materials**  
Application of the basic concepts of chemistry to energy conversion (thermochemistry, nuclear chemistry), reaction kinetics and equilibria, electrochemistry and materials (metals, ceramics and polymers). Occasionally offered in distance-learning format. (Corequisite 1011-277) (1011-271 or 1011-208) **Class 3, Credit 3 (W, S)**

**1011-276** **Chemistry of Water and Waste Water Laboratory**  
Laboratory to be taken concurrently with 1011-272. Techniques used in water and waste water analysis are covered. (1011-271 or equivalent) **Lab 3, Credit 1 (F)**

**1011-277 Introduction to Chemistry of Materials Laboratory**  
Experiments in thermochemistry, kinetics, equilibrium, oxidation-reduction and the properties of matter that complement the lecture material. (Corequisite 1011-273) (1011-205 or 1011-208) **Lab 3, Credit 1 (W, S)**

**1011-281 Chemical Foundations I**  
Basic concepts of general chemistry, including measurement, atomic theory, chemical bonding, stoichiometry, the liquid and solid states, properties of water. (1016-204) **Class 3, Recitation 1, Credit 4 (W)**

**1011-282 Chemical Foundations II**  
Basic concepts of general chemistry, including solutions, colligative properties, acid-base theory, pH, titrations, oxidation-reduction, organic functional groups, addition and condensation polymers. (1011-281) **Class 3, Recitation 1, Credit 4 (S)**

**1011-289 Contemporary Science: Chemistry**  
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 (offered upon sufficient request)**

**1011-309 Glassblowing Techniques**  
Introduces and trains each student in small-scale scientific glassblowing techniques. Proficiency is 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)**

**1012-562 Inorganic Chemistry I: Periodicity and Reactivity**  
For common elements, mastery of chemical reactions that describe: (1) their isolation, (2) their characteristic chemical reactivities with other common elements, (3) large-volume industrial processes and (4) environmental impacts required. (1013-433, 1014-442) **Class 3, Credit 3 (S)**

**1012-563 Inorganic Chemistry II: Isomerism, Symmetry and Bonding**  
This course provides a view of how bonding theories endeavor to account for and predict the physical properties of a wide variety of inorganic compounds; e.g., color, magnetism, stability, chemical potential and electrical conductivity. (1012-562 or permission of instructor) **Class 3, Credit 3 (F, W-X\*)**

**1012-564 Inorganic Chemistry III: Physical Methods and Applications**  
Introduction to some of the tools with which an inorganic chemist investigates inorganic materials. These physical methods, along with the bonding theories from 1012-563, 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 the contemporary research areas of inorganic chemistry is conducted. (1012-563) **Class 3, Credit 3 (S)**

**1012-762 Inorganic Chemistry I: Periodicity and Reactivity**  
For the common elements, mastery of chemical reactions that describes their isolation, characteristic chemical reactivities, large-volume industrial processes and environmental impacts is required. Relationships between the reactivities of neighboring elements are elucidated and justified according to current theories. (1013-433, 1014-442) **Class 3, Credit 3 (S)**

**1012-763 Inorganic Chemistry II: Isomerism, Symmetry and Bonding**  
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. (1012-762 or permission of instructor) **Class 3, Credit 3 (F, W-X\*)**

**1012-764 Inorganic Chemistry III: Physical Methods and Applications**  
Introduces the more sophisticated tools with which an inorganic chemist investigates inorganic materials. These physical methods, with the bond theories from 1012-763, are applied to inorganic reactions that exemplify the similarities and differences for the elements in each family of the periodic table. Applications of bonding to current research are included. (1012-763) **Class 3, Credit 3 (S)**

**1012-765 Preparative Inorganic Chemistry**  
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 1012-763) (1012-762 or permission of instructor) **Lab 8, Credit 2 (F, W-X\*)**

**1013-231, 232 Organic Chemistry**  
Survey of the structure, nomenclature, reactions and synthesis of the major functional groups. Mechanisms of main classes of reactions are discussed. (Corequisites 1013-235, 236) (1011-212 or 1011-216 or permission of instructor) **Class 3, Credit 3 (231-F, W-X\*; 232-W, S-X\*)**

**1013-233 Organic Chemistry**  
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 1013-237) (1013-232) **Class 3, Credit 3 (S, SU-X\*)**

**1013-235, 236, 237 Organic Chemistry Laboratory**  
Laboratory work emphasizes techniques, preparations and analyses. 1013-237 emphasizes reactions and properties of biomonomers and polymers. (Corequisites 1013-231, 232, 233) **Lab 3, Credit 1 (235-F, W-X\*; 236-W, S-X\*; 237-S, SU-X\*)**

**1013-431 Organic Chemistry I**  
A rigorous survey of the reactions of major organic functional groups, emphasizing alkanes, alkenes, alkyl halides and alkynes. Stereochemistry is also included. (Corequisite 1013-435) (1010-252) **Class 3, Credit 3 (S, SU)**

**1013-432 Organic Chemistry II**  
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 1013-436) (1013-431) **Class 3, Credit 3 (F, W)**

**1013-433 Organic Chemistry III**  
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 1013-437) (1013-432) **Class 3, Credit 3 (S, SU)**

**1013-435 Preparative Organic Chemistry I Laboratory**  
Designed for chemistry and polymer chemistry majors to complement 1013-431, Organic Chemistry I. Synthesis, purification and characterization of organic compounds are conducted. (Corequisite 1013-431) (1010-252) **Lab 4, Credit 1 (S, SU)**

**1013-436 Preparative Organic Chemistry II Laboratory**  
Designed for chemistry and polymer chemistry majors to complement 1013-432, Organic Chemistry II. Emphasis is on synthesis, functional group reactivities, separations, IR and NMR analysis and introduction to microscale synthesis. (Corequisite 1013-432) (1013-431) **Lab 4, Credit 1 (F, W)**

**1013-437 Systematic Identification of Organic Compounds**  
A laboratory course utilizing synthesis, chemical and spectral (IR, NMR and GC/MS) techniques to identify and characterize organic compounds. (Should be taken concurrently with 1013-433.) (1008-319, 1013-432, 436) **Lab 6, Credit 2 (S, SU)**

**1013-601 Organic Chemistry of Polymers**  
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. (1013-433) **Class 4, Credit 4 (F-X\*)**

**1013-730 Toxicology and Drug Analysis**  
Clinical and forensic aspects of abused drugs, including history, structure, classification, drug levels, metabolism and effects. Drug analysis methods: history, theory and practical applications of GLC, HPLC, GC/MS, UV spectrometry, TLC, IR, EIA, FPIA and stat tests. You are the drug chemist and the toxicologist in this multimedia experience. (College biology and chemistry, some biochemistry helpful or permission of instructor) **Class 4, Credit 4 (offered alternate years; offered 1996-97) (W-X\*)**

**1013-736 Spectrometric Identification of Organic Compounds**  
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. (1013-433) **Class 4, Credit 4 (W)**

**1013-737 Advanced Organic Chemistry**  
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. (1013-433) **Class 4, Credit 4 (F)**

**1013-739 Advanced Organic Chemistry**  
Selected topics in physical organic chemistry including: techniques for elucidation of mechanism (kinetic, linear free, energy relationships, isotope effects), molecular orbital theory, electrocyclic reactions. (1013-433, 1014-443) **Class 4, Credit 4 (offered alternate years; offered 1997-98) (S)**

**1013-832 Stereochemistry**  
Advanced treatment of steric relationships, conformational analysis and stereoisomerism in organic compounds. (1013-433, 1014-433) **Class 4, Credit 4 (offered upon sufficient request)**

**1013-833 Heterocyclic Chemistry**  
A general treatment of heterocyclic chemistry. Syntheses and relative reactivities of heterocyclic compounds as demonstrated by their chemical reactions. (1013-433) **Class 4, Credit 4 (offered upon sufficient request) (F)**

**1014-301 Introduction to Polymer Technology**  
Survey of polymer science, including terminology, synthesis, structures, properties, applications and processing techniques of commercially significant polymers. (General Chemistry, 1016-251 or equivalent) **Class 2, Credit 2 (F)**

**1014-340 Introduction to Physical Chemistry**  
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. (1010-252, 1016-252; 1017-211 or 1017-311) **Class 3, Credit 3 (F, W-X\*)**

**1014-441 Chemical Thermodynamics**  
Review of the thermodynamic laws; criteria for equilibrium and spontaneity; chemical equilibrium; phase rule; equilibrium in ideal and nonideal solutions; electrochemistry. (Should be taken concurrently with 1014-445.) (1014-340) **Class 3, Credit 3 (S, SU-X\*)**

**1014-442 Quantum Chemistry**  
Introduction to quantum mechanics and spectroscopy, radioactivity; Planck's law; photoelectric effect; the Bohr atom; deBroglie, Schrödinger 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 1014-446.) (1016-306, 1014-441) **Class 3, Credit 3 (F, W-X\*)**

**1014-443 Chemical Kinetics**  
Kinetic molecular theory, transport properties of gases, chemical kinetics, surface chemistry, photochemical kinetics, irreversible processes in solution. (Should be taken concurrently with 1014-447.) (1014-441) **Class 3, Credit 3 (S, SU-X\*)**

**1014-445 Chemical Thermodynamics Laboratory**  
Introduction to physical chemistry laboratory; chemical thermodynamics and equilibrium. (Should be taken concurrently with 1014-441.) **Lab 3, Credit 1 (S, SU-X\*)**

**1014-446 Quantum Chemistry Laboratory**  
Experiments in the application of quantum chemistry, atomic and molecular spectroscopy, and radioactivity. (Should be taken concurrently with 1014-442.) **Lab 3, Credit 1 (F, W-X\*)**

**1014-447 Chemical Kinetics Laboratory**  
Laboratory experiments in chemical dynamics. (Should be taken concurrently with 1014-443.) **Lab 3, Credit 1 (S, SU-X\*)**

**1014-602 Physical Chemistry of Polymers**  
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 are related to experimental results. (1014-443) **Class 4, Credit 4 (S-X\*)**

**1014-603 Structure-Property Relationships in Polymers**  
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. (1013-601 or 1014-602) **Class 4, Credit 4 (F-X\*)**

**1014-604 Characterization of High Polymers**  
Study of experimental techniques for characterizing polymer composition, molecular weight, thermal stability, morphology and thermo-mechanical properties. (1014-301) **Lab 6, Credit 2 (offered alternative years; offered 1996-97) (S)**

**1014-605 Synthesis of High Polymers**  
Experiments on condensation, free radical, ring opening, and ionic polymerizations and polymer modification. (1013-437) **Lab 6, Credit 2 (offered alternate years; offered 1996-97) (F)**

**1014-730 Magnetic Resonance Imaging**  
Introduction to the principles of magnetic resonance imaging (MRI) at a level understandable by both the scientist and nonscientist. The course begins with the basics of nuclear magnetic resonance, the foundation of MRI. Magnetic resonance imaging techniques and instrumentation are explained. Emphasis is on understanding the imaging process. A discussion of information available for water proton content images of body parts and tissue types is presented. Future directions of MRI are presented. (1017-311, 312, 313 or 1017-211, 212, 213) **Class 4, Credit 4 (S-X\*)**

**1014-740 Basics of Pulsed NMR**  
An introduction to the principles of pulsed nuclear magnetic resonance (NMR) spectroscopy. Lectures on instrumentation, pulse sequences, Fourier transforms and artifacts are presented. (1008-311) **Class 1, Credit 1 (F)**

**1014-741** **Advanced Chemical Thermodynamics**  
A study of the basic fundamentals of thermodynamics, including an introduction to statistical mechanics and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases are calculated based on spectroscopic data. Theory of solutions and phase equilibria are discussed. (1014-443, 1016-306) **Class 4, Credit 4 (offered alternate years; offered 1997-98) (W-X\*)**

**1014-742** **Survey of Physical Chemistry**  
A study of the fundamental principles of physical chemistry for clinical chemistry and biotechnology students. Kinetic-molecular theory, quantum mechanics, spectroscopy, thermodynamics and kinetics are presented in application to the life sciences. Not acceptable for BS in chemistry. **Class 3, Credit 3 (offered alternate years; offered 1997-98) (W-X\*)**

**1014-743** **Advanced Chemical Kinetics**  
Methods of investigating the kinetics of chemical reactions and the theories used to interpret their results. Focus on homogeneous reactions in gas and liquid phases. Discussions of references from recent chemical literature. (1014-443) **Class 4, Credit 4 (offered alternative years; offered 1996-97) (W-X\*)**

**1014-744** **Advanced Quantum Mechanics**  
Review of basic quantum theory and models. Variation and perturbation methods, atomic and molecular orbital theory, emphasis on relationship of spectroscopy and quantum chemistry. (1014-442) **Class 4, Credit 4 (offered alternative years; offered 1996-97) (S-X\*)**

**1014-747** **Principles of Magnetic Resonance**  
A series of lectures designed to introduce the principles of magnetic resonance spectroscopies with emphasis on pulsed nuclear magnetic resonance (NMR) spectroscopy. Topics covered include classical and quantum mechanical theory, Fourier transform techniques, pulse sequences, instrumentation, instrumental techniques and modern applications such as 2-D NMR and solid-state NMR. (1014-443; 1014-648) **Class 4, Credit 4 (offered alternate years; offered 1997-98) (W-X\*)**

## Mathematics and Statistics

**1016-200** **Algebra**  
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. (One year of high school algebra) **Class 4, Credit 4 (F, W, S)**

**1016-204** **College Algebra and Trigonometry**  
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. (Two years of high school algebra) **Class 4, Credit 4 (F, W, S)**

**1016-210, 211** **First-Year Seminar**  
**210:** An introductory course for freshmen and some transfers that explores the three majors and shows typical problems that applied mathematicians, computational mathematicians and applied statisticians solve in academic and industrial settings.

**211:** A continuation of 210 including an introduction to co-op, with cover letter and résumé writing. Additional mathematical and statistical topics are discussed. A technical report is required. **Class 1, Credit 1 (210-F; 211-W)**

**1016-214, 215** **Elementary Calculus I, II**  
**214:** Introduction to the study of differential calculus. The following topics are covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, maxima and minima. (1016-204 or equivalent)

**215:** A continuation of (1016-214, dealing with an introduction to integral calculus. The following topics are covered: definite integral, area, work and distance problems, volumes, fundamental theorem of calculus, approximation techniques, exponential and logarithmic functions, applications, introduction to differential equations. (1016-214) **Class 3, Credit 3 (214-W, S; 215-S, F)**

**1016-220** **Fundamentals of Trigonometry**  
A study of the fundamental concepts in trigonometry including terminology, radian measures, trigonometric ratios, graphs of trigonometric functions, applications and vectors. **Class 1, Credit 1 (S)**

**1016-225** **Algebra for Management Science**  
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. (Three years of high school mathematics) **Class 4, Credit 4 (F, W, S, SU)**

**1016-226** **Calculus for Management Science**  
A course stressing applications of calculus concepts to solving problems in business and economics. Topics include the limit concept, differentiation, partial differentiation and integration. (1016-225) **Class 4, Credit 4 (F, W, S, SU)**

**1016-228** **Analytic Geometry**  
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. (1016-204) **Class 4, Credit 4 (W, S)**

**1016-241, 242** **Calculus and Analytic Geometry**  
**241:** A study of precalculus topics needed to succeed in learning calculus combined with the course material covered in 1016-251. (Three years of high school mathematics)

**242:** A continuation of the material from 1016-241 combined with the course material covered in 1016-252. (1016-241 or 1016-251) **Class 6, Credit 6 (241-F, W; 242-W, S)**

**1016-251, 252, 253** **Calculus I, II, III**  
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. (Three 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. (1016-251)

**253:** Improper integrals, limits of sequences, infinite series, Taylor series, polar coordinates, conic sections. (1016-252)

**Class 4, Credit 4 (251-F, W, S, SU; 252-F, W, S, SU; 253-F, W, S, SU)**

**1016-258** **Introduction to Mathematica**  
An introduction to the computer algebra system Mathematica and its uses and applications in several undergraduate courses. Symbolic manipulations, numerical calculations and graphics techniques are explored, as well as Mathematica packages and programming techniques. (Corequisite is a basic calculus course such as 1016-251, 1019-420, 1016-241 or 1016-214) **Class 2, Credit 2 (S)**

**1016-265** **Discrete Mathematics I**  
An introduction to discrete mathematics with applications in computer science and mathematics with an emphasis on proof techniques. The basics of combinatorics, sets, functions, the natural numbers and the integers modulo  $n$  are covered. (Sophomore standing) **Class 4, Credit 4 (F, W, S)**

**1016-266** **Discrete Mathematics II**  
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 1016-467.* (1016-265) **Class 4, Credit 4 (W, S)**

**1016-267** **Introduction to Probability Models**  
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. (1016-266 and 1019-421 or equivalent) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-289** **Contemporary Science: Mathematics**  
A basic survey of mathematical structures as well as an introduction to problem solving. Topics are chosen from foundations of mathematics, algebra, topology, number theory, graph theory, probability and statistics. These structures are examined as they occur naturally in modern settings. *NOTE: Not acceptable as science credit for College of Science majors.* **Class 4, Credit 4 (offered upon sufficient request)**

- 1016-301** **Introductory Statistical Methods I**  
An elementary introduction to the topics of descriptive analysis and probability. (Credit or coregistration in 1016-311) (1016-200 or equivalent) **Class 3, Credit 3 (F, W)**
- 1016-302** **Introductory Statistical Methods II**  
An elementary, concept-oriented introduction to the topics of inferential statistics and survey sampling methodology. Most of the calculations are done by computer. (Credit or coregistration in 1016-312) (1016-301) **Class 3, Credit 3 (W, S)**
- 1016-303** **Introductory Statistical Methods III**  
An elementary introduction to the topics of analysis of variance, regression and forecasting. (Credit or coregistration in 1016-313) (1016-302) **Class 3, Credit 3 (S, F)**
- 1016-305** **Calculus IV**  
A continuation of 1016-253 treating three-dimensional analytic geometry and vector algebra, partial derivatives, multiple integrals and applications. (Credit or coregistration in 1016-253) **Class 4, Credit 4 (F, W, S, SU)**
- 1016-306** **Differential Equations I**  
An introduction to the study of ordinary differential equations and their applications. 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, vibrating systems, Laplace transforms. (1016-253) **Class 4, Credit 4 (F, W, S, SU)**
- 1016-307** **Differential Equations II**  
Second-quarter course in ordinary differential equations that includes power series solutions to ordinary differential equations about ordinary and regular singular points; orthogonal polynomials; solution of systems of linear differential equations; phase plane analysis, stability and chaos. (1016-305, 306) **Class 4, Credit 4 (S)**
- 1016-311** **Introductory Statistical Methods I Laboratory**  
Lab course to reinforce the concepts in the Introductory Statistical Methods I lecture course. MINITAB is used as a tool for data analysis. (Credit or coregistration in 1016-301) **Class 2, Credit 1 (F, W)**
- 1016-312** **Introductory Statistical Methods II Laboratory**  
Lab course to reinforce concepts in the Introductory Statistical Methods II lecture course. SPSS is used as a tool for data analysis. (Credit or coregistration in 1016-302) **Class 2, Credit 1 (W, S)**
- 1016-313** **Introductory Statistical Methods III Laboratory**  
Lab course to reinforce the concepts in the Introductory Statistical Methods III lecture course. SPSS is used as a tool for data analysis. Credit or coregistration in 1016-303) **Class 2, Credit 1 (S, F)**
- 1016-314** **Statistics**  
Basic statistical concepts for engineers and scientists covering descriptive statistics, probability and inference. Calculus is used where appropriate, and the software package MINITAB is incorporated. *NOTE: This course may not be taken for credit if credit is to be earned in 1016-319.* (1016-253) **Class 4, Credit 4 (W, S)**
- 1016-318** **Matrices and Boundary Value Problems**  
An introduction to matrix algebra and boundary value problems. Topics 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. (1016-305, 306) **Class 4, Credit 4 (F, S, SU)**
- 1016-319** **Data Analysis I**  
The statistical principles of presenting and interpreting data. Topics include descriptive statistics and displays, random sampling, the normal distribution, confidence intervals and hypothesis testing. The statistical software package MINITAB is 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 1016-314.* (1016-204) **Class 4, Credit 4 (F, W, S)**
- 1016-320** **Data Analysis II**  
An elementary introduction to the topics of regression and analysis of variance. The statistical software package MINITAB is used to reinforce these techniques. (1016-309 or 1016-319 or equivalent) **Class 4, Credit 4 (W, S)**
- 1016-324** **Vector Calculus**  
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. *NOTE: This course may not be taken for credit if credit is to be earned in 1016-328.* (1016-305, 306) **Class 3, Credit 3 (offered upon sufficient request)**
- 1016-328** **Engineering Mathematics**  
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. *NOTE: This course may not be taken for credit if credit is to be earned in 1016-324.* (1016-305, 306) **Class 4, Credit 4 (F, S, SU)**
- 1016-331** **Matrix Algebra**  
An introduction to the basic concepts of linear algebra, with an emphasis on matrix manipulation. Topics 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 are interspersed throughout the course. (1016-305, 306) **Class 4, Credit 4 (F, W, S)**
- 1016-351** **Probability and Statistics I**  
Descriptive statistics; sample spaces and events; axioms of probability; counting techniques; conditional probability and independence; distributions of discrete and continuous random variables; joint distributions; central limit theorem. (1016-253) **Class 4, Credit 4 (F, W, S, SU)**
- 1016-352** **Probability and Statistics II**  
Basic statistical concepts, sampling theory, hypothesis testing, confidence intervals and nonparametric methods. A statistical software package is used for data analysis. (Corequisite 1016-305) (1016-351) **Class 4, Credit 4 (W, S)**
- 1016-353** **Applied Statistics**  
Topics in simple linear regression, an introduction to analysis of variance and the use of statistical software packages. (1016-352 or 1016-314) **Class 4, Credit 4 (S)**
- 1016-354** **Introduction to Regression Analysis**  
A study of regression techniques with applications to the type of problems encountered in real-world situations. Includes use of statistical software. Topics include review of simple linear regression, residual analysis, multiple regression, matrix approach to regression, model selection procedures, various other models as time permits. (1016-353 and 331 or permission of instructor) **Class 4, Credit 4 (F)**
- 1016-355** **Design of Experiments**  
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. (1016-353) **Class 4, Credit 4 (W)**
- 1016-358** **Statistical Quality Control**  
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 is used for data analysis. (1016-352 or 1016-314) **Class 4, Credit 4 (S)**
- 1016-365** **Combinatorial Mathematics**  
An introduction to the mathematical theory of combination, arrangement and enumeration of discrete structures. Topics include enumeration, recursion, inclusion-exclusion, block design, general functions. (1016-265 or permission of instructor) **Class 4, Credit 4 (offered upon sufficient request)**
- 1016-379** **Data Analysis I Laboratory**  
A computer laboratory course that reinforces the concepts of 1016-319: Data Analysis I. The statistical software package MINITAB is used. The focus is on statistical analysis of data with business applications. (Corequisite: 1016-319 or equivalent) **Class 2, Credit 2 (W, S)**
- 1016-380** **Data Analysis II Laboratory**  
A computer laboratory course that reinforces the concepts of 1016-320: Data Analysis II. Statistical software such as MINITAB, SPSS or SAS is used, and spreadsheet software such as Lotus or Excel may also be used. The focus is on statistical analysis and model building using data with business applications. (Corequisite: 1016-320 or equivalent) **Class 2, Credit 2 (S, F)**

- 1016-399** **Co-op Seminar**  
Exploration of cooperative education opportunities, practice in writing letters of application, résumé writing and interviewing procedures. **Class 1, Credit 0 (W)**
- 1016-411, 412** **Real Variables**  
**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. (1016-305 and either 1016-265 or permission of the instructor)  
**412:** A continuation of 1016-411 that concentrates on integration: definition of integral—its existence and its properties, improper integrals, infinite series, sequences and power series. (1016-411)  
**Class 4, Credit 4 (411-F, W; 412-S)**
- 1016-420** **Complex Variables**  
A brief discussion of preliminaries leading to the concept of analyticity. Complex integration. Cauchy's integral theorem and integral formulas. Taylor and Laurent series. Residues. Real integrals by complex methods. (1016-305)  
**Class 4, Credit 4 (F, W, SU)**
- 1016-432** **Linear Algebra**  
A further development of the basic concepts of linear algebra, including orthogonality. Topics include similarity, linear transformations, diagonalization, inner products, Gram-Schmidt, quadratic forms and various numerical techniques. Several applications of these ideas are also presented. (1016-331)  
**Class 4, Credit 4 (F)**
- 1016-437** **Computer Methods in Applied Mathematics**  
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. (1016-305, 306, 331, some programming knowledge) **Class 4, Credit 4 (S)**
- 1016-451, 452** **Mathematical Statistics I, II**  
**451:** Brief review of basic probability concepts and distribution theory; mathematical properties of distributions needed for statistical inference. (1016-352)  
**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. (1016-451)  
**Class 4, Credit 4 (451-W; 452-S)**
- 1016-454** **Nonparametric Statistics**  
An in-depth study of inferential procedures that are valid under a wide range of shapes for the population distribution. Topics include tests based on the binomial distribution, contingency tables, statistical inferences based on ranks, runs tests and randomization methods. A statistical software package is used for data analysis. (1016-352) **Class 4, Credit 4 (F)**
- 1016-457** **Research Sampling Techniques**  
Provides a basis for understanding the selection of the appropriate tools and techniques for analyzing survey data. Topics include design of sample surveys, methods of data collection, a study of standard sampling methods. A statistical software package is used for data analysis. (1016-352 or 1016-314)  
**Class 4, Credit 4 (W)**
- 1016-461** **Mathematical Modeling**  
Explores problem solving, formulation of the mathematical model from physical considerations, solution of the mathematical problem, testing the model and interpretation of results. Problems are selected from the physical sciences, engineering and economics. (1016-305, 306, 331, 352) **Class 4, Credit 4 (F)**
- 1016-465** **Linear Programming**  
A presentation of the general linear programming problem. A review of pertinent matrix theory, convex sets and systems of linear inequalities; the simplex method of solution; artificial bases; duality; parametric programming; and applications. (1016-432) **Class 4, Credit 4 (W)**
- 1016-466** **Advanced Mathematical Programming**  
A continuation of 1016-465 that surveys the mathematical optimization techniques of integer programming, dynamic programming, project scheduling, queuing theory and some simulation. NOTE: 1016-465 and 1016-466 together cover the material on which the Operations Research exam of the Society of Actuaries is based. (1016-465) **Class 4, Credit 4 (offered alternate years) (S)**
- 1016-467** **Theory of Graphs and Networks**  
The basic theory of graphs and networks, including the concepts of circuits, trees, edge and vertex separability, planarity and vertex coloring and partitioning. There is a strong emphasis on applications to physical problems and on graph algorithms such as those for spanning trees, shortest paths, non-separable blocks and network flows. (1016-265) **Class 4, Credit 4 (F)**
- 1016-469** **Mathematical Simulation**  
An introduction to computer simulation, simulation languages, model building and computer implementation, and mathematical analyses of simulation models and their results using techniques from probability and statistics. (1016-352; 0601-241, 242 or 0602-208, 210) **Class 4, Credit 4 (offered alternate years) (S)**
- 1016-481** **Topics in Mathematical Problem Solving**  
Helps students develop strategies for solving problems that are chosen from a wide variety of areas in mathematics. Emphasis is on attempting problem solutions and presentation of efforts to the class or to the instructor. (One year of calculus or permission of instructor) **Class 2, Credit 2 (F)**
- 1016-485** **Number Theory**  
A study of the structure of the set of integers. Topics such as divisibility, congruences, arithmetic functions, primitive roots, quadratic residues, and the nature and distribution of primes are investigated. (1016-265) **Class 4, Credit 4 (offered upon sufficient request)**
- 1016-501, 502** **Advanced Differential Equations**  
A study of first order, linear higher order and systems of differential equations including such topics as existence, uniqueness, properties of solutions, Green's functions, Sturm-Liouville systems and boundary value problems. (1016-305, 306; 331 desirable) **Class 4, Credit 4 (offered upon sufficient request)**
- 1016-511, 512** **Numerical Analysis**  
**511:** Numerical techniques for the solution of nonlinear equations, interpolation, differentiation, integration, initial value problems. (1016-305, 306; some programming knowledge)  
**512:** Numerical techniques that treat systems of equations, eigenvalue problems, boundary value problems, splines, additional topics at the discretion of the instructor. (1016-331, some programming knowledge) **Class 4, Credit 4 (511-F; 512-W)**
- 1016-521** **Topics in Probability and Statistics**  
Selected topics in applied probability and statistics to meet the needs and interest of the students. (1016-305, 352 or permission of instructor) **Class 4, Credit 4 (offered upon sufficient request)**
- 1016-524** **An Introduction to Time Series**  
A study of the modeling and forecasting of time series. Topics include ARMA and ARIMA models, autocorrelation function, partial autocorrelation function, detrending, residual analysis, graphical methods and diagnostics. A statistical software package is used for data analysis. (1016-352 or 1016-314)  
**Class 4, Credit 4 (offered upon sufficient request)**
- 1016-525** **Stochastic Processes**  
Explores Poisson processes and Markov chains with an emphasis on applications. Extensive use is made of conditional probability and conditional expectation. Further topics, such as renewal processes, Brownian motion, queuing models and reliability, are discussed as time allows. (1016-331, 351, or permission of instructor) **Class 4, Credit 4 (offered upon sufficient request)**
- 1016-531, 532** **Abstract Algebra**  
**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. (1016-265, 432)  
**532:** The basic theory of rings, integral domains, ideals and fields  $GF(p^n)$ , applications to coding theory or abstract vector spaces, function spaces, direct sums, applications to differential equations and to scientific problems. (1016-331)  
**Class 4, Credit 4 (531-W; 532-S)**
- 1016-541** **Actuarial Mathematics I**  
Students study challenging problems whose solutions require a combination of skills that one acquires in a typical mathematics-based curriculum. Course work synthesizes basic, essential problem-solving ideas and techniques as they apply to various areas, such as actuarial mathematics. (1016-432 or permission of instructor) **Class 2, Credit 2 (F)**

**1016-542** **Actuarial Mathematics II**  
Students study challenging problems in probability and statistics whose solutions require a combination of skills that one acquires in a typical mathematical statistics curriculum. Course work synthesizes basic, essential problem-solving ideas and techniques as they apply to various areas, such as actuarial mathematics. (1016-451 or permission of instructor) **Class 2, Credit 2 (W)**

**1016-543** **Actuarial Mathematics III**  
Students study challenging problems in applied statistical methods whose solutions require a combination of skills that one acquires in a typical mathematical statistics curriculum. Course work synthesizes basic, essential problem-solving ideas and techniques as they apply to various areas, such as actuarial mathematics. (1016-542 or permission of instructor) **Class 2, Credit 2 (S)**

**1016-544** **Actuarial Mathematics IV**  
Students study challenging problems in the field of operations research as used in actuarial studies. In addition to receiving thorough treatment of topics in these areas, they enhance their mathematical background for upper-division courses, graduate school and such exams as the GRE, actuarial exams, etc. (1016-466 or permission of instructor) **Class 2, Credit 2 (S)**

**1016-545** **Actuarial Mathematics V**  
Students study challenging problems in numerical methods whose solutions require a combination of skills that one acquires in a typical mathematical statistics curriculum. Course work synthesizes basic, essential problem-solving ideas and techniques as they apply to various areas, such as actuarial mathematics. (1016-511, 512 or permission of instructor) **Class 2, Credit 2 (S)**

**1016-551** **Topics in Algebra**  
Topics in abstract algebra to be chosen by the instructor either to give the student an introduction to topics not taught in 1016-531, 532 or to explore further the theory of groups, rings or fields. (Permission of instructor) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-552** **Topics in Analysis**  
Topics in analysis to be chosen by the instructor, either to introduce the student to topics not covered in 1016-411, 412 or to explore further the topics covered there. (1016-265, 412) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-555** **Statistics Seminar**  
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. (1016-354, 355) **Class 4, Credit 4 (F)**

**1016-558** **Multivariate Analysis**  
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 is used for data analysis. (1016-354, 331) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-559** **Special Topics: Mathematics**  
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)**

**1016-561, 562** **Complex Analysis I, II**  
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 1016-420. (1016-411) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-565** **Game Theory**  
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. (1016-331 or permission of instructor) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-566** **Nonlinear Optimization Theory**  
The theory of optimization of nonlinear 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). (1016-305, 432) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-571, 572** **Topology**  
Metric spaces, topological spaces, separation axioms, compactness, connectedness, product spaces. (1016-412 or permission of instructor) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-581** **Introduction to Linear Models**  
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. (1016-331, 354) **Class 4, Credit 4 (offered upon sufficient request)**

**1016-599** **Independent Study: Math**  
Faculty-directed study of appropriate topics on a tutorial basis. 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**

**1016-620** **The Fourier Transform**  
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. (1016-420) **Class 4, Credit 4 (offered upon sufficient request)**

**1019-420** **Calculus for Technologists I**  
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. (1016-204) **Class 4, Credit 4 (F, W, S)**

**1019-421** **Calculus for Technologists II**  
A continuation of 1019-420. 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 technology problems. (1019-420 or equivalent) **Class 4, Credit 4 (F, W, S)**

**1019-422** **Solutions of Engineering Problems**  
A continuation of 1019-421. 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. (1019-421 or equivalent) **Class 4, Credit 4 (F, W, S)**

**1019-423** **Linear Mathematics for Technologists**  
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. (1019-422 or equivalent) **Class 4, Credit 4 (W, S)**

## Physics

**1017-200** **Physics Orientation**  
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 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)**

**1017-201, 202** **Physics in the Arts**  
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 allows study of the relation of an art form to basic optical, mechanical and electrical physics and, in addition, provides time for the development of student projects. *NOTE: Not acceptable as science credit for College of Science majors.* **Class 2, Lab 2, Credit 3 (offered upon sufficient request)**

**1017-211** **College Physics I**  
An elementary course in college physics. Mechanics: Newton's laws of motion, momentum, rotational motion, energy. (Competency in algebra, geometry and trigonometry) (See 1017-271 for lab) **Class 3, Credit 3 (F, W, S)**

**1017-212** **College Physics II**  
Heat and thermodynamics, fluids, wave motion, sound. (1017-211) (See 1017-272 for lab) **Class 3, Credit 3 (F, W, S)**

**1017-213** **College Physics III**  
Geometrical and wave optics, electricity and circuits, magnetism, some elements of modern physics. (1017-211; 1017-212 is highly recommended) (See 1017-273 for lab) **Class 3, Credit 3 (F, W, S)**

**1017-230** **Stellar Astronomy**  
An introduction to the basic concepts of stellar astronomy, including celestial sphere, constellations, nomenclature, 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. (May be taken before or after 1017-235) **Class 3, Credit 3 (F)**

**1017-231** **Stellar Astronomy Laboratory**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. Observational exercises utilizing the RIT observatory and associated equipment are emphasized. **Class 2, Credit 1 (F)**

**1017-235** **Solar System Astronomy**  
An introduction to basic concepts of solar system astronomy, including celestial sphere, zodiac, astronomical telescopes, sun, moon, eclipses, earth as a planet, planets and their satellites, comets, meteors and theories of the origin of the solar system. (May be taken before or after 1017-230) **Class 3, Credit 3 (S)**

**1017-236** **Solar System Astronomy Laboratory**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. Observational exercises utilizing the RIT observatory and associated equipment are emphasized. **Class 2, Credit 1 (S)**

**1017-250** **Fundamentals of Radiation**  
An introduction to ionizing radiation. Includes the different kinds of radiation and their properties. The effects of radiation, how it can be detected and its applications are also discussed. This is a distance learning course. (Competency in algebra) **Class 4, Credit 4 (offered every year upon sufficient request)**

**1017-271** **College Physics Laboratory I**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (Credit or coregistration in 1017-211) **Lab 2, Credit 1 (F, W, S)**

**1017-272** **College Physics Laboratory II**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (Credit or coregistration in 1017-212) (1017-271) **Lab 2, Credit 1 (F, W, S)**

**1017-273** **College Physics Laboratory III**  
This laboratory course includes experiments related to the principles and theories discussed in corresponding lecture. (Credit or coregistration in 1017-213) (1017-271) **Lab 2, Credit 1 (F, W, S)**

**1017-289** **Contemporary Science: Physics**  
Introductory science for nonscience students. One or more topics such as astronomy, space exploration, relativity, nuclear energy and lasers are discussed and simply explained to give an appreciation of the significance of physics in our contemporary technological society. A minimum of mathematics is used. A laboratory or discussion option may be offered for small group meetings once a week which reinforces the material given in demonstration lectures and audiovisual presentations. *NOTE: Not acceptable as science credit for College of Science majors.* **Class 4, Credit 4 (F, W, S)**

**1017-300** **Introduction to Semiconductor Device Physics**  
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. (1017-212, 213, 273; 1019-422) **Class 4, Credit 4 (S)**

**1017-311** **University Physics I**  
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; gravitation. (Credit or coregistration in 1016-252) (See 1017-371 for three-hour lab, 1017-375 for two-hour lab) **Class 4, Credit 4 (F, W, S)**

**1017-312** **University Physics II**  
Rotational motion, oscillatory motion, heat and thermodynamics, kinetic theory of gases, wave motion, sound, physical optics. (Credit or coregistration in 1016-253) (1017-311) (See 1017-372 for three-hour lab, 1017-376 for two-hour lab) **Class 4, Credit 4 (F, W, S, SU)**

**1017-313** **University Physics III**  
Electrostatics, Gauss' law, electric field and potential, capacitance, resistance, DC circuits, magnetic field, Ampere's law, inductance. (Credit or coregistration in 1016-253) (1017-311, 312) (See 1017-373 for three-hour lab, 1017-377 for two-hour lab) **Class 4, Credit 4 (F, W, S)**

**1017-314** **Introduction to Modern Physics**  
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. (1016-305; 1017-312, 313) **Class 4, Credit 4 (F, W, S)**

**1017-315** **Introduction to Semiconductor Physics**  
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. (1016-306, 1017-314) **Class 4, Credit 4 (S)**

- 1017-317** **Introduction to Computational Physics with FORTRAN Applications**  
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; subscripted variables; intrinsic functions; subprograms; reading from and writing to files. Introduction to the main-frame (VAX) environment. (Credit or coregistration in 1017-312 and 1016-252) **Class 4, Credit 4 (S)**
- 1017-319** **Electrical Processes in Solids**  
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. (1017-315) **Class 4, Credit 4 (offered upon sufficient request) (S)**
- 1017-321** **Introduction to Laboratory Techniques**  
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. (1017-312, 313, 372, 373) **Class 3, Lab 3, Credit 4 (W)**
- 1017-331** **Introduction to Electricity and Electronics**  
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)**
- 1017-341** **Foundations of Scientific Thinking**  
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)**
- 1017-350** **Sophomore Physics Seminar**  
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 and oral presentations. Physics majors must pass this course before going on to 400-level courses. (1017-311, 312, 313, 314) **Class 2, Credit 1 (S)**
- 1017-351** **Radiation Physics I**  
Introductory modern physics emphasizing radiation phenomena. Atomic physics, nuclear physics, radioactivity, production of radionuclides, interaction of charged particles and neutrons with matter. (1017-213; competency in algebra, geometry and trigonometry; 1016-309 recommended) **Class 4, Lab 3, Credit 5 (F)**
- 1017-352** **Radiation Physics II**  
Interaction of x-rays and gamma-rays with matter. Radiation detectors, scintillation detectors, solid state detectors. Radionuclide imaging instrumentation. (1017-351) **Class 4, Lab 3, Credit 5 (W)**
- 1017-353** **Radiation Physics III**  
Principles of radiation protection. Radiation protection instrumentation. Internal and external dose calculations. Practical radiation health physics. Introduction to electronics, including laboratory. (1017-352) **Class 4, Lab 3, Credit 5 (S)**
- 1017-355** **Radiation Protection**  
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 (S)**
- 1017-358** **Nuclear Medicine Physics and Instrumentation**  
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 (SU)**
- 1017-361** **Ultrasonic Physics**  
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 (F)**
- 1017-371** **University Physics Laboratory I**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (Credit or coregistration in 1017-311) (See 1017-375 for a two-hour lab) **Lab 3, Credit 1 (W)**
- 1017-372** **University Physics Laboratory II**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (Credit or coregistration in 1017-312) (1017-371) (See 1017-376 for a two-hour lab) **Lab 3, Credit 1 (S)**
- 1017-373** **University Physics Laboratory III**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (Credit or coregistration in 1017-313) (1017-371, 372) (See 1017-377 for a two-hour lab) **Lab 3, Credit 1 (F)**
- 1017-374** **Modern Physics Laboratory**  
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 1017-315 may include experiments in semiconductor solid state physics. (1017-314, 1017-321) **Lab 3, Credit 1 (S)**
- 1017-375** **University Physics Laboratory I**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (Credit or coregistration in 1017-311) (Recommended for all students in the University Physics lectures who are not required to take a three-hour lab) **Lab 2, Credit 1 (F, W, S)**
- 1017-376** **University Physics Laboratory II**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (Credit or coregistration in 1017-312) (1017-375 or 1017-371) (Recommended for all students in the University Physics lectures who are not required to take a three-hour lab) **Lab 2, Credit 1 (F, W, S)**
- 1017-377** **University Physics Laboratory III**  
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (Credit or coregistration in 1017-313) (1017-375 or 1017-371) (Recommended for all students in the University Physics lectures who are not required to take a three-hour lab) **Lab 2, Credit 1 (F, W, S)**
- 1017-401, 402** **Intermediate Mechanics I, II**  
**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 1017-480) (1016-306, 1017-312, 313)  
**402:** Translating and rotating coordinate systems, mechanics of continuous media, wave motion, Lagrangian formulation of mechanics. (Credit or coregistration in 1017-481) (1017-401, 480) **Class 4, Credit 4 (401-F; 402-S)**
- 1017-411, 412** **Electricity and Magnetism I, II**  
Electric and magnetic fields using vector methods, Gauss's 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. (1016-306; 1017-312, 313, 480, 481) **Class 4, Credit 4 (411-F; 412-S)**
- 1017-415** **Thermal Physics**  
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. (1016-306; 1017-312, 313) **Class 4, Credit 4 (F)**
- 1017-421, 422** **Experimental Physics**  
The elements of advanced laboratory work, including the importance 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. (1017-314, 321, 431 plus coregistration or credit in any one of these: 1017-401, 411, 415, 455) **Class 1, Lab 5, Credit 3 (421-S; 422 upon sufficient request)**
- 1017-431** **Electronic Measurements**  
Laboratory course in electronic measurements and instrumentation, with theory and applications of discrete and integrated circuits in analog and digital electronics. (1017-313, 321) **Class 3, Lab 3, Credit 4 (S)**

**1017-432 Computer Interfacing to Laboratory Instrumentation**  
An introduction to microcomputer interfacing with associated laboratory exercises. Emphasis on the interface circuits using an 80286-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. (1017-331 or 431 or equivalent) **Class 3, Lab 3, Credit 4 (offered upon sufficient request) (F)**

**1017-435 Introduction to Chaotic Dynamics of Physical Systems**  
Basic concepts for visualizing the behavior of nonlinear 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. (1017-317, 401) **Class 4, Credit 4 (offered upon sufficient request) (F or S)**

**1017-440 Astrophysics**  
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. (1017-314, 1016-252) **Class 4, Credit 4 (offered upon sufficient request) (F or S)**

**1017-455 Optical Physics I**  
Physical optics including interference, diffraction and polarization. Brief introduction to modern optics. (1016-305; 1017-312, 313, 480) **Class 4, Credit 4 (F)**

**1017-480, 481 Theoretical Physics I, II**  
**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. (1016-306, 1017-312, 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, complex variables and contour integration. (1017-480) **Class 4, Credit 4 (480-F; 481-S)**

**1017-511 Experimental Optics**  
Advanced laboratory course with experiments based on topics in Optical Physics I and II. Laboratory work includes experimental design, construction, data collection, analysis and reporting. (1017-455) **Lab 6, Credit 3 (offered upon sufficient request) (F or S)**

**1017-521 Advanced Experimental Physics**  
Advanced laboratory experiments and projects in atomic physics, nuclear physics, or solid state physics. Special emphasis on experimental research techniques. (1017-412, 421) **Lab 6, Credit 2 (F)**

**1017-522 Introduction to Quantum Mechanics**  
A study of the concepts and mathematical structure of nonrelativistic quantum mechanics. Exact and approximate techniques for solving the Schrödinger equation are presented for various systems. (1017-315, 402, 412, 455, 480, 481) **Class 4, Credit 4 (S)**

**1017-531 Solid State Physics**  
The structure of solids and their thermal, mechanical, electrical and magnetic properties. (1017-315, 415, 480, 481 and 522) **Class 4, Credit 4 (F)**

**1017-540 Astronomical Instrumentation and Techniques**  
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. (1017-455 or 0925-362 and permission of instructor) **Class 3, Credit 3 (offered upon sufficient request) (F or S)**

**1017-541, 542, 543 Physics Research I, II, III**  
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**

**1017-550, 551 Senior Physics Seminar I, II**  
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. (1017-402, 412, 415, 455, 522) **Class 2, Credit 1 (F)**

**1017-553 Nuclear Physics**  
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. (1017-522) **Class 4, Credit 4 (offered on sufficient request) (F or S)**

**1017-555 Optical Physics II**  
This course is an extension of Optical Physics I (1017-455). It covers coherence theory, fourier optics, holography, gradient index optics, and other modern optics topics. (1017-455) **Class 4, Credit 4 (offered upon sufficient request) (F or S)**

**1017-556 Laser Physics**  
The semiclassical theory of the operation of a laser, characteristics and practical aspects of laser systems, applications of lasers in scientific research. (1017-455) **Class 4, Credit 4 (offered upon sufficient request) (F or S)**

**1017-559 Special Topics: Physics**  
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)**

**1017-599 Independent Study: Physics**  
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**

## General Science

**1018-621 Building Scientific Apparatus Laboratory**  
Basic skills associated with the construction of scientific laboratory apparatus, some of which is not commercially available, are covered: machine shop skills, working with glass, vacuum line technology, optical spectrometer design and instrument electronics. (Corequisite 1008-620) (1014-441; 1017-212, 213 or 312, 313; or permission of instructor) **Lab 4, Credit 1 (offered upon sufficient request)**

## Allied Health Sciences

**1024-210 Medical Technology Seminar**  
Introduction to the profession of medical technology through a series of lectures that provide an overview of the major departments within the modern clinical laboratory. Historical perspectives, development aspects and regulating standards of the medical technology profession are discussed. **Class 1, Credit 1 (F)**

**1024-401 Hematology/Immunohematology**  
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. (1001-306 or permission of instructor) **Class 3, Lab 3, Credit 4 (F)**

**1024-405 Diagnostic Bacteriology and Mycology**  
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. (1001-404) **Class 3, Lab 3, Credit 4 (W)**

**1024-432** **Clinical Laboratory Instrumentation**  
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. (1011-217 or equivalent) **Class 2, Lab 6, Credit 4 (W)**

**1024-433** **Basic Clinical Chemistry**  
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. (1011-217 or equivalent) **Class 2, Lab 6, Credit 4 (S)**

**1024-450** **Medical Laboratory Testing**  
Emphasizes the role of clinical laboratory testing in the areas of blood banking, clinical chemistry, hematology, urinalysis and microbiology. Relates laboratory values with disease states. (Third-year in the PA program) **Class 4, Credit 4 (S)**

**1025-301** **Clinical Aspects of MRI**  
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 an MR center. **Credit 3 (S)**

**1025-310** **Radiation and the Human Body**  
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. Presents a rationale for the safe handling and use of radioactive materials. **Class 2, Credit 2 (SU)**

**1025-401** **Introduction to Clinical Nuclear Medicine**  
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 in the NMT program) **Credit 4 (F)**

**1025-402** **Nuclear Medicine Procedures 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 in the NMT program) **Credit 1 (S)**

**1025-502** **Nuclear Medicine Procedures 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 in the NMT program) **Credit 1 (F)**

**1025-503** **Nuclear Medicine Procedures Respiratory System**  
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 in the NMT program) **Credit 1 (F)**

**1025-510** **Nuclear Medicine Procedures Urinary System**  
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 in the NMT program) **Credit 1 (W)**

**1025-511** **Nuclear Medicine Procedures Endocrine System**  
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 in the NMT program) **Credit 2 (W)**

**1025-512** **Nuclear Medicine Procedures Cardiovascular System**  
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 in the NMT program) **Credit 2 (F)**

**1025-513** **Nuclear Medicine Procedures Digestive System**  
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 in the NMT program) **Credit 2 (W)**

**1025-514** **Nuclear Medicine Procedures Special Studies**  
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 in the NMT program) **Credit 1 (S)**

**1025-515** **Nuclear Medicine Procedures Hematological and In Vitro Studies**  
Basic procedures utilized in nuclear medicine for the evaluation of patients with hematologic disorders. Medical indications, fundamental principles, techniques, data calculations and test interpretation are covered for each procedure discussed. (Fourth-year in the NMT program) **Credit 1 (S)**

**1025-516** **Instrumentation and Computers in Nuclear Medicine**  
A combination lecture/practicum course covering the various nuclear instrumentation found in the clinical setting. The lectures provide knowledge of the function and characteristics of the basic components of any scintillation detection system necessary to understand its applications in nuclear medicine. Lectures are reinforced through clinical practicums in which the student operates the equipment. Collimation, tomography, quality control, computer systems and film processing are covered. (Fourth-year in the NMT program) **Credit 2 (F)**

**1025-517** **Radiochemistry and Radiopharmacology**  
A combination lecture/lab course covering the production and use of radioisotopes in medicine. Radiopharmaceutical compounding, quality control procedures, dose calibration and licensing regulations regarding the handling and use of radiopharmaceuticals are covered. (Fourth-year in the NMT program) **Credit 2 (W)**

**1025-518** **Radionuclide Therapy**  
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 in the NMT program) **Credit 1 (W)**

**1025-519** **Radiation Health Safety**  
A course designed to familiarize the student with the daily routine for safe handling of radioactive materials. Radiation protection, licensing regulations, decontamination procedures, waste disposal and area surveys are covered. (Fourth-year standing in NMT program) **Credit 2 (W)**

**1025-520** **Radioassay**  
A combination lecture/practicum course in RIA. Topics include theory and basic principles, instrumentation, types of assays performed and quality control. Commonly encountered pitfalls, current RIA developments and the diagnostic meaning of several tests are covered. (Fourth-year in the NMT program) **Credit 4 (S)**

**1025-521** **Review in Nuclear Medicine**  
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 in the NMT program) **Credit 2 (S)**

**1025-522** **Clinical Nuclear Medicine I**  
A clinical practicum that 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 in the NMT program) **Credit 7 (F)**

**1025-523** **Clinical Nuclear Medicine II**  
Continuation of Clinical Nuclear Medicine I. (Fourth-year in the NMT program) **Credit 7 (W)**

**1025-524** **Clinical Nuclear Medicine III**  
Continuation of Clinical Nuclear Medicine II. (Fourth-year in the NMT program) **Credit 7 (S)**

**1026-203** **Allied Health Freshman Seminar**  
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)**

**1026-205** **Introduction to Diagnostic Medical Imaging**  
An entry-level exploration of the historical, professional and occupational development of medical imaging. Current uses and future trends are discussed in the areas of radiography, computed tomography, magnetic resonance, nuclear medicine and ultrasound imaging. **Class 2, Credit 2 (F, S)**

**1026-220** **Medical Laboratory Procedures**  
This first part of a two-course sequence (see 1026-221, following) is a survey of the most frequently performed laboratory tests used in the diagnosis and treatment of disease and maintenance of health. The fundamentals of medical laboratory procedures are reinforced by laboratory experiences in microscopy, urinalysis, clinical chemistry, hematology, serology and bacteriology. Laboratory safety and quality assurance also are stressed. This course may not be taken by allied health sciences majors to fulfill degree requirements. **Class 3, Lab 2, Credit 4 (F)**

**1026-221** **Health Awareness**  
In this continuation of 1026-220 (see above) the opportunity is provided to explore the effects of common stressors on lifestyle. Basic structure and function of selected human body systems are discussed and related to factors such as diet, alcohol, drugs, smoking, stress and the environment. Lecture, discussion, demonstrations and student participation are used to explore health-related issues. **Class 3, Lab 2, Credit 4 (W)**

**1026-230** **Computers in Medicine**  
An introduction to computer technology and its use in the medical field. A study of large computer systems and microcomputers as well as related software. Exposure through demonstration and computer laboratory assignments to personal productivity software such as word processors, spreadsheets, database systems and electronic communications. A study of major applications of computers in medicine, including Hospital Information Systems (HIS), Laboratory Information Systems (LIS), medical imaging, disease diagnosis, patient treatment, medical education and biomedical research. **Class 4, Credit 4 (F, S)**

**1026-289** **Contemporary Science: Health Sciences**  
Examines 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)**

**1026-301** **Medical Terminology**  
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 (F, W, S)**

**1026-351** **Clinical Laboratory Topics: Trends in Allied Health**  
A seminar that provides students with exposure to current issues of concern to the clinical laboratory scientist. Topics include TQM in the clinical laboratory, financing health care, DRGs, CLIA '88, point-of-care testing, chemical hygiene and safety issues in the clinical laboratory, state licensure issues, and postgraduate opportunities and career development in the clinical laboratory sciences. **Class 1, Credit 1 (F)**

**1026-352** **Clinical Laboratory Topics: Medical Laboratory Management**  
A seminar series that provides students with exposure to basic management concepts and topics related to maintaining effective laboratory operations. Topics include hospital organization and management, laboratory organization and management, laboratory personnel management, inventory management, marketing clinical products and services, selling clinical products and services, advertising clinical products and services, and entrepreneurship. **Class 1, Credit 1 (W)**

**1026-353** **Clinical Laboratory Topics: New Medical Technologies**  
A seminar series that provides students with exposure to the latest techniques and instruments modernizing the clinical laboratory. Topics include modern automation in microbiology, new testing in microbiology, new procedures in blood banking, modern clinical chemistry and analyzers, contemporary hematology instrumentation, new testing for the clinical chemistry lab, clinical toxicology and AIDS concerns for the laboratory worker. **Class 1, Credit 1 (S)**

**1026-415** **Medical Pathophysiology**  
Presents the physiologic and pathologic processes that underlie the spectrum of human disease entities. Taught in the context of clinical scenarios that demonstrate the basic science principles in a real-world context of health care. Material is presented in the context of case studies, utilizing clinical findings and addressing underlying basic physiologic, biochemical and immunologic processes as they relate to patient care and individual patient problem cases. (1001-305, 306) **Credit 4 (F, S)**

**1026-559** **Special Topics: Clinical Sciences**  
Advanced courses that 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)**

**1026-599** **Independent Study: Clinical Sciences**  
Faculty-directed study of appropriate topics on a tutorial basis. Enables an individual to pursue studies of existing knowledge available in the literature. **Class variable, Credit variable (F, W, S)**

**1027-201** **Introduction to Biomedical Computing**  
An introduction to the applications of computers in health care. Information concerning career opportunities and cooperative education is also provided. **Class 1, Credit 1 (W)**

**1027-305****M Programming**

An in-depth study of the M programming language and its database capabilities. Programming projects are required and are taken from the health care field. Direct mode, local/global/special variables, commands, arguments, operators, writing and executing routines, M editors, screen/prINTER formatting, string manipulation, pattern matching, concatenation, arrays and trees, multilevel and string subscripts, input/output using devices, cross reference files, indirection. (0603-231, 232) **Class 4, Credit 4 (S)**

**1030-412****Cross-Sectional Anatomy**

Basic sectional anatomy of the 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. (1001-305, 306 or permission of instructor) **Class 4, Credit 4 (W)**

**1030-413****Ultrasound Instrumentation**

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 are discussed. Emphasis is on the creation of high-quality images on laboratory scanners. **Class 4, Credit 4 (S)**

**1030-414****General Vascular Evaluation**

Provides basic knowledge of general vascular evaluation with an emphasis on the sonographic approach. Two-dimensional real-time imaging and Doppler techniques are presented as well as a discussion of other imaging modalities and their use in vascular evaluation. Performance of examinations on laboratory equipment is stressed. This is an internship course. (Fourth-year in the ultrasound program or permission of faculty) **Class 4, Credit 4 (S)**

**1030-552****Introduction to Obstetrical Ultrasound**

Provides the ultrasound candidate with basic knowledge necessary to perform obstetrical examinations. High-quality image production, recognition of normal structures and basic pathologic states are stressed. Examination protocols, review of specific anatomy, film reading, and use of other imaging techniques are addressed. This is an internship course. (Fourth-year in the ultrasound program or permission of faculty) **Class 3, Credit 3 (F)**

**1030-553****Gynecologic Ultrasound**

Information necessary to perform basic gynecologic sonographic examinations is presented. Examination strategies for various procedures are explored, as well as the integration of ultrasound into established clinical practices. This is an internship course. (Fourth-year in the ultrasound program or permission of faculty) **Class 3, Credit 3 (F)**

**1030-554****Advanced Obstetrical Ultrasound**

Provides information necessary to perform more sophisticated obstetrical procedures utilizing ultrasound. Examination strategies for various procedures are 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)**

**1030-556****Abdominal Ultrasound I**

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 are stressed. Examination protocols, review of anatomy, film reading and use of other scanning techniques are addressed. This is an internship course. (Fourth-year standing in ultrasound program or permission of faculty) **Class 3, Credit 3 (F)**

**1030-557****Abdominal Ultrasound II**

A continuation of 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 are stressed. Examination protocols, review of anatomy, film reading and use of other scanning techniques are addressed. This is an internship course. (Fourth-year in the ultrasound program or permission of faculty) **Class 3, Credit 3 (F)**

**1030-558****Small Parts Ultrasound**

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 are discussed, as well as the role of ultrasound in established clinical practices utilizing small parts imaging. This is an internship course. (Fourth-year in the ultrasound program or permission of faculty) **Credit 3 (S)**

**1030-560****Ultrasound Seminar**

Candidates prepare a complete plan for an ultrasound department as if they had been hired to establish a new department in a hospital setting. The candidates work together to develop the physical, administrative and financial aspects of a department. This is an internship course. (Fourth-year in the ultrasound program or permission of faculty) **Class 2, Credit 2 (S)**

**1030-561****Research Seminar**

Speaking, writing and researching skills are explored. 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 in the ultrasound program or permission of faculty) **Class 2, Credit 2 (W)**

**1030-570****Clinical Ultrasound I**

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 is stressed. Nursing procedures, ethical issues and medico-legal considerations also are discussed as they relate to the practice of ultrasound examination. This is an internship course. (Fourth-year in the ultrasound program or permission of director) **Credit 7 (F)**

**1030-571****Clinical Ultrasound II**

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 is stressed. The candidate is expected to perform basic examinations with little, if any, assistance by the end of this course. This is an internship course. (Fourth-year in the ultrasound program or permission of director; 1030-570) **Credit 7 (W)**

**1030-572****Clinical Ultrasound III**

Final development of ultrasound examination skills by means of clinical internship. The candidate is expected to perform general ultrasound examinations with no assistance by the end of this course. This is an internship course. (Fourth-year in the ultrasound program or permission of director; 1030-571) **Credit 7 (S)**

**1032-200****Behavioral Medicine**

Familiarizes physician assistant students with biological concepts and the human life cycle. Provides students with a foundation in basic psychopathology and its relationship to understanding human illness. Addresses basic principles of patient care in the context of biopsychosocial issues and social structures in contemporary Western society. First or second year in the PA program) **Credit 2 (S)**

**1032-210****Physician Assistant Seminar**

Introduces the student to the role of the physician assistant in relationship to patients, supervising physicians, colleagues and other physician assistants. Emphasis is on developing a high degree of professionalism in conjunction with health care. Topics include legislation, certification, registration, professional organizations, sociomedical issues, ethics, legal and economic aspects of medicine, health care organization and medical records. (Second- or third-year in the PA program) **Class 1, Credit 1 (W)**

**1032-401****Patient History and Physical Examination I**

This first part of a three-quarter sequence introduces and develops the clinical psychosocial skills and anatomic/physiologic science involved in interviewing and examining patients. Includes practical medical terminology, attitude development and values clarification strategies to aid students in adopting a humanistic approach, interviewing techniques used during patient interaction, comprehensive database, demonstrated techniques for a complete physical examination of all body systems and explanation/implementation of the Problem Oriented Medical Record (POMR). Weekly patient contact. (Third-year in the PA program or permission of instructor) **Class 2, Credit 2 (F)**

**1032-402 Patient History and Physical Examination II**  
This second part of a three-quarter sequence introduces and develops the clinical psychosocial skills and anatomic/physiologic science involved in interviewing and examining patients. Includes performing and writing complete, accurate medical histories and physical examinations with small group instruction. Weekly patient contact. (1032-401) **Class 1, Credit 1 (W)**

**1032-403 Patient History and Physical Examination III**  
This final part of a three-quarter sequence introduces and develops the clinical psychosocial skills and anatomic/physiologic science involved in interviewing and examining patients. Includes a critical analysis of students performing and writing complete, accurate medical histories and physical examinations. Small group instruction. Weekly patient contact. (1032-402) **Class 1, Credit 1 (S)**

**1032-406 Medical Microbiology**  
Provides physician assistant students with the understanding of the biology of human pathogens. The students study how this understanding impacts therapeutic modalities for the treatment of human disease. Students have the opportunity to master specific skills that will be central to their roles as practicing physician assistants. (Third-year in the PA program) **Credit 4 (W)**

**1032-410 Clinical Skills**  
Provides for the PA student requisite skills for professional courses and internships. Emphasis is on developing competence in basic skills in conjunction with patient care. (Third-year in the PA program or permission of instructor) **Class 1, Credit 1 (S)**

**1032-420 Clinical Pharmacology I**  
A study of the mechanics of medications: indications, effects, distribution, absorption, metabolism, excretion, interactions, pharmacokinetics and administration/dosing. Emphasizes agents commonly prescribed in the diagnosis and treatment of disease. A body systems approach is utilized to study cardiology, pulmonology, infectious diseases, dental diseases, otorhinolaryngology, neurology and ophthalmology. (Third-year in the PA program or permission of instructor) **Class 3, Credit 3 (F)**

**1032-421 Clinical Pharmacology II**  
Continuation of 1032-420. Indications, effects, distribution, absorption, metabolism, excretion, interactions, pharmacokinetics and administration/dosing. Emphasizes agents commonly prescribed in the diagnosis and treatment of disease. A body systems approach is utilized to study fluids/electrolytes/nutrition, gastroenterology, nephrology, urology, endocrinology and dermatology. (1032-420) **Class 3, Credit 3 (W)**

**1032-422 Clinical Pharmacology III**  
Continuation of 1032-421. Indications, effects, distribution, absorption, metabolism, excretion, interactions, pharmacokinetics and administration/dosing. Emphasizes agents commonly prescribed in the diagnosis and treatment of disease. A body systems approach is utilized to study hematology, obstetrics, gynecology, orthopedics, surgery, geriatrics, pediatrics and psychiatry. Prescribing and dispensing are discussed. (1032-421) **Class 2, Credit 2 (S)**

**1032-430 Clinical Diagnostic Imaging**  
Introduces PA students to the principles of diagnostic imaging: physical foundations, recognition of gross abnormalities, determination of a diagnostic impression and application of different diagnostic procedures. Emphasis is on correlating body systems with findings of specific radiographic studies. (Third-year in the PA program or permission of instructor) **Class 1, Credit 1 (S)**

**1032-440 Clinical Medicine I**  
The clinical medicine courses give the PA student the necessary foundation of knowledge and understanding to deal with the patient in the clinical context. This preparation precedes the clinical rotations in which students apply their knowledge in examining patients and expand their expertise in evaluation, clinical procedures and problem solving. A body systems approach is utilized to study cardiology, pulmonology, infectious diseases, otorhinolaryngology, neurology and ophthalmology. (Third-year in the PA program or permission of instructor) **Class 15, Credit 5 (F)**

**1032-441 Clinical Medicine II**  
Continuation of 1032-440. This section covers fluids/electrolytes/nutrition, gastroenterology, nephrology, urology, endocrinology and dermatology. (1032-440) **Class 15, Credit 5 (W)**

**1032-442 Clinical Medicine III**  
Continuation of 1032-441. Further areas of study encompass hematology, obstetrics, gynecology, orthopedics, surgery, geriatrics, pediatrics and psychiatry. (1032-441) **Class 15, Credit 5 (S)**

**1032-490 PA Clinical Rotation I**  
Mandatory rotations are in fields of general clinical practice that build a solid basic understanding and groundwork. These required rotations are Internal Medicine (in-patient and out-patient), Family Practice, Emergency Medicine, OB/GYN, Pediatrics, General Surgery and Psychiatry. Students also are able to select two elective rotations. These latter rotations allow students to individualize their experiences according to their own areas of interest. (Fourth-year in the PA program) **Credit 12 (SU)**

**1032-491 PA Clinical Rotation II**  
Continuation of PA Clinical Rotation I. (Fourth-year standing in PA program) **Credit 12 (F)**

**1032-492 PA Clinical Rotation III**  
Continuation of PA Clinical Rotation II. (Fourth-year standing in PA program) **Credit 12 (W)**

**1032-493 PA Clinical Rotation IV**  
Continuation of PA Clinical Rotation III. (Fourth-year standing in PA program) **Credit 12 (S)**

## Clinical Chemistry

**1023-705 Mechanisms of Disease**  
Following a brief review of normal physiology, this course covers 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 (offered alternate years) (W)**

**1023-712 Statistics and Quality Control**  
The principles of statistics as applied to biomedical research as well as clinical laboratory analysis are 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 are studied. **Class 3, Credit 3 (offered alternate years) (S)**

**1023-722 Clinical Laboratory Computer Applications**  
The basic concepts of data processing, as well as the design evaluation and utilization of computer systems in both hospital and clinical laboratories, are studied. The legal aspects of biomedical data processing as well as instrument interfacing are also studied. **Class 3, Credit 3 (offered alternate years)**

**1023-820 Advanced Clinical Chemistry I**  
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 alternate years)**

**1023-821 Advanced Clinical Chemistry II**  
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 alternate years)**

**1023-822 Advanced Clinical Chemistry III**  
A survey of endocrinology and of the immunoassay methods used in performing endocrine assays. The endocrine systems covered include the thyroid, the adrenals, calcium metabolism, 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 alternate years)**

**1023-823 Advanced Clinical Chemistry IV**  
Introduces the student to the types of instrumentation and analytical methods commonly found in the clinical laboratory. Instrumentation and methods covered include UV-visible spectroscopy, immunoassay, GC-MS, HPLC, TLC, ion selective electrodes, atomic absorption spectroscopy, electrophoresis, osmometry, nephelometry and multi-analyzers. The laboratory component serves to provide hands-on experience in these types of procedures and measurements. **Class 3, Lab 3, Credit 4 (offered alternate years)**

**1023-870** **Clinical Chemistry Seminar**  
**Credit 1 (W)**

**1023-872** **Special Topics in Clinical Chemistry**  
 In response to student and/or faculty interest, special courses that are of current interest and/or logical continuations of regular courses are presented. These courses are structured as ordinary courses with specified prerequisites, contact hours and examinations. **Class variable, Credit variable (offered upon sufficient request)**

**1023-877** **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**

**1023-879** **Clinical Chemistry Research**  
 Research carried out in the College of Science laboratories under the direction of RIT faculty members. The amount of credit awarded for such projects is determined after evaluation of a research proposal. **Credit variable 1-16**

**1023-899** **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

**1028-701** **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 (F)**

**1028-702** **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. (1028-701 or equivalent) **Class 4, Credit 4 (W)**

**1028-703** **Solid State Science**  
 Survey of topics in the physics of solids. Included are crystal symmetry, structure and binding; mechanical, thermal and electrical properties of insulators, semiconductors and conductors, including band theory. (1028-704 or equivalent) **Class 4, Credit 4 (W)**

**1028-704** **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. (Graduate standing and permission of instructor) **Class 4, Credit 4 (F)**

**1028-705** **Introductory Experimental Techniques**  
 Introduction 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 are conducted. (1028-701 and 702 or equivalents) **Class variable, Lab variable, Credit 4 (S)**

**1028-706** **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**

**1028-707** **Experimental Techniques: Electron Microscopy and Spectroscopy**  
 Detailed study of scanning electron microscopy and modern applications in microelectronic engineering. (Permission of instructor) **Class variable, Lab variable, Credit 4**

**1028-708** **Experimental Techniques**  
Provides an in-depth integrated approach to the analysis, investigation and development of materials, concentrating on specific types or classes. (1028-701 or equivalent) **Class variable, Lab variable, Credit 4**

**1028-710** **Materials Properties and Selection**  
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. (1028-701 or equivalent) **Class 4, Credit 4**

**1028-714** **Glass Science**  
Topics include the structure and properties of glass, applied areas such as glass melting and processing, and various technological applications of glass. (1028-701 or equivalent; 1028-704) **Class 4, Credit 4**

**1028-717** **Materials Degradation Corrosion**  
Introduction to the basic electrochemical nature of corrosion and considers the various factors that influence the rate of corrosion in a variety of environments. Various means of controlling corrosion are considered. (1028-701 or equivalent) **Class 4, Credit 4**

**1028-720** **Organic Polymers**  
Meets 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. (1028-702 or equivalent) **Class 4, Credit 4**

**1028-721** **Physical Chemistry of Polymers**  
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. (1028-702 or equivalent) **Class 4, Credit 4**

**1028-722** **Polymer Processing**  
A study of the basic principles and methods involved in the technology of processing polymeric materials, including treatments of heat transfer, mass transfer, mixing and shaping or molding of these materials. (1028-702 or equivalent) **Class 4, Credit 4**

**1028-730** **Optical Properties of Materials**  
Fundamentals of geometrical and physical optics, interaction of radiation with matter, dielectrics and thin films, introduction to electro-optic and acousto-optic effects. (1028-704 or equivalent) **Class 4, Credit 4**

**1028-733** **Magnetic Properties of Materials**  
Band structures of pure and doped solids and solid compounds, transport phenomena, semiconduction, optical properties, galvanomagnetic and magneto-optic effects. (1028-701 and 704 or equivalents) **Class 4, Credit 4**

**1028-734** **Advanced Optics**  
Lasers: theory, types and construction; optics of metals; multilayer dielectrics; electro- and acousto-optic modulators and deflectors; optical detectors. (1028-730 or equivalent) **Class 4, Credit 4**

**1028-736** **Amorphous and Semicrystalline Materials**  
Electrical, thermal and optical properties of amorphous materials; model of conduction. (1028-701, 703, 704 or equivalents) **Class 4, Credit 4**

**1028-740** **Nuclear Science and Engineering**  
Systemics of the atomic nuclei, radioactivity, nuclear reactions, fission, nuclear reactor principles, designs, materials and safety. (1028-701 and 704 or permission of instructor) **Class 4, Credit 4**

**1028-760** **Plasma Science**  
An introduction to plasma science; a study of the basic phenomena and application of plasma to etching, deposition, polymerization, plasma production of materials, analytical emission spectroscopy and atmospheric science. (1028-701 or equivalent) **Class 4, Credit 4**

**1028-770** **Physics and Chemistry of I.C. Processing**  
Study of the various processing steps used in integrated circuit fabrication technology with special emphasis on diffusion, thermal oxidation, ion implantation and plasma-assisted deposition and etching processes. Process modelling using SUPREM. (1028-703 or permission of instructor) **Class 4, Credit 4**

**1028-800** **Special Topics**  
In addition to in-depth study of any of the courses listed under Elective Courses, special topics may be selected from such areas as elastomers, organometallics, radiation damage, processing of materials, superconductivity, etc. (Permission of instructor) **Class variable, Credit 4**

**1028-877** **External Research Project**  
Research using equipment and facilities at a site other than RIT. Prior to enrollment in the course, a proposal from the student that includes a letter of support from the host facility is evaluated for determination of credit to be awarded upon successful completion of the project. A total of 8 quarter credit hours, with a maximum of 4 quarter credit hours per quarter, can be applied toward the MS degree. For matriculated MSE students employed full time by local companies. (Permission of program director) **Credit variable**

**1028-879** **Research and Thesis Guidance**  
A project involving research on a topic in materials science and engineering. An oral examination and written thesis are required. A maximum of 16 quarter credit hours can be applied toward the MS degree. **Credit variable**

**1028-879-99** **Continuation of Thesis**  
Course selection is available to satisfy the Institute's Continuation of Thesis policy. **Credit 0 or 1**

**1028-890** **Seminar**  
Required for completion of the program and involves a one-hour presentation on some topic in materials science in engineering. **Class variable, Credit 1 (R, S)**

**1028-899** **Independent Study**  
This course number should be used by students wishing to study a topic on an independent study basis. (Permission of instructor) **Credit variable**

## Center for Imaging Science

**1051-201** **Survey of Imaging Science**  
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**

**1051-202** **Introduction to Imaging Systems**  
Survey of the features of several imaging systems, including optical systems, radar, sonar, x-ray, holography, etc. (1051-201, 211) **Class 2, Credit 2**

**1051-203** **Introduction to Imaging Science**  
Introduction to Imaging Science continues the work begun in 1051-201, 202, introducing students to several nonconventional imaging systems. The student designs and performs an independent project. **Class 2, Lab 2, Credit 2**

**1051-211** **C Programming for Imaging Science**  
An introductory-level course in computer programming techniques to solve problems in imaging science. The student is introduced to the VAX/VMS operating system on UNIX (Decultrix) C programming language and shown how to use these to implement such computational techniques as numerical integration, root finding and simple image processing. **Class 3, Credit 3**

**1051-302** **Geometrical Optics**  
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. (1016-252, 1051-203 or permission of instructor) **Class 3, Lab 3, Credit 4**

**1051-303 Physical Optics**

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. (1016-252, 1051-203, or permission of instructor) **Class 3, Lab 3, Credit 4**

**1051-313 Interaction Between Light and Matter**

The interaction of electromagnetic energy with various states of matter, including 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. (1017-314, 1011-213) **Class 4, Credit 4**

**1051-401 Radiometry**

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. (1016-306, 1017-313) **Class 3, Lab 3, Credit 4**

**1051-402 Vision, Color and Psychophysics**

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. (1051-401) **Class 3, Lab 3, Credit 4**

**1051-403 Macroscopic Imaging Systems Analysis**

Consolidates the understanding gained in the previous three courses in this series (1051-313, 401, 402), 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 that 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. (1051-402) **Class 3, Credit 3**

**1051-461, 462, 463 Digital Image Processing**

The principles, techniques and applications of digital image processing are introduced. 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 are considered, including kernel operators and discrete convolution. Other mathematical representations of discrete image information are introduced, including the discrete Fourier transform. Applications of image processing are described. Emphasis is placed on implementation of image operations. (1051-211, 1016-331) **Class 3, Credit 3**

**1051-501 Technical Communication and Research Practices**

Develops 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 1051-502, 503. (Matriculation in 1051) **Class 3, Credit 3**

**1051-502, 503 Senior Project**

Students perform the independent research project defined in 1051-501 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 Spring Quarter. **Class 3, Credit 3**

**1051-511 Imaging Systems Analysis**

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. (1016-306, 331) **Class 3, Credit 3**

**1051-512 Advanced Imaging Systems Analysis**

A continuation of 1051-511 extending 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. (1051-511) **Class 3, Credit 3**

**1051-513 Quantum Limitations of Imaging Processes**

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. (1051-512) **Class 3, Credit 3**

**1051-525 Optics for Microelectronics**

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. Characteristics of optical components and their combination into instrument and imaging systems also are introduced. (1017-313 and general familiarity with elementary calculus and trigonometry) **Class 3, Lab 3, Credit 4**

**1051-550, 551, 552, 553 Special Topics in Imaging**

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**

**1051-562 Electro-Optics I**

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. (1051-302, 303) **Class 3, Credit 3**

**1051-563 Electro-Optics II**

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. (1051-562) **Class 3, Lab 3, Credit 4**

**1051-564 Optical Instrumentation**

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. (1051-302, 303) **Class 3, Credit 3**

**1051-599 Independent Study**

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. **Credit variable**

## National Technical Institute for the Deaf

## Applied Accounting

**0801-100** **Career Exploration: Business Technology**  
Helps 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)**

**0801-201** **Principles of Accounting I**  
Introduction to accounting for both accounting and nonaccounting students. Topics covered include the analyzing and recording of business transactions using the double-entry accounting system, end-of-period adjustments, the worksheet, financial statements, closing entries, the post-closing trial balance and the management of cash funds. **Class 6, Credit 3 (W, S)**

**0801-202** **Principles of Accounting II**  
A continuation of Principles Accounting I for both accounting and nonaccounting students. Topics covered include the payroll system and accounting for a merchandising business using special journals. Course work includes a practice set that applies accounting concepts in a simulated business situation. Spreadsheet applications are used on microcomputers. (0801-201) **Class 6, Credit 3 (F, S)**

**0801-203** **Principles of Accounting III**  
This course for accounting students is a continuation of Principles of Accounting I and II. Topics include notes payable and notes receivable; the valuation of receivables, inventories, and plant and equipment; as well as the voucher system of accounting. Course work includes a computerized practice set that applies accounting concepts in a simulated business situation. Spreadsheet applications are used on microcomputers. (0801-202) **Class 6, Credit 4 (F, W)**

**0801-204** **Principles of Accounting IV**  
Emphasizes corporate accounting concepts and principles. Topics covered include capital stock, retained earnings, taxes, dividends, the statement of cash flow and the analysis of financial statements. Accounting for partnerships also is covered. (0801-253) **Class 6, Credit 4 (F, W)**

**0801-231, 232** **Fundamentals of Economics I, II**  
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, 0804-101) **Class 4, Credit 3 (0801-231, W; 0801-232, S)**

**0801-252** **Cost Accounting I**  
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. Culminates with practical application of course content through a practice set. Computer applications include spreadsheets. (0801-203) **Class 6, Credit 4 (W, S)**

**0801-253** **Cost Accounting II**  
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. (0801-252) **Class 6, Credit 4 (F, S)**

**0801-260** **Applied Accounting Techniques**  
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, spreadsheets, graphics and data bases. (0801-253) **Class 6, Credit 2 (F, W)**

## Applied Art and Computer Graphics\*

**0825-101** **Career Exploration: Art**  
Helps 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, art career options, working conditions, salaries and job responsibilities. **Studio 2, Credit 1 (F, W, S)**

**0825-105** **Visual Idea Development**  
Gives students the opportunity to tap a multitude of resources, including personal experience and the environment, as aids to creativity through a variety of activities including classroom discussions, field trips, guest lectures, written journals and sketchbooks. Students learn strategies for developing concepts and organization of thought processes as well as systems to formulate solutions to design problems. Emphasis is on the use of critical thinking to discriminate what can be considered to be "good" design and why. The library is used for development of research skills. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. **Class 2, Credit 2 (F, W, S)**

**0825-110** **Introduction to Computer Graphics**  
Introduction to the use of computer hardware and software to create, edit and produce graphics. Course content includes file formats, legal issues, health/safety issues, vocabulary, memory, file management and hands-on involvement with specific applications: word-processing, pixel-based and object-based. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. **Studio 4, Credit 2 (F, W, S)**

**0825-115** **Freshman Art Seminar**  
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. Systematic decision making related to art careers is emphasized. Required for applied art and computer graphics majors. **Class 2, Credit 2 (F, W, S)**

**0825-201** **Studio Techniques**  
Basic tools, materials and non-computer-based equipment used in the professional applied art studio for design concept development and presentation of comprehensive layouts are introduced. Emphasis is on correct technical use of various color and black-and-white imaging media, materials and equipment. The skills learned in this course will be utilized in other major courses in the program to create clean, well-crafted presentations. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. **Studio 4, Credit 2 (F, W, S)**

**0825-204** **Perspective Drawing**  
Introduction to the fundamentals of perspective, including one-point, two-point and three-point perspective; special vanishing points; mixed perspective; and ellipses. Basic three-dimensional shapes are drawn using both free-hand techniques and drafting tools. Perspective concepts are applied to drawing more complex objects and environments, including shading. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. **Studio 4, Credit 2 (F, W, S)**

**0825-206** **Figure Drawing**  
Introduces students to the study of the human form, including quick gesture drawing, contour studies, line drawing, proportion, shading and light, study of head/facial features, use of quick sketches and sustained study, and use of the figure in composition. Students are introduced to media and materials used to draw the human form. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. **Studio 4, Credit 2 (F, W, S)**

**0825-208** **Drawing Composition**  
Use of drawing principles learned in previous drawing courses and the Visual Idea Development course are applied to drawing still life, architecture, various environments and the human form within environments. Use of sketchbooks is emphasized for development of compositions. Students are encouraged to research visual ideas through the use of the library and other sources. A variety of media and materials are used, including color. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-204, 206) **Studio 4, Credit 2 (F, W, S)**

\* Final approval of the AOS and AAS degree programs by Institute curriculum governing bodies and the New York State Department of Education is pending.

**0825-210 Intermediate Computer Graphics**  
A continuation of the basic experience gained in Introduction to Computer Graphics. Students gain in-depth experience with computer hardware and software to create, manipulate and produce finished graphics. Course content includes hands-on black-and-white and color software experience using illustration and photo manipulation software. Also includes a continuing focus on health/safety issues, vocabulary, file formats and file management. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-110) **Studio 4, Credit 2 (F, W, S)**

**0825-211 Introduction to Design**  
Introduction to the concepts, elements and exploration of design related to a career in the art field. Emphasis is on basic two-dimensional design concepts and principles such as point, line, shape, texture and space, using black-and-white media for presentation of ideas. Technical quality in presentation of design concepts is emphasized. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. **Studio 4, Credit 2 (F, W, S)**

**0825-212 Color in Design**  
In this course, color theory is emphasized. Concepts learned in Introduction to Design are applied using color media and materials to solve basic design problems. Technical quality in presentation of design concepts continues to be discussed. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-211) **Studio 4, Credit 2 (F, W, S)**

**0825-215 Art Career Seminar**  
Provides information regarding jobs, titles, roles and paths for careers in the art field. Students identify a specific art field for further personal exploration. They also are expected to arrange and conduct an interview with a professional artist. Development of college survival skills and systematic decision-making related to art careers is further emphasized. Information is presented through presentations, field trips, discussions and research of art careers. Required for applied art and computer graphics majors. (0825-115) **Class 2, Credit 2 (F, W, S)**

**0825-221 Introduction to Typography**  
Students learn type measurement/point sizes and type classification/type families. Identification of typefaces, letter spacing, word spacing, line spacing, line length and type arrangements is also emphasized. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-105, 201, 210, 212) **Studio 4, Credit 2 (F, W, S)**

**0825-230 Electronic Layout Programs**  
Computerized page layout programs are taught through the use of professional tutorials and supplemental practice materials. Students acquire a good working knowledge of page layout software used in most graphic design studios and agencies. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-210, 212) **Studio 4, Credit 2 (F, W, S)**

**0825-245 Co-op Preparation**  
Prepares students for a cooperative work experience in the applied art and computer graphics field. Course content includes decision making, locating potential employers, résumé and letter preparation, methods for securing interviews, portfolio organization and interviewing. Course experiences include field trips, guest lectures, discussion and a personally-directed co-op employment search. Required for applied art and computer graphics majors. (0825-215) **Class 2, Credit 2 (F, W, S)**

**0825-281 Drawing Applications**  
An advanced course refining freehand and technical drawing concepts, methods and techniques developed in Perspective Drawing, Figure Drawing and Drawing Composition. Emphasis is on development of advanced drawing skills, using various subjects, media and processes. Elective course for both applied art and computer graphics students and students in other majors. (0825-208) **Studio 4, Credit 2 (F, W, S)**

**0825-282 Applied Art Photography**  
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 well-crafted photographic image. Elective course for both applied art and computer graphics students and students in other majors. **Studio 4, Credit 2 (F, W, S)**

**0825-283 Freehand Lettering**  
Introduction to the basic processes of freehand lettering. Emphasis 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, letter-spacing, word spacing, line spacing and rendering of both serif and sans serif letter forms are taught. Elective course for both applied art and computer graphics students and students in other majors. **Studio 4, Credit 2 (F, W, S)**

**0825-284 Three-Dimensional Applications**  
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. Elective course for both applied art and computer graphics students and students in other majors. **Studio 4, Credit 2 (F, W, S)**

**0825-285 Air Brush/Retouching**  
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. (0825-208) **Studio 4, Credit 2 (F, W, S)**

**0825-299 External Co-op**  
This 10-week, full-time experience gives students matriculated in the applied art and computer graphics AOS and AAS programs a sampling of the world of work in the applied art field under the supervision of qualified professionals such as production managers and art directors. There is a written learning contract established between the student, employer and applied arts and computer graphics department. This experience must be satisfactorily completed before the student enrolls in the Graphic Applications/ Portfolio Review and Employment Seminar courses. This experience is required for applied art and computer graphics majors. (0825-245, 310, 332, 342) **Credit 0 (F, W, S)**

**0825-310 Computer Illustration Methods**  
Provides students with advanced skills in the area of computer illustration. Students learn to use the advanced functions of black-and-white and color graphic software to create professional-quality renderings for print publication. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-208, 210, 212) **Studio 4, Credit 2 (F, W, S)**

**0825-315 Art History I**  
Survey of major historical developments in the visual arts as they relate to applied art, specifically examining Western art from prehistoric times to the late Renaissance at the end of the sixteenth century. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. **Class 2, Credit 2 (F, W, S)**

**0825-316 Art History II**  
Survey of major historical developments in the visual arts as they relate to applied art, specifically examining Western art from the Baroque period of the seventeenth century to current movements in fine art. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-315) **Class 2, Credit 2 (F, W, S)**

**0825-317 History of Graphic Design**  
Survey of art and design movements, designers and typographers who have made significant contributions to the field of graphic design. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-316) **Class 2, Credit 2 (F, W, S)**

**0825-321 Type in Design**  
Students focus on use of type as an integral part of a design, including how to choose letter, word and line spacing and line length and type arrangement. Emphasis is on selection of appropriate type to best communicate a message, working with type and grids, legibility and readability, proofreaders' marks and proofreading, working with copy to make it fit in a layout and copy specification. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-221) **Studio 4, Credit 2 (F, W, S)**

**0825-331 Layout for Graphics**  
Application of design concepts, principles and methods developed in first-year courses. Students learn how to define and research simple graphic design problems and develop and present solutions to create clear, well-executed "thumbnail" sketches, "roughs" and comprehensive layouts. Emphasis is on verbal presentation of layout ideas and group critiques. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-208, 221, 230) **Studio 6, Credit 3 (F, W, S)**

0825-332

**Publication Design**

Students use information learned in previous layout courses to solve more complex design problems for multipage jobs. Major emphasis is given to verbal presentation of layout ideas, group production meeting times and group critiques. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-321, 331) **Studio 6, Credit 3 (F, W, S)**

0825-341

**Introduction to Production**

Students learn to use hand skills and computer skills to create and prepare simple production art for black-and-white and color reproduction. Technical vocabulary related to preparing artwork for printing is emphasized. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-221, 230) **Studio 4, Credit 2 (F, W, S)**

0825-342

**Production Applications**

Students use computer skills to create and prepare multipage production art for black-and-white and color production. Technical vocabulary related to preparing artwork for printing is emphasized. Required for applied art and computer graphics majors and may be taken as an elective by students in other majors. (0825-321, 341) **Studio 4, Credit 2 (F, W, S)**

0825-345

**Employment Seminar**

Prepares students for permanent employment in the applied art and computer graphics field. Course content includes preparing and revising résumés and various employment-related letters, organizing the employment search, interviewing, income taxes and legal aspects of employment. Course experiences include field trips, guest lectures, discussions and a personally-directed job search. Required for applied art and computer graphics majors. (0825-299) **Class 2, Credit 2 (F, W, S)**

0825-351

**Graphic Applications**

An advanced course stressing layout, mechanical and computer skills within the context of a professional studio environment. The course involves practical work experience, with an emphasis on studio procedures, work habits, professional skills and dealing with clients. Required for applied art and computer graphics majors. (0825-310, 332, 342) **Studio 12, Credit 6 (F, W, S)**

0825-352

**Graphic Applications/Portfolio Review**

Applied art and computer graphics students' final professional preparation course prior to graduation. Includes practical work experience, interaction with clients and involvement with all phases of studio production, including layout, mechanicals and computer graphics. Students must submit a portfolio of artwork for final review by a jury composed of department faculty members and professional artists. Required for applied art and computer graphics majors. (0825-299, 351) **Studio 12, Credit 6 (F, W, S)**

0825-381

**Survey of Electronic Layout**

An overview of the principles, concepts and processes involved in producing visual layouts. The course focuses on applications within an electronic/desktop publishing environment and includes hands-on experience with both traditional and electronic methods. Emphasis is on understanding the function of a layout as well as the basic methods and criteria used in making design/layout decisions. Elective course for students not enrolled in the applied art and computer graphics program. **Studio 4, Credit 2 (F, W)**

0825-382

**Applied Computer Illustration Techniques**

Provides students with an opportunity to enhance their skills in and knowledge of computer illustration software. The course focuses on the comparison and use of some of the special functions and tools found in vector-based graphic/ illustration programs, including type effects, bezier drawing tools, blends, tiles, color, word spacing and letterspacing, and the importing and exporting of files. Elective course for both applied art and computer graphics students and students in other majors. **Studio 4, Credit 2 (F, W, S)**

0825-383

**Finished Lettering**

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 letter forms. Elective course for both applied art and computer graphics students and students in other majors. (0825-283) **Studio 4, Credit 2 (F, W, S)**

0825-384

**Mechanical Perspective**

Students learn the use of mechanical drawing methods for visualizing three-dimensional form in perspective. Experiences 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. Elective course for both applied art and computer graphics students and students in other majors. (0825-204) **Studio 4, Credit 2 (F, W, S)**

0825-385

**Mechanical Drawing Methods**

Introduction to mechanical processes for depicting three-dimensional forms on a flat surface. Drawing methods, such as oblique and isometric, based on simple and complex forms are included. Emphasis is on translating the three-dimensional form into a technically accurate drawing. Elective course for both applied art and computer graphics students and students in other majors. (0825-384) **Studio 4, Credit 2 (F, W, S)**

0825-399

**Credit Variable****Independent Study**

## Applied Computer Technology

*Note: Required laboratories may take place during evening hours or on Saturdays.*

0802-100

**Logic and Problem Solving**

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)**

0802-101

**Introduction to Business Programming**

Introduction to computer programming concepts. Focuses on problem analysis, design and writing of typical business applications with emphasis on logic skill development. Serves as a foundation for future programming courses. (0802-100, 0817-140) **Class 4, Credit 4 (F, W, S)**

0802-105

**Career Exploration—Data Processing**

Helps 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. 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)**

0802-157

**Beginning Computer Operations**

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: 0802-158) **Class 3, Credit 2 (F, W)**

0802-158

**Beginning Computer Operations Laboratory**

Students are given hands-on experience with one or more computer systems. (Corequisite: 0802-157) **Lab 2, Credit 1 (F, W)**

0802-170

**Utilities/CL for Computers**

Presents the use of control language (CL) and utilities as applicable to a typical mainframe operations data center environment. The CL examples discussed include jobs for standard system utilities and production work. (0802-157) **Class 3, Credit 2 (W, S)**

0802-172

**Utilities/CL Lab**

This lab provides hands-on experience related to the Utilities/CL for Computers course lecture. Students write and run a variety of CL jobs for typical system utilities and production work in a midrange environment. (Corequisite: 0802-170) (0802-157) **Lab 3, Credit 1 (W, S)**

0802-201

**C++ Programming I**

The first course in a two-quarter sequence in C++ programming. Topics include elementary data types, C++ control structures, arrays, records, functions with parameters and introductory object-oriented programming concepts. This sequence gives students beginning skills in C++ programming. (0802-101) **Class 4, Credit 4 (F, W)**

**0802-202** **C++ Programming II**  
 Second in a two-quarter course sequence in C++ programming. Topics include elementary data types, C++ control structures, arrays, records, functions with parameters and introductory object-oriented programming concepts. This sequence gives students beginning skills in C++ programming. (0802-201) **Class 4, Credit 4 (W, S)**

**0802-210** **Data Processing for Business Occupations**  
 An introduction to the use of computers in business-related applications. Concepts of interacting with the computer function of a business as well as hands-on use of computers are presented. (Second-year standing in business occupations department) **Class 3, Credit 3 (W)**

**0802-213** **Applications Software**  
 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)**

**0802-214** **Spreadsheet Software**  
 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. (0802-101, 213, 222) **Class 3, Credit 3 (F, S)**

**0802-215** **Microcomputer Database Software**  
 Creating, inquiring, reporting and other database functions. Several leading database software products for microcomputers are studied. Similarities and differences of these and other database software products are analyzed. Database utilization in the business environment and application to the students' expected work environment are presented. (0802-213) **Class 3, Credit 3 (W, S)**

**0802-220** **Computer Hardware I**  
 Introduction to the fundamental concepts of computer hardware. Topics include basic computer hardware components, I/O, secondary storage devices, data communications/network equipment and media. (0802-157) **Class 3, Credit 3 (F, S)**

**0802-221** **Computer Hardware II**  
 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. (0802-220) **Class 3, Credit 3 (F, W)**

**0802-222** **Software and Operating Systems I**  
 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. (0802-157) **Class 4, Credit 3 (W, S)**

**0802-224** **Networking I**  
 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. (0802-220, 214) **Class 3, Credit 3 (F, S)**

**0802-225** **Networking II**  
 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. (0802-221, 224) **Class 3, Credit 3 (F, W)**

**0802-230, 231** **Business Programming in COBOL I, II**  
 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 gives students beginning skills in COBOL programming. (0802-101 for 0802-230; 0802-230 for 0802-231) **Class 4, Credit 3 (W, S)**

**0802-232** **RPG Programming I**  
 Introduction to report program generator (RPG) language. Course content includes developing program logic, flow charting, 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 databases for input are discussed. (0802-101) **Class 3, Credit 3 (F, W)**

**0802-233** **RPG Programming II**  
 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. (0802-232) **Class 3, Credit 3 (W, S)**

**0802-235, 236** **Programming for Computer Science Students I, II**  
 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. 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, 0802-101 for 0802-235; 0802-235 for 0802-236) **Class 4, Credit 3 (W, S)**

**0802-240** **Assembler Language Programming**  
 Students learn to use assembler language to program the computer on a low-level basis. The major emphasis is on the actual machine language of the computer and how the CPU works. The language taught (BAL) is not intended for use as a business programming language. (0802-101, 0802-163) **Class 4, Credit 3 (F, W)**

**0802-241** **Advanced Assembler Programming**  
 A continuation of Assembler Language Programming focusing on using assembler language as a programming language. (0802-240) **Class 4, Credit 3 (W)**

**0802-250** **Multiprogramming/Spooling for Operators**  
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: 0802-251) (0802-170) **Class 2, Credit 2 (F, S)**

**0802-251** **Multiprogramming/Spooling Laboratory**  
This laboratory provides hands-on experience related to Multiprogramming/Spooling for Operators. Students develop skills in working with queues and spooling programs. (Corequisite: 0802-250) **Lab 2, Credit 1 (F, S)**

**0802-260** **System Generation for Operators**  
Students learn the various parameters as well as the design of a medium-scale operating system from an operator's viewpoint. (Corequisite: 0802-261) (0802-170) **Class 2, Credit 2 (F, W)**

**0802-261** **System Generation Laboratory**  
Students receive hands-on experience in working with a medium-scale operating system. Exercises support concepts presented in System Generation for Operators. (Corequisite: 0802-260) **Lab 3, Credit 1 (F, W)**

**0802-262** **Advanced Operating Systems**  
A continuation of System Generation for Operators focusing on the software that makes up a total computer system. Topics covered are the major operating system software components, compilers and utilities. (Corequisite: 0802-263) (0802-260) **Class 2, Credit 2 (F, S)**

**0802-263** **Advanced Operating Systems Laboratory**  
Students in this laboratory investigate the software related to operating systems. (Corequisite: 0802-262) **Lab 1, Credit 1 (F, S)**

**0802-299** **Co-op Work Experience**  
**Credit 0 (SU)**

**Note: All 300-number courses require that students are enrolled in Written Communication I or higher level course.**

**0802-300** **Software and Operating Systems II**  
A continuation of Software and Operating Systems I, concentrating on advanced operating system functions and system utilities. Topics include conversion of files between different formats, system interfaces and shells, advanced hard disk management and system and data protection. (0802-222, 0847-218) **Class 4, Credit 3 (F)**

**0802-305** **Introduction to Desktop Publishing**  
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. (0802-213, 220, 222; 0847-218; third-year status or department approval) **Class 3, Credit 3 (W)**

**0802-325** **Database Systems**  
Introduces students to the use of database systems on computers. Students design a database 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)**

**0802-330** **File Management**  
Students learn to store and use maintenance information 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)**

**0802-335** **Data Organization**  
A continuation of Programming for Computer Science Students II. The sorting process and the concepts of trees and pointers are discussed and programmed. For students interested in pursuing a baccalaureate degree in computer science. (0802-236, 0817-151) **Class 4, Credit 4 (F)**

**0802-340** **Maintenance Programming**  
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. For students interested in COBOL business programming. (0802-231) **Class 4, Credit 3 (F)**

**802-350** **Large-Scale Systems**  
Students are introduced to large-scale systems and their operation. Content varies depending on the systems available. The topics are related to the support functions in large computer installations. (Corequisite: 0802-351) (One 200-series programming course, 0802-250) **Class 2, Credit 2 (W)**

**0802-351** **Large-Scale Systems Laboratory**  
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 are based on availability of systems. (Corequisite: 0802-350) **Lab 2, Credit 1 (W)**

**0802-360** **Small Business Systems**  
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. Requires extensive laboratory work outside of class. (Corequisite: 0802-361) (One 200-series programming course) **Class 2, Credit 2 (F, S)**

**0802-361** **Small Business Systems Laboratory**  
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: 0802-360) **Lab 3, Credit 1 (F, S)**

**0802-390** **Data Processing Seminar**  
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)**

**0802-399** **Independent Study**  
**Credit Variable (F, W, S)**

## Architectural Technology

**0808-100** **Career Exploration: Architectural Technology**  
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)**

**0808-110** **Construction Terminology**  
Provides an introduction to construction terminology, materials and methods. Topics include obtaining and surveying project sites, designing projects and preparing contract documents. **Class 3, Credit 4 (F)**

**0808-111** **Construction Drafting I**  
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: 0808-110) **Lab 6, Credit 2 (F)**

**0808-112** **Construction Drafting II**  
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: 0808-201) (0808-111) **Lab 6, Credit 2 (W)**

**0808-113** **Construction Drafting III**  
Students continue to learn and practice basic drafting techniques. They also learn to make three-dimensional models. Topics include building models, topographic models, presentation drawings from sketches, free-hand drawings, measured drawings from field measurements, topographic contour maps from spot elevations and design development drawings from preliminary drawings. Students also continue CAD-skill development. (Corequisite: 0808-202) (0808-112) **Lab 6, Credit 2 (S)**

**0808-201** **Construction Methods and Procedures I**  
Continues the introduction to construction terminology, materials and methods begun in the Construction Terminology course. Topics include contracting, managing construction projects, earthwork, foundations, superstructure and enclosing the building. (0808-110) **Class 3, Credit 3 (W)**

**0808-202 Construction Methods and Procedures II**  
Continues the introduction to construction terminology, materials and methods begun in the Construction Terminology and Construction Methods and Procedures I courses. Topics include transportation systems, climate control, electrical power systems, communications systems, interior finishes, landscaping, and operating and maintaining projects. (0808-201) **Class 3, Credit 3 (S)**

**0808-211 Architectural Materials I**  
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. (0808-202) **Class 3, Credit 3 (F)**

**0808-212 Architectural Materials II**  
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. (0808-211) **Class 3, Credit 3 (W)**

**0808-220 Principles of Structural Systems**  
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. (0808-212) **Class 4, Credit 4 (S)**

**0808-221, 222, 223 Architectural Design Drafting I, II, III**  
In this sequence of three courses, students learn drafting production techniques, production scheduling and self-monitoring of progress. Students produce drawings for one or more building projects during the three courses. The process includes 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. (0808-113 for 0808-221; 0808-221 for 0808-222; 0808-222 for 0808-223) **Lab 12, Credit 4 (0808-221, F; 0808-222, W; 0808-223, S)**

**0808-224 Construction Computations**  
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. (0817-151) **Class 2, Credit 2 (W)**

**0808-299 Co-op Work Experience**  
**Credit 0 (SU)**

**0808-340 Planning Project**  
Introduction to the basic techniques for planning surveys, including base map preparation, data collection from field surveys and public records, database 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. (0808-223) **Lab 15, Credit 5 (F)**

**0808-351, 352 Architectural Projects I, II**  
In this sequence of two courses, students complete one or more building design projects. Activities usually include field inspection and measurement, measured drawings, schematic design drawings, design development drawings and working drawings. The courses simulate the environment of an architectural office. (0808-340 for 0808-351; 0808-351 for 0808-352) **Lab 15, Credit 5 (0808-351, W; 0808-352, S)**

**0808-375 Architectural History**  
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)**

**0808-376 Building Estimating**  
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. (0808-224 or 0808-128) **Class 2, Credit 2 (S)**

**0808-377 Building Equipment**  
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. (0808-202) **Class 3, Credit 3 (F)**

**0808-399 Independent Study**  
**Credit Variable**

## Audiology

**0861-103 Intercultural Communication I**  
Helps 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)**

**0861-105 Intercultural Communication II**  
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: 0860-177, 0861-101, 0861-103, 0861-155, or 0861-157; speechreading score [with or without sound] lower than 35 percent) **Class 2, Credit 2, (F, W, S)**

**0861-115 Communication for the Job Interview**  
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. (0847-101, speech score lower than 3.0, completion of at least three quarters in program of study) **Class 2, Lab 1, Credit 2 (W, S)**

**0861-120 Auditory Training for Auditory Profile 1 and 2 Students**  
Auditory training course 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)**

**0861-130 Sounds of English 1: A**  
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. Students who depend on both listening and speechreading to understand everyday speech benefit most from this course. **Class 2, Lab 1, Credit 2 (F, W, S)**

**0861-135 Sounds of English 2: A**  
Continuation of Sounds of English 1: A in which auditory training is continued for the acquisition of listening fluency and comprehension. (0861-130, 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)**

**0861-140 Sounds of English 1: B**  
Helps 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. Students who can understand everyday speech without speechreading benefit most from this course. **Class 2, Lab 1, Credit 2 (F, W, S)**

0861-145

**Sounds of English 2: B**

Continuation of Sounds of English 1: B focusing on continued 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 audio tape. 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. (0861-140, auditory profile of 4 or 5, use of amplification all or most of the time) **Class 2, Lab 1, Credit 2 (F, W, S)**

0861-160

**Intermediate Speechreading**

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)**

0861-170

**Advanced Speechreading: Nontechnical**

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)**

0861-180

**New Telecommunication Technology for the Job: A**

Includes information about regular telephones, telephone amplifiers, answering machines, text telephones (TTYs), computer software for TTY calls, electronic mail, fax and pagers. Students learn how to use the phone system to get information, call for emergency help and make appointments. Students also learn how to become good consumers of telecommunication equipment and services. In addition, students learn about relay services and voice carryover (VCO) for local and long-distance calls. Videotapes are shown that help teach supervisors and co-workers how to use text telephones and relay services. Students also learn how to explain their telecommunication needs for the job. **Class 2, Lab 1, Credit 2 (F, W, S)**

0861-186

**New Telecommunication Technology for the Job: B**

Helps 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)**

0861-399

**Independent Study**

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 adviser or Audiology Department chairperson. **Credit Variable**

## Business Occupations/ Business Technology/ Office Technologies

0804-101

**Orientation to Business**

Broad overview of the form and structure of American business providing 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 4, Credit 3 (F, W, S)**

0804-110

**Business English**

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. Designed specifically for students enrolled in courses in the business occupations department. **Class 3, Credit 3 (W, S)**

0804-111, 112, 113

**Keyboarding, OAS Formatting,  
OAS Document Production I**

These courses are for students with limited typing experience and for those who type below 30 net words per minute. The focus is on keyboard training, skill development and basic formatting. Business correspondence, reports and tables are produced on microcomputers using current software. Students are expected to exit OAS Formatting with a net speed of 25 words per minute for five minutes and to exit OAS Document Production I with a net speed of 30 words per minute for five minutes. (0804-111 for 0804-112; 0804-112 for 0804-113) **Class 5, Credit 2 (F, W, S)**

0804-114

**Keyboarding for Nonmajors**

Offered to students who possess 0-20 words per minute keyboarding speed. The focus 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. Open to all NTID students. **Class 4, Credit 2 (F, W, S)**

0804-115

**Word Processing Foundations**

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)**

0804-124

**Introduction to Data Processing**

Gives students a background in data processing. The concepts and techniques in the processing of data are presented and directed to the needs and requirements of students. **Class 2, Credit 2 (F, W, S)**

0804-211, 212

**Records Management/Business Calculations,  
Payroll/Spreadsheet Applications**

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 databases, 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 (0804-211, F, W; 0804-212, W, S)**

0804-221

**OAS Document Production II**

Emphasis on the improvement of basic skills and their application to a variety of realistic office projects. Students type correspondence, reports and tables on a microcomputer using current software. Applied accounting and office technologies students are expected to exit with a net speed of 40 words per minute for five minutes. (0804-113) **Class 5, Credit 3 (F, W, S)**

0804-230

**Office Technology Seminar**

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)**

0804-284

**Fundamentals of Management**

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. Also introduces students to motivation and leadership theory as it relates to the role of a manager. (0804-101) **Class 4, Credit 1 (F, W)**

0804-286

**Fundamentals of Marketing**

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. (0804-101) **Class 4, Credit 3 (S)**

**0804-290** **Small Business Organization and Management**  
An elective course for business students but available to students who have completed the prerequisites and have a desire to learn entrepreneurial skills for starting a business. Each student writes a business plan describing a selected business. (0804-201, 0804-284, or 0804-286) **Class 4, Credit 3 (S)**

**0804-291** **Applied Business Techniques**  
Gives students an opportunity to review skill-oriented course work on a microcomputer prior to graduation and job entry. Skill review includes production and speed typing, payroll procedures, records management techniques, word processing and database applications using various software packages. (0804-301) **Class 3, Credit 2 (F, W, S)**

**0804-299** **Co-op Work Experience**  
**Credit 0 (SU)**

**0804-302** **Advanced Applications for Word Processing**  
This self-paced course provides an introduction to advanced document formatting and applications using various types of word processing and electronic office procedures. Students learn using current software on a PC. (0804-221) **Class 4, Credit 4 (F, W, S)**

**0804-303** **Business Graphics**  
This self-paced course provides a continuation of the word processing concepts and applications presented in the previous course. Students use current software on a PC to create basic business and data-driven graphics that are prepared in the office environment. An introduction to desktop publishing basics also is included. (0804-302) **Class 4, Credit 4 (F, W, S)**

**0804-304** **Database Applications for Business**  
This self-paced course contains the concepts and applications for creating, maintaining and printing files. Using current database software on PC equipment, students use files to create repetitive letters, lists and reports. **Class 4, Credit 4 (F, W, S)**

**0804-310** **Desktop Publishing for Business Applications**  
This course for students in the office technologies program provides further study in the field of desktop publishing, utilizing word processing and microcomputer equipment. Students create documents that contain business graphics, clip art and self-created graphics. Current software programs are used and provide a working knowledge of microcomputer-based desktop publishing. In addition to required projects, students select and design documents of their choice. (0804-303) **Class 4, Credit 3 (S)**

**0804-312** **International Dimensions of Business**  
Increases students' awareness of the impact of international developments on the U.S. work force and market conditions as well as the impact of the global marketplace as it relates to employment in a U.S. or foreign-owned company in the industrial, manufacturing and service sectors. **Class 4, Credit 3 (S)**

**0804-399** **Independent Study**  
**Credit Variable**

## Civil Technology

**0809-100** **Career Exploration: Civil Technology**  
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)**

**0809-211** **Surveying and Mapping**  
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. (0808-113, 0817-152) **Class 6, Lab 4, Credit 6 (S)**

**0809-241** **Mapping I**  
Students work on a variety of assignments that focus on land planning and site design. Course topics include calculating angles, bearings, distances, coordinates 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. (0808-113, 0817-152) **Lab 3, Class 1, Credit 2 (S)**

**0809-250** **Statics**  
Requires students to apply physical concepts of equilibrium in coplanar 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. (0817-152, 0818-203) **Class 3, Lab 3, Credit 4 (F)**

**0809-260** **Strength of Materials**  
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. (0809-250) **Class 3, Lab 3, Credit 4 (W)**

**0809-283** **Soil Mechanics**  
Introduces students to the characteristics of soils related to construction projects. Topics include visual and laboratory classification of soils, compaction, subsurface investigation, percolation and soil nomenclature. Students perform laboratory experiments and tests and write laboratory reports. **Class 3, Lab 3, Credit 4 (W)**

**0809-284** **Engineering Materials**  
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. (0809-283) **Class 2, Lab 6, Credit 4 (S)**

**0809-285** **Civil Technology Seminar**  
Overview of the field of civil technology. Students learn how the field is related to the profession of civil engineering. Research and laboratory report writing, résumé writing and interviewing skills also are introduced. **Class 1, Lab 3, Credit 2 (F)**

**0809-290** **Programming for Civil Technicians**  
Gives students an opportunity to develop programming skills in BASIC computer language and to create an electronic spreadsheet. Students write programs and design spreadsheets to solve a variety of problems in areas related to mathematics, engineering and business. **Class 2, Lab 3, Credit 3 (S)**

**0809-299** **Co-op Work Experience**  
**Credit 0 (SU)**

**0809-311** **Surveying Projects**  
Students continue to learn the basic techniques of land measurement with an emphasis on field work and related computations. Topics include angular and linear misclosure, traverse computations, stadia, and horizontal and vertical curves. Students have hands-on experience with surveying equipment including levels, transits and a total station. (Corequisite: 0809-242) (0809-231, 241) **Class 1, Lab 6, Credit 3 (F)**

**0809-312** **Mapping and Site Design**  
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: 0809-232) (0809-231, 241) **Class 1, Lab 3, Credit 2 (F)**

**0809-321, 322, 323** **Structural Design Drafting 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. (0809-260 for 0809-321; 0809-321 for 0809-322; 0809-322 for 0809-323) **Class 2, Lab 6, Credit 4 (0809-321, F; 0809-322, W; 0809-323, S)**

**0809-340** **Fundamentals of Fluid Mechanics**  
Introduction 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)**

**0809-350** **Highway Design and Construction**  
Introduction 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. (0809-311) **Class 3, Lab 3, Credit 4 (W)**

**0809-385** **Principles of Environmental Technology**  
Introduction 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. (0809-340) **Class 3, Lab 3, Credit 4 (S)**

**0809-399** **Independent Study**  
**Credit Variable**

## Educational Interpreting

**0870-110** **American Sign Language I**  
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 3 (F)**

**0870-112** **Aspects and Issues of Deafness I**  
Surveys the audiological, psycho-social and developmental aspects of varying degrees of deafness and hearing impairment. **Class 3, Credit 3 (F)**

**0870-114** **Intercultural Communication for Interpreters**  
Provides students with an introduction to the concepts of culture, communication and intercultural communication as they relate to interpreters. **Class 3, Credit 3 (F)**

**0870-120** **American Sign Language II**  
Concentrates on continued development of conversational fluency in ASL. Students learn to accurately recognize and produce ASL with appropriate nonmanual behaviors and grammatical features. (0870-110) **Class 4, Credit 3 (W)**

**0870-122** **Aspects and Issues of Deafness II**  
Focuses on the heritage of deaf people and the ways in which their social needs are satisfied through affiliation with one another. The course covers—through reading, lectures, videotapes and guest presentations—perspectives on the deaf community, identity of deaf people and the evidence of a deaf heritage. (0870-112, 114) **Class 4, Credit 3 (W)**

**870-123** **Processing Skills Development**  
Introduction to a variety of mental processing skills that are components of the complex process of interpretation. The major skill areas developed include listening, memory, abstracting, concentration, sight translation and lag time. **Class 4, Credit 3 (W)**

**0870-124** **Introduction to Interpreting**  
Focuses on the interpreting process model, evolution of the interpreting field and considerations when interpreting. Topics include competencies of sign language interpreters, relevant terminology, evolution in the field of interpreting, process of interpreting, assessment of interpreting assignments, environmental and practical considerations in interpreting, and problem-solving techniques. (0870-114) **Class 3, Credit 3 (W)**

**0870-127** **Principles of Tutoring and Notetaking**  
Gives students an overview of the research and development of tutor/notetaking programs and develops students' tutor/notetaking skills. Tutor/notetaking provision in various educational levels as well as aspects of tutor/notetaking management are studied. (0870-112) **Class 3, Credit 3 (F, W, S)**

**0870-131** **Fingerspelling and Numbers**  
Introduction to the expression and reception of the manual alphabet and numbers. **Class 4, Credit 3 (S)**

**0870-133** **ASL Interpreting I**  
Introduction to the process of taking a spoken message and rendering it into the target language of ASL. Students practice interpreting using consecutive interpretation and rehearsed simultaneous interpretation. Additional topics include a comparison of foreign language and sign language interpretation as well as team interpreting. (0870-120) **Class 4, Credit 3 (S)**

**0870-134** **Practical and Ethical Applications**  
Introduction to the areas of decision making, assignment assessment, environmental management, consumer and professional organizations that interpreters must work with, and policies and procedures within agencies and organizations. Includes an in-depth discussion and application of the RID Code of Ethics principles and guidelines as they apply to various situations within religious, legal, performing arts, telephone, mental health, medical, vocational rehabilitation, and business and industry settings. **Class 3, Credit 3 (S)**

**0870-135** **Voice Interpreting I**  
This is the introductory course in a three-course sequence that 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. (0870-120) **Class 4, Credit 3 (S)**

**0870-214** **Professional Interpreter**  
Provides students with effective job-seeking skills as well as the basic skills needed by entry-level professionals. Topics include computer skills, résumé preparation, interviewing skills, professional credentials and public speaking skills. (0870-134) **Class 3, Credit 3 (F)**

**0870-215** **Voice Interpreting II**  
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. (0870-135) **Class 4, Credit 3 (F, W, S)**

**0870-216** **Transliteration I**  
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. Course work 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. Also addresses the areas of critiquing, assignment preparation and knowledge of target audience. (0870-120, 131) **Class 4, Credit 3 (F)**

**0870-217** **Oral Transliteration**  
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. (0870-112, 124) **Class 4, Credit 3 (F)**

**0870-222** **Mainstreaming: Educational Programs and Alternatives**  
Students learn about educational options for deaf and hard-of-hearing students. The current status of education of deaf people is examined in relation to historical trends as well as legal, social and cultural considerations. Major issues, such as identification, labeling, placement, least restrictive environment and due process are reviewed. Current federal, state and local legislation affecting disabled people are analyzed. (0870-112) **Class 3, Credit 3 (W)**

**0870-225** **Voice Interpreting III**  
This is the third course in a three-course sequence that focuses on the process and performance of voice interpreting. Assignments include learning jargon used for such sensitive topics as human sexuality, human anatomy, substance abuse and crime. Strategies and practice in working with different age groups of signers also are included. (0870-215) **Class 4, Credit 3 (W)**

**0870-226** **Transliteration II**  
This course is the second 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. Course work in analysis of spoken language discourse in order to render an equivalent message. Output emphasizes development of message accuracy, sign vocabulary, speed of transmission, use-of-space techniques and fingerspelling. (0870-216) **Class 4, Credit 3 (W)**

**0870-232** **Support Service Professional**  
Addresses the knowledge and skills necessary for functioning in a variety of educational and noneducational settings in which the support service provider has more than one major responsibility. (0870-127, 222) **Class 3, Credit 3 (S)**

**0870-311** **Interpreting Practicum I**  
Provides students with an opportunity to acquire knowledge about the interpreting profession through observation of and discussion with professional interpreters. Practicum students are assigned mentors who supervise the practicum experience. Students enrolled in Interpreting Practicum I also must register for Interpreting Seminar I. (Grade of C or higher in 0870-112, 124, 134, 135) **Class 10, Credit 5 (F, W, S)**

**0870-313** **Interpreting Seminar I**  
Designed as part of the practicum experience. Students come together to share observations and experiences gained from the practicum placement. Class discussion focuses on analyzing ethical or situational problems, behavioral alternatives and outcomes. Students enrolled in Interpreting Seminar I also must register for Interpreting Practicum I. **Class 2, Credit 1 (F, W, S)**

**0870-321** **Interpreting Practicum II**  
Provides students with an opportunity to integrate skills and knowledge through practicum situations. Experiences are gained by observation and actual interpreting in a variety of settings. Practicum students are assigned mentors who supervise the practicum experience. Students enrolled in Interpreting Practicum II also must register for Interpreting Seminar II. (Grade of C or higher in 0870-122, 214, 215, 216, 222) **Class 10, Credit 5 (F, W, S)**

**0870-323** **Interpreting Seminar II**  
Designed as part of the practicum experience. Students come together to share observations and experiences gained from the practicum placement. Class discussion focuses on analyzing ethical or situational problems, behavioral alternatives and outcomes. Students enrolled in Interpreting Seminar II also must register for Interpreting Practicum II. **Class 2, Credit 1 (F, W, S)**

## Electromechanical Technology

**0811-100** **Career Exploration: Electromechanical Technology**  
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 (F, W, S)**

**0811-101** **Basic Drafting I**  
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. (0817-141) **Lab 6, Credit 2 (F, W)**

**0811-171** **Digital Systems**  
Introduction to logic components and how they are used in machines. Students study gates, switches, counters, flip-flops, multiplexers, demultiplexers, truth tables, Boolean algebra, logic families, registers and counters. (0811-368) **Class 3, Lab 4, Credit 4 (S)**

**0811-201** **C++ Programming I**  
The first course in a two-quarter sequence in C++ programming. Topics include elementary data types, C++ control structures, arrays, records, functions with parameters and introductory object-oriented programming concepts. This sequence gives students beginning skills in C++ programming. (0802-101) **Class 4, Credit 4 (F, W)**

**0811-202** **C++ Programming II**  
Second in a two-quarter sequence in C++ programming. Topics include elementary data types, C++ control structures, arrays, records, functions with parameters and introductory object-oriented programming concepts. This sequence gives students beginning skills in C++ programming. (0802-201) **Class 4, Credit 4 (W, S)**

**0811-209** **Technical Graphics**  
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. (0811-101, 0811-368) **Lab 6, Credit 2 (W)**

**0811-211** **Mechanical Components**  
Introduction to mechanical devices used in electromechanical equipment. The basic topics covered include torque, work, power, gears, cams and drive systems. Students develop basic breadboarding skills. (0817-150, 0818-202) **Class 3, Lab 4, Credit 4 (S)**

**0811-213** **DC Circuits**  
Introduction to the theory and use of direct current circuits. Students learn about direct current units and measurements, basic circuit laws, networks, Thevenin's Theorem and superposition theorem. (0817-150, 0818-202) **Class 3, Lab 6, Credit 5 (S)**

**0811-234** **Optical Systems**  
Introduction 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. (0811-369, 0817-202) **Class 3, Lab 2, Credit 4 (F)**

**0811-241** **Tool Skills**  
Introduction 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. Requires the completion of several projects. (0817-141) **Lab 6, Credit 2 (F, W)**

**0811-299** **Co-op Work Experience**  
(0811-171, 321, 368) **Credit 0 (F, W, S, SU)**

**0811-304** **AC Circuits**  
Theory and use of alternating current circuits. Students learn about inductance, capacitance, alternating current circuits, series and parallel resonant circuits. (0811-210, 213) **Class 3, Lab 6, Credit 5 (F)**

**0811-317** **Kinematics**  
Emphasizes the motion of machine parts. Students learn about linkages and levers and the relation of these parts to velocities, accelerations and distances. (0811-211, 0817-152) **Class 3, Lab 4, Credit 4 (F)**

**0811-321** **Fluid Power**  
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. (0811-317) **Class 3, Lab 4, Credit 4 (W)**

**0811-322** **Electrical Power Systems**  
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. (0811-304, 317) **Class 3, Lab 4, Credit 4 (S)**

**0811-324** **Transducers**  
Introduction 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. (0811-321, 368) **Class 3, Lab 4, Credit 4 (F)**

**0811-325** **Control Systems**  
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. (0811-324) **Class 3, Lab 4, Credit 4 (W)**

**0811-327** **Microprocessor Control Systems I**  
The first course in a two-quarter sequence. 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. (0811-171, 369) **Lab 6, Credit 2 (W)**

**0811-328** **Microprocessor Control Systems II**  
Emphasizes the construction, testing and troubleshooting 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. (0811-327) **Lab 6, Credit 2 (S)**

**0811-330** **Circuit Analysis**  
Emphasizes the analysis of complex circuits. Students learn about Kirchoff's Laws, independent and dependent sources, power, equivalent sources and resistances, Thevenin's Theorem, Norton's Theorem, superposition theorem, mesh analysis and nodal analysis. (0811-370) **Class 4, Credit 4 (W)**

**0811-332** **Statics**  
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. (0811-317) **Class 4, Credit 4 (W)**

**0811-333** **Strength of Materials**  
Introduction to the reactions of engineering materials to different types of loading. 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. (0811-332) **Class 3, Lab 3, Credit 4 (S)**

**0811-334** **Electromechanical Systems**  
Emphasizes the interface between microprocessors and electromechanical devices. Students work on projects that include circuit design, software design, breadboarding skills and troubleshooting techniques. (0811-328) **Class 3, Lab 3, Credit 4 (S)**

**0811-368** **Electronics I**  
Introduction 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. (0811-304) **Class 3, Lab 6, Credit 4 (W)**

**0811-369** **Electronics II**  
Introduction 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. (0811-368) **Class 3, Lab 6, Credit 5 (S)**

**0811-370** **Electronics III**  
Introduction 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. (0811-369) **Class 3, Lab 4, Credit 4 (F)**

**0811-399** **Independent Study**  
**Credit Variable**

## Electronic Publishing and Printing Technology

**0822-100** **Career Exploration: Printing**  
Explores printing as a career choice and helps students make well-informed career planning decisions before enrolling in the printing production technology program. **Class 0, Lab 2, Credit 1 (F, W, S)**

**0822-101** **Introduction to Printing Processes**  
An overview of the printing processes from design to finished product through a combination of lab and classroom activities. Fundamental principles of job safety, paper image generation, image assembly, bindery and comparative image reproduction processes—including flexography, gravure, screen printing and xerography, with an emphasis on offset lithography—are studied. Provides a background for subsequent courses in the printing production technology department. **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-110** **Page Creation Methods**  
Supports the career development of prepress technicians. Included is an introduction to traditional and electronic-image page generation, typography, basic personal computer operation and special-effects typography. Elementary desktop publishing skills are emphasized. This is the first course in a sequence. **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-115** **Fundamentals of Desktop Publishing**  
Provides students with desktop publishing skills. File management, image capture, networking, page layout, editing and document output are covered. Laboratory projects are output to both laser printers and high-resolution imagesetters. (0822-110) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-120** **Fundamentals of Reproduction Photography**  
Prepares students to be camera technicians. Students learn tray and machine processing, exposure on manual and programmable cameras, scaling and cropping copy, line negative and stat production, and basic halftone production. An introduction to electronic image capture and manipulation also is provided. **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-125** **Film Contacting, Proofing and Platemaking**  
Prepares students to be technicians in film contacting, proofing and offset platemaking. Areas of study include contact exposure calibration, comparison of contact exposure targets, densitometry, registration, spreads and chokes, use of a flat identification and exposure communication system, production procedures and quality control. **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-130** **Fundamentals of Offset Film Assembly**  
Prepares students to be offset film assembly technicians/strippers. Students learn single- and multicolor film assembly/stripping procedures, including production of film assembly rule-out, stripping halftones and tints, color-break masking, reverse and surprint type, window cutting, opaquing, and spotting and correcting flats. Areas of study include use of film assembly materials, job analysis and planning, imposition and layout, use of a flat identification and exposure communication system, and an introduction to electronic image assembly. This is the first course in a sequence. **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-140** **Offset Duplicator Operation I**  
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. This is the first course in a sequence. **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-145** **Offset Duplicator Operation II**  
Second in a sequence, this course prepares students to be duplicator operators. Included is instruction on various duplicators that are widely used by in-plant and commercial printers. Multicolor register, feed of various paper stocks, quality assurance procedures and basic finishing operations are among the areas of study. (0822-140) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-200** **Production Procedures and Quality Control**  
Supports the career development of all printing students. Through production of a complete offset printed job, students learn cost estimating, safety, production standards and procedures, job flow and scheduling, quality control standards and procedures, job accountability and recordkeeping, troubleshooting and problem solving. (0822-100-level) **Class 1, Lab 2, Credit 2 (F, W, S)**

**0822-210 Computerized Typesetting**  
Prepares students to be input operators in typesetting and desktop publishing environments. Special keyboard functions, coding systems, file management, telecommunications, optical character recognition and output devices are studied. Covers the basics of direct input imagesetting skills, media conversion, and translation principles used to generate and format text for reproduction. Basic typesetter/imagesetter maintenance is included. (0822-110) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-215 Advanced Desktop Publishing**  
Principles and techniques required for complex document development using layout principles and skills covered in Fundamentals of Desktop Publishing. Topics include document tagging, template generation, style sheets, database publishing and mechanical color separation by computer. (0822-115) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-220 Output Devices and Quality Control**  
Prepares students to be prepress technicians. Students learn film processor requirements, controls, maintenance, imagesetter film and paper processing, calibration and quality control software. Other topics include proofing; image evaluation; page description language (PDL) problem-solving techniques; and laser printer, imagesetter and related output device operation and maintenance. (0822-115, 120) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-225 Electronic Halftone and Illustration Production**  
Supports the career development of prepress technicians. Students learn software and hardware system requirements as well as capabilities for image processing in electronic imaging and publishing environments. Scanning, calibration, tone reproduction control, image manipulation, file management and output are covered. (0822-115, 120) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-230 Process Color Film Assembly**  
Continues the preparation of students to be offset film assembly technicians. Students learn about related color theory, various methods of aligning negatives, registration requirements and procedures, color matching with process color tints, type considerations, flat identification and contact exposure communication, and making composite negatives. (0822-130) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-231 Advanced Process Color Film Assembly**  
Continues the study of process color film assembly techniques and quality control. Areas of study include job analysis and planning, comparative construction stripping and film contacting procedures, quality control and an overview of computer-aided masking and stripping systems. (0822-230) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-235 Offset Press Operation**  
Emphasizes the systematic methods of press preparation and operation, sheet control, set-up of ink and dampening systems and an introduction to four-color process printing. (0822-145) **Class 2, Lab 6, Credit 4 (F, W, S)**

**0822-236 Advanced Offset Press Systems and QC**  
Continues the development of offset press operators. Areas of study include process color printing, densitometry, use and interpretation of image quality control test targets, and troubleshooting press problems. (0822-235) **Class 2, Lab 6, Credit 4 (F, W, S)**

**0822-241, 242, 243, 244, 245 Production Printing I, II, III, IV, V**  
This sequence of courses provides work experiences in a simulated production environment in which students apply standard production and quality control procedures. Previously learned skills are emphasized and reinforced. (0822-200 for 0822-241; 0822-241 for 0822-242; 0822-242 for 0822-243; 0822-243 for 0822-244; 0822-244 for 0822-245) **Class 0, Lab 4, Credit 2 (F, W, S)**

**0822-258 Computer Publishing Methods**  
Advanced course in electronic publishing methods and techniques, emphasizing paint/draw programs, interactive and format-based page makeup, color image scanning, special-effects typography and elementary PostScript programming. (0822-215) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-259 Advanced Computer Publishing Methods**  
Continues the career development of students in electronic publishing and emphasizes the attainment of proficiency in use of long document production and color separation software, systems management and film output. Electronic still video is included. (0822-258) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-260 Color Separation Methods**  
Develops color prepress technicians and includes a study of color separation theory, traditional and electronic color separation techniques, and desktop color separation software and system requirements. (0822-225) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-268 Survey of Image Reproduction**  
Overview of the production processes and techniques utilized for the reproduction of a comprehensive layout. Emphasis is on electronic and traditional production techniques used to generate, process, reproduce, finish and bind documents according to specifications. An elective for students not enrolled in the printing production technology program. **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-273 Desktop Color Separation Production**  
Further prepares color prepress technicians to enter the printing industry as desktop color scanner operators and color workstation operators. Areas of study include copy evaluation, scanner calibration, scanning problem copy, color proofing and correction, and tone reproduction requirements. (0822-260) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-275 Electronic Image Assembly**  
Prepares students in the area of computer-based image assembly. Areas of study include job flow, file management, system hardware and software requirements and applications, film output devices, shop standards and specifications. (0822-220, 230) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-278 Imposition**  
Supports the career development of all printing production technology students. Students learn the variables and capabilities of press and post-press equipment and procedures in planning page imposition on the press sheet for publications of varying lengths. Students plan, specify and produce various impositions. (Department approval required) **Class 1, Lab 3, Credit 2 (F, W, S)**

**0822-280 Production Presswork**  
Continues the study of offset press operation in a simulated production setting. Areas of study include systematic approaches to solving press-related problems and development of production skills. (0822-236) **Class 2, Lab 6, Credit 4 (F, W, S)**

**0822-298 Employment Seminar**  
Students are introduced to the work environment of the printing and publishing industry and corporate publishing workplace, with an emphasis on the processes for securing and maintaining employment. Experiences include résumé preparation and critique, interviewing techniques, field trips, presentations, discussions and development of job-seeking skills. **Class 2, Lab 0, Credit 2 (F)**

**0822-299 Co-op Work Experience**  
**Credit 0 (SU)**

**0822-399 Independent Study**  
**Credit Variable (F, W, S)**

## English

### *Entry Courses*

**0862-100 Ideas in English/A**  
Includes work on basic English sentence structure for reading, writing, speaking and speechreading; practice with vocabulary and comprehension skills needed to read about contemporary topics; and the use of writing to report events. English Learning Center assignments are required. For students with basic English skills. **Class 5, Lab 2, Credit 4 (F)**

**0862-103 English in American Life**  
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. For students with low to intermediate English skills. **Class 4, Lab 2, Credit 4 (F)**

**0862-105****Social Issues**

This English course helps 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. For students with intermediate to high English skills. **Class 3, Lab 2, Credit 4 (F, W, S)**

**0862-107****Language Structure in Written English**

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. Appropriate for students with high-level English skills. **Class 4, Credit 4 (F, W, S)**

*Integrative Courses***0862-110****Ideas in English/B**

Students study English grammar for compound and beginning complex sentences. Reading materials and vocabulary practice include world knowledge needed for college learning. Students are expected to write paragraphs and longer compositions about reading materials and short films. English Learning Center assignments are required. (0862-100) **Class 5, Lab 2, Credit 4 (W)**

**0862-111****Ideas in English/C**

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. (0862-110) **Class 5, Lab 2, Credit 4 (S)**

**0862-112****Writing for Different Purposes**

Students use English skills to organize ideas and solve problems in situations related to their technical course work 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)**

**0862-113****Verbs and Complements**

Deals with verb tense, agreement, and active and passive voice. Includes a detailed study of complementation, which involves the writing of several short passages. Students also work on vocabulary development. (0862-174, California Reading Test score of 8.0–10.0, Michigan Test score of 55–70) **Class 4, Lab 1, Credit 4 (W, S)**

**0862-114****Reading English Dialogue**

Helps students improve their skills in writing English and using English words. Provides instruction in two areas: the use of verbs in different kinds of sentences and the independent analysis of vocabulary words. 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)**

**0862-118****Self-Expression**

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)**

**0862-119****Mass Communication**

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)**

**0862-120****English and the Arts**

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)**

**0862-121****Improving Vocabulary Through Reading**

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. (0862-103) **Class 4, Lab 2, Credit 4 (W)**

**0862-122****Quantitative Concepts**

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)**

**0862-123** **Famous Scientists**  
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)**

**0862-124** **The Earth and Universe**  
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)**

**0862-125** **Library Research for Writing**  
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)**

**0862-131** **Changing World**  
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. (0862-105) **Class 3, Lab 2, Credit 4 (F, W, S)**

**0862-132** **Medical Issues**  
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. (0862-105) **Class 3, Lab 2, Credit 4 (S)**

**0862-133** **Visual Arts**  
Students read a variety of texts that develop the human dimensions of issues related to photography. 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. (0862-105) **Class 3, Lab 2, Credit 4 (W)**

**0862-134** **Beginning Scientific English**  
Introduction 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)**

**0862-135** **Writing Scientific English**  
Improves reading and writing skills through discussion of 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. 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)**

**0862-136** **American Experiences**  
Integrative course focusing on the theme of alienation in American society. Students are required 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. (0862-105) **Class 3, Lab 2, Credit 4 (W, S)**

**0862-138** **Reading and Thinking in English**  
Improves 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)**

**0862-139** **Reading, Thinking and Writing**  
Improves 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 0862-138) **Class 5, Lab 1, Credit 4 (W)**

**0862-144** **Clear Thinking and Writing**  
This critical thought course includes critical reading, using language for personal analysis, writing for persuasive purposes and studying the vocabulary of inference and implication. (0862-107) **Class 4, Credit 4 (W, S)**

### *Emphasis Courses—Reading*

**0862-150** **English in Context**  
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. 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)**

**0862-152** **Reading a Novel**  
Emphasizes the reading process and offers instruction in the elements of a novel. 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)**

**0862-153** **Reading for Language Learning**  
Helps students use reading as a means of improving general English skills. 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)**

**0862-154** **Reading and Vocabulary Skills for the Social Sciences**  
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)**

**0862-155** **Reading for Comprehension in the Liberal Arts**  
Students practice college reading skills while they learn vocabulary and develop reading strategies for learning abstract ideas and acquiring information. Course materials 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. 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)**

**0862-156** **Literature Seminar**  
Involves reading novels or short stories based on a specific theme. 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)**

**0862-157** **Introduction to Deaf Literature**  
This course provides exposure to literature, improves literary analysis skills and broadens knowledge of Deaf culture. Students read fictional and biographical stories by and about deaf people, including 19th-century stories as well as introductions to current literature. Deaf literature focuses on reading comprehension and studying the actions, thoughts and interactions of deaf characters. Other elements such as setting, theme, plot, conflict, point of view and style/voice are discussed. Students write weekly journals and a short research paper. (California Reading Test score higher than 8.5) **Class 4, Credit 4 (F, W, S)**

*Emphasis Courses—Vocabulary*

0862-160

**Vocabulary Through ASL**

For students whose preferred method of communication is American Sign Language (ASL). Develops ability and confidence in translating ASL vocabulary into English equivalents. 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)**

0862-161

**Business Vocabulary**

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)**

0862-162

**Vocabulary/Dictionary Skills**

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)**

0862-163

**English Idioms**

Helps 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)**

0862-164

**Popular Film and English**

Students are exposed 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*

0862-171

**Introduction to Complex Sentences**

Improves English skills for constructing sentences and using new vocabulary. Provides instruction in two areas: the structure of sentences with two verbs and a connector and the analysis of independent vocabulary words. Concentrates on improving written communication and developing reading skills. English Learning Center assignments are required. (0862-100) **Class 4, Lab 2, Credit 4 (F, W, S)**

0862-172

**Identifying Parts of Speech**

Students learn definitions of parts of speech and their functions in a sentence, how to identify the parts of speech of new vocabulary and how to use the words appropriately in a sentence. Focuses on the different uses of words that can function as more than one part of speech. 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)**

0862-173

**Basic English Phrase Structure**

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)**

0862-174

**Adverbials and Basic Clause Structure**

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. (0862-173) **Class 5, Lab 1, Credit 4 (W)**

0862-175

**English Phrase Structure**

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)**

0862-176

**English Clause Structure, Tense and Passive Voice**

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. (0862-175) **Class 4, Lab 1, Credit 4 (F, W, S)**

0862-178

**English Discourse Grammar**

Helps 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.). (0862-107) **Class 4, Credit 4 (W, S)**

*Emphasis Courses—Writing*

0862-180

**Basic Composition**

Instruction in composition writing at the basic level. 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)**

0862-181

**Organizing Paragraphs**

Instruction and practice in developing short, well-organized compositions. 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 0862-180) **Class 2, Credit 2 (F, W, S)**

0862-183

**Essay Writing**

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 0862-181) **Class 3, Credit 3 (F, W, S)**

0862-187

**Creative Writing**

Designed for students who need or want to improve their creative thinking and writing skills. The focus 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)**

0862-188

**Practical Writing**

Helps students become skilled in practical, everyday writing through practice in 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)**

0862-189

**Professional Writing**

Examines various types of letters, memos and reports that students may encounter in the workplace. 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)**

0862-399

**Independent Study**

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 adviser. **Credit 1–4 (F, W, S)**

## General Education

*Required Courses***0847-100 or 0853-100****Freshman Seminar**

Provides 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)**

**0847-101****Job Search Process**

Designed for students who are preparing for their first co-op experience or permanent job. Students learn about résumé 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)**

**0847-102****Contemporary Life Issues**

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. Designed for students completing certificates, diplomas and AOS degrees. AOS-degree students who have completed the three Human Experience courses (0847-166, 167 and 168) may choose to take Contemporary Social Issues (0847-202) instead of this course. **Class 2, Credit 2 (F, W, S)**

**0847-202****Contemporary Social Issues**

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. For AAS-degree students who have completed three Liberal Arts courses. AOS-degree students who have completed the three Human Experience courses (0847-166, 167 and 168) may choose to take this course instead of Contemporary Life Issues (0847-102). **Class 2, Credit 2 (F, W, S)**

*Elective Courses*

## Fine Arts and Humanities

*History***0847-148****Deaf Heritage**

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)**

**0847-149****American Past**

Gives students an understanding of American history, beginning in 1607 and continuing through the 20th century. 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)**

**0847-201****European History**

Introduction to political, social and cultural history from 1600 through the 20th century and 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)**

**0847-204****Perspectives on World Events**

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***0847-215****Introduction to Dramatic Literature**

A basic introduction to dramatic literature as well as a bridge to the study of dramatic literature in the College of Liberal Arts. Introduces students to the play script as literature and to play script analysis, focusing on vocabulary and basic skills. **Class 3, Credit 3 (F)**

**0847-216****Introduction to Prose Literature**

A survey course for students desiring a basic knowledge of prose fiction and nonfiction and a bridge to the study of prose in the College of Liberal Arts. Introduces students to the genres of the short story, novel, autobiography and essay. **Class 3, Credit 3 (W)**

*Religion*

0847-145

**The Bible as Literature: A Cultural and Historical Perspective**

Provides a basic understanding of the contents of the Bible. 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)**

0847-150

**Our Judeo-Christian Heritage**

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)**

*Interdisciplinary*

0847-166

**The Human Experience: An Individual Life**

Introduces the major challenges faced by human beings throughout the life cycle. 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. Required for AOS-degree students. (Permission of department chairperson or instructor) **Class 4, Credit 4 (F, W, S)**

0847-167

**The Human Experience: The Individual and Society**

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. 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. Required for AOS-degree students. (0847-166) **Class 4, Credit 4 (F, W, S)**

0847-168

**The Human Experience: The Individual and Technology**

Explores the social, political, economic and ethical dimensions of the relationship between the individual and technology in modern society. 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 is 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. Required for AOS-degree students. (0847-167) **Class 4, Credit 4 (F, W, S)**

*Mathematics and Science*

0847-220 or 0853-220

**Reading and Thinking in Science and Technology**

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. 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*

0847-106

**Personal Finance**

Introduction 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)**

0847-203

**Economic Basics**

Serves as a bridge to Introduction to Economics, offered in the College of Liberal Arts. Introduces students to basic background knowledge in economic concepts and methods of analysis. Emphasis is on the application of basic methods of economic analysis, economic theories and contemporary economic issues of the United States. (0817-142 or the equivalent is recommended) **Class 3, Credit 3 (S)**

*Psychology*

0847-105 or 0853-105

**Learning Strategies**

Helps students evaluate their strengths and weaknesses and improves 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)**

0847-108

**Drug and Alcohol Usage**

Gives 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 these drug-related topics: social impact, peer pressure, economy of drugs and personal values related to drugs. **Class 2, Credit 2 (F, W, S)**

0847-109

**Growing Up Deaf in America**

Assists 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. 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)**

0847-111

**Basic Human Sexuality**

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)**

0847-113

**Psychology and Your Life**

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)**

0847-114

**Early Childhood and Parenting**

Helps 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. 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)**

0847-126

**Leadership Development**

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 follower-ship, styles of leadership, delegating responsibility, planning skills, helping behaviors, establishing goals and problem-solving techniques. **Class 2, Credit 2 (F, W, S)**

0847-146

**Psychology of Religion**

Helps 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)**

**0847-161 Career Decision Making**  
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)**

**0847-163 Interpersonal Relationships on the Job**  
Students learn the importance of good work relationships to careers. Topics include employer-employee relationships, coworker 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*

**0847-112 Love, Marriage and the Family**  
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. 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)**

**0847-127 Community Service I**  
Gives 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)**

**0847-147 Law and Society**  
Assists 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*

**0848-100 Technical Theater I**  
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)**

**0848-101 Technical Theater II**  
A course for students who want to learn more about technical theater. Activities include independent projects, supervision of crews and shop work. (0848-100) **Class 2, Credit 2 (F, W, S)**

**0848-102 Stage Lighting**  
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. (0848-100) **Class 2, Credit 2 (F, W, S)**

**0848-120 Acting I**  
Explores communication by using pantomime, sign mime, body language, facial expression, character study and role playing. Students learn to perform with confidence and skill in front of an audience. **Class 2, Credit 2 (F, W, S)**

**0848-121 Acting II**  
Helps students perfect acting skills. Activities include advanced character development and preparation of scenes with a partner. (0848-120, permission of instructor) **Class 2, Credit 2 (F, W, S)**

**0848-130 Introduction to Theater**  
Teaches students about theater production and 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**

**0848-131 Creative Translation into Sign Language**  
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**

**0848-132 Sign Mime**  
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**

**0848-133 Theater Practicum**  
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. May be taken more than once. **Class 3-8, Credit 1-3**

**0848-140 Dance Performance I**  
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)**

**0848-141 Dance Performance II**  
This intermediate-level modern dance course teaches technique, group work and performance standards. Activities include lectures, discussions, exercises and performances. (0848-140, dance experience or permission of instructor) **Class 2, Credit 2 (F, W, S)**

**0848-142 Sign Dance**  
Basic dance class includes warm-up, barre, center and across-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**

**0848-143 Special Topics in Dance**  
This course teaches different styles of dance. Possible topics include Afro-Caribbean dance, ballet, jazz and tap. May be taken more than once. **Class 2, Credit 2 (F, W, S)**

**0848-150 Music Introduction/Instruction Practicum**  
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. May be taken more than once. **Class 2, Credit 2 (F, W, S)**

**0848-398 Special Topics Courses**  
The Performing Arts Department offers a broad range of special topics each quarter related to performance and technical/design courses. **Credit variable**

**0848-399 Independent Study**  
**Credit variable**

## Industrial Drafting

**0810-100 Career Exploration: Industrial Drafting**  
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)**

**0810-103 Introduction to Computer-Aided Drafting (CAD)**  
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 may have an opportunity to work on special applications. **Class 1, Lab 3, Credit 2 (F, W, S)**

**0810-131, 132 Manufacturing Processes I, II**  
Students are exposed to various traditional and nontraditional manufacturing operations. Students develop an appreciation for tolerancing of manufactured parts. (0817-152 for 0810-131; 0810-131 for 0810-132) **Lab 3, Credit 1 (0810-131, W; 0810-132, S)**

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**0810-141** **Basic Technical Drafting I**  
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. (0817-142) **Class 1, Lab 6, Credit 3 (F)**

**0810-142** **Basic Technical Drafting II**  
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. (0810-141) **Class 1, Lab 6, Credit 3 (W)**

**0810-143** **Basic Technical Drafting III**  
Students continue to develop skills necessary to produce industrial-quality drawings. Major topics include production drawings, tolerance limits and fits, threads and fasteners, surfaces, finishes, material specification and preparation of an engineering notebook. (0810-142) **Class 1, Lab 6, Credit 3 (S)**

**0810-151** **Materials and Processes I**  
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. (0818-156) **Class 3, Credit 3 (W)**

**0810-152** **Materials and Processes II**  
Students continue to learn the structure, classification, properties and processes of engineering materials while practicing identification, selection and specification methods. (0810-151) **Class 3, Credit 3 (S)**

**0810-204** **Technical Drafting IV**  
Students detail two assemblies from realistic engineering requirements. They work in the laboratory to produce a design/assembly with supporting detail drawings and related documentation. May require the use of 3-D CAD. Manual and CAD drawings are required. (0810-243) **Lab 8, Credit 3 (F)**

**0810-205** **Technical Drafting V**  
Students detail two assemblies from realistic engineering requirements. They work in the laboratory to produce a design/assembly with supporting detail drawings and related documentation. Requires the use of 3-D CAD parametric modeling techniques, including defining the design intent into the part file. Manual and/or CAD drawings are required. (0810-204) **Lab 9, Credit 3 (W)**

**0810-206** **Technical Drafting VI**  
Students detail two mechanical assemblies from realistic engineering requirements. They work in the laboratory to produce details and related documentation. Requires 3-D CAD. (0810-205) **Lab 15, Credit 5 (S)**

**0810-213** **Industrial Drafting: Statics**  
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. (0817-202, 0818-135) **Class 5, Credit 5 (F)**

**0810-214** **Industrial Drafting: Strength of Materials**  
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. Field trips to see test demonstrations may occur. (Corequisite: 0810-221) (0810-213) **Class 5, Credit 5 (W)**

**0810-215** **Mechanisms**  
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. (0817-202) **Class 3, Lab 4, Credit 4 (F)**

**0810-221** **Machine Design I**  
A study of the analytical design of bearings, clutches, couplings, brakes, springs, gearing systems and power shafting. (Corequisite: 0810-214) (0810-213) **Class 3, Lab 3, Credit 4 (W)**

**0810-222** **Machine Design II**  
Students learn methods of constructing machine parts as well as specifications of materials and manufacturing processes. (0810-221) **Class 3, Lab 3, Credit 4 (S)**

**0810-230** **General Tolerancing**  
An introductory course providing instruction in the principles of dimensioning and tolerancing. Helps 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 1, Credit 2 (F)**

**0810-231** **Geometric Tolerancing I**  
The first of two sequential courses that introduce students to geometric dimensioning and tolerancing. Gives 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)**

**0810-232** **Geometric Tolerancing II**  
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. Completes the study of the individual feature characteristic symbols and introduces related feature and positional characteristic symbols per the American National Standards Institute (ANSI Y 14.5M-1982). **Class 2, Lab 1, Credit 2 (S)**

**0810-241** **Technical Mechanical Drafting I**  
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)**

**0810-242** **Technical Mechanical Drafting II**  
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)**

**0810-243** **Technical Mechanical Drafting III**  
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)**

**0810-251** **Technical Electrical Drafting I**  
This first course of a three-course sequence 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)**

**0810-252** **Technical Electrical Drafting II**  
This second course of a three-course sequence is designed to provide students with the necessary skills to identify, draw and differentiate between various electronics diagrams. 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)**

**0810-253** **Technical Electrical Drafting III**  
This third course of a three-course sequence is designed to provide students with the necessary skills to identify, define and produce drawings required for printed circuit board assemblies. Topics include artwork, board detail, marking, assembly drawings, productive processes and fabrication. **Class 2, Lab 6, Credit 3 (S)**

**0810-299** **Co-op Work Experience**  
**Credit 0 (SU)**

**0810-399** **Independent Study**  
**Credit Variable**

## Manufacturing Processes Technology

**0812-150** **Introduction to Computer Numerical Control**  
Introduces the principles, concepts and terminology of computer numerical-controlled machining (CNC). Students review CNC history, development and applications and learn basic programming formats and techniques. (0813-135) **Class 1, Lab 2, Credit 2 (S)**

**0812-151** **Computer Numerical Control I**  
Introduction to computer-controlled machine tools. Students develop the skills required to program a machine, using several canned cycles, and to write programs that include point-to-point, linear and circular interpolation operations. (0813-134, 0817-152) **Class 4, Lab 3, Credit 4 (W)**

**0812-152** **Computer Numerical Control II**  
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 and a CNC lathe. (0812-151) **Class 4, Lab 3, Credit 4 (S)**

**0812-253** **Computer Numerical Control III**  
Introduces students to computer numerical control. Topics 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. (0812-152) **Class 4, Lab 3, Credit 4 (S)**

**0813-100** **Career Exploration: Manufacturing Processes**  
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)**

**0813-101** **Basic Drafting I**  
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. (0817-142) **Lab 6, Credit 2 (F)**

**0813-102** **Basic Drafting II**  
A continuation of Basic Drafting I 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. (0813-101, 0817-150) **Lab 6, Credit 2 (W)**

**0813-131, 132, 133** **Manufacturing Processes 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. (0817-140 for 0813-131; 0813-131 for 0813-132; 0813-132 for 0813-133) **Class 1, Lab 8, Credit 4 (0813-131, F; 0813-132, W; 0813-133, S)**

**0813-134, 135, 136** **Manufacturing Processes IV, V, VI**  
Students apply theory required to set up and operate lathes, milling machines, grinders and precision hand tools. Students also are introduced to nontraditional machining. Greater emphasis is placed on accuracy and quality. Safety is stressed throughout all courses. (0813-133 for 0813-134; 0813-134 for 0813-135; 0813-135 for 0813-136) **Class 1, Lab 8, Credit 4 (0813-134, F; 0813-135, W; 0813-133, S)**

**0813-139, 140** **Blueprint Reading I, II**  
Students develop the skills necessary to read and interpret engineering drawings of details and assemblies. (0817-141 for 0813-139; 0813-139 for 0813-140) **Class 1, Lab 3, Credit 2 (0813-139, F; 0813-140, W)**

**0813-151** **Industrial Materials**  
Introduction to the many materials used in industry and the reasons why the final cost of producing a part is influenced by material selection. Metals, plastics and ceramics are covered from the perspective of physical, mechanical and dimensional properties. (0813-134) **Class 3, Credit 3 (W)**

**0813-152** **Manufacturing Analysis**  
Introduction to manufacturing concepts. Students learn modern methods of planning, producing and controlling manufactured goods. The text and class discussions focus on problem solving and industrial operations. (0813-134) **Class 3, Credit 3 (S)**

**0813-153** **Welding I**  
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. (0813-134) **Lab 4, Credit 2 (W)**

**0813-154** **Precision Measurement**  
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. (0813-132) **Class 1, Lab 3, Credit 2 (S)**

**0813-155** **Welding II**  
Students develop skills in gas tungsten arc welding, gas metal arc welding and resistance welding. Emphasizes proper operation of equipment and related safety measures. (0813-153) **Lab 4, Credit 2 (S)**

**0813-237** **Advanced Machining Processes**  
Students develop advanced-level machining skills. They apply theories associated with precision form and compound-angle grinding, advanced mill and lathe techniques, nontraditional machining processes and electrical discharge machining. Safety is stressed throughout the course. (0813-136) **Class 1, Lab 8, Credit 4 (F)**

**0813-256** **Advanced Precision Measurement**  
Introduction to advanced-level precision measuring equipment and quality control procedures. Students develop additional skills in the use of optical and computer-programmed measuring equipment. (0813-136) **Class 2, Lab 2, Credit 3 (W)**

**0813-260** **Senior Seminar**  
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. (0813-136) **Class 2, Credit 1 (S)**

**0813-299** **Co-op Work Experience**  
**Credit 0 (SU)**

**0813-399** **Independent Study**  
**Credit Variable**

## Ophthalmic Optical Finishing Technology

**0827-105 Introduction to Optical Finishing Technology I**  
A sampling of 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. **Class 2, Credit 2 (F)**

**0827-106 Introduction to Optical Finishing Technology II**  
The function and use of optical laboratory equipment necessary to the production of single-vision eye wear. Students learn the basic concepts of sphere, cylinder, axis and geometric center. **Class 2, Credit 2 (W)**

**0827-107 Introduction to Optical Finishing Technology III**  
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. (0827-106) **Class 2, Credit 2 (S)**

**0827-111 Optical Finishing Technology Math I**  
Focuses on the rules of transposition, including transposition of lens powers. Students learn to apply mathematic functions, solving for binocular and monocular P.D.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. (0817-141) **Class 4, Credit 3 (F)**

**0827-112 Optical Finishing Technology Math II**  
Students learn how to select and determine appropriate base curves, cross curves and inside curves of given lens powers. Students learn mathematical 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 gauge readings. (0817-141; 0827-111) **Class 4, Credit 3 (W)**

**0827-115 Prescription Analysis I**  
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)**

**0827-116 Prescription Analysis II**  
Students continue to analyze and write ophthalmic prescriptions in various forms with an emphasis on ortholite plastic, cataract and trifocal prescriptions. (0827-115) **Class 4, Credit 3 (W)**

**0827-117 Lens Design**  
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. (0827-111, 112) **Class 5, Credit 3 (S)**

**0827-121 Optical Finishing Techniques I**  
Teaches students basic techniques of using the vertometer to analyze single-vision lenses, layout marker, heat treat units, and pattern maker, automatic edging machines and development of hand-beveling skills. (0827-112, 116, 162) **Class 6, Credit 5 (W)**

**0827-122 Optical Finishing Techniques II**  
Teaches students the theory and techniques of centering, power verification and spotting of single-vision and selected multifocal lenses. Students also are taught the mechanics of lens centration using layout markers. (0827-121) **Class 6, Credit 5 (S)**

**0827-123 Optical Finishing Techniques III**  
Teaches students how to automatic-edge lenses using a variety of edging machines. The concepts and techniques of Vee-beveling, rimless bevels and hide-a-bevel are emphasized. (0827-122) **Class 12, Credit 6 (S)**

**0827-161 Optical Finishing Terminology I**  
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)**

**0827-162 Optical Finishing Terminology II**  
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. (0827-161) **Class 5, Credit 3 (F, W, S)**

**0827-163 Optical Finishing Terminology III**  
Emphasizes the comprehension, spelling and application of terminology related to lens tolerances, functions, procedures, and operation and troubleshooting of selected auto edge machines. Students complete a paper describing the procedures used in making prescription eyeglasses. (0827-162) **Class 5, Credit 3 (F, W, S)**

**0827-224 Optical Finishing Techniques IV**  
Emphasis is on individual fabrication of given prescriptions. Students are given a variety of single-vision and multifocal prescriptions to be completed during the quarter. Finished prescriptions are evaluated using ANSI standards. (0827-123) **Class 9, Credit 5 (F)**

**0827-225 Optical Finishing Laboratory Simulation I**  
Provides practice in the total processing of actual eyeglass prescriptions from uncut stage through completion and final inspection. Students practice assembling lenses into frames and symmetrical alignment of the finished product. Students assume the duties of supervisors and rotate positions to demonstrate competence in all phases of operation. **Class 9, Credit 5 (W)**

**0827-226 Optical Finishing Laboratory Simulation II**  
Teaches the techniques of rimless mounting, 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. (0827-225) **Class 9, Credit 5 (S)**

**0827-241 Management of Optical Stockroom Procedures**  
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)**

**0827-243 Optical Finishing Inspection and Correction**  
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)**

**0827-251 Professional Optic Seminar**  
Students learn how attitude, aptitude and personal/social factors contribute to successful employment. They evaluate and summarize information provided by local ophthalmic professionals. **Class 2, Credit 2 (W)**

**0827-299 Co-op Work Experience**  
(0827-101) **Credit 0 (SU)**

**0827-399 Independent Study**  
**Credit Variable**

## Photo/Media Technologies

**0872-100 Career Exploration: Photo/Media Technologies**  
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, programs and expectations of the imaging technology 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)**

- 0872-101** **Freshman Seminar—Photo/Media I**  
Students develop college life survival skills in this course. They explore and develop skills in team building, learning styles and learning strategies. Cultural diversity topics also are included. **Class 2, Credit 1 (F, W, S)**
- 0872-102** **Freshman Seminar—Photo/Media II**  
Students explore career and academic opportunities in the imaging disciplines and begin to develop a personal career plan. Systematic decision making related to imaging careers is introduced. (0872-101) **Class 2, Credit 1 (F, W, S)**
- 0872-103** **Freshman Seminar—Photo/Media III**  
Students develop a personal academic plan that is based upon a career plan in the imaging disciplines. Systematic decision making related to imaging careers is emphasized. (0872-102) **Class 2, Credit 1 (F, W, S)**
- 0872-121** **Computers in Visual Communications**  
Students are introduced to how a computer works and what it can do in the digital imaging environment. The basic function of a computer and a variety of software programs are introduced. **Lab 4, Credit 2 (F, W, S)**
- 0872-122** **Image Sources I**  
An introductory image-capture course utilizing current processes and materials to produce copy images. (0872-121, 141, 181) **Lab 6, Credit 3 (F, W, S)**
- 0872-123** **Image Manipulation I**  
Introduction to the production and manipulation of digital images originating from scanners, video capture or other digital graphic files. (0872-121) **Lab 6, Credit 3 (F, W, S)**
- 0872-141** **Imaging Lab I**  
Students produce continuous-tone paper prints by making enlargements and controlling density and contrast. Includes proper use of equipment, chemical mixing, processing and print finishing techniques, and image evaluation for quality. (Corequisite: 0872-181) **Lab 6, Credit 3 (F, W, S)**
- 0872-142** **Imaging Lab II**  
Students apply principles of color theory to produce and evaluate color prints. Includes making enlargements, controlling print density and color balance, and applying print finishing skills. (0872-101) **Lab 6, Credit 3 (F, W, S)**
- 0872-143** **Imaging Lab III**  
Students apply principles of color theory and densitometry to produce and evaluate color negatives and prints. Students produce and calibrate standard images and use them to evaluate a variety of processes. Mechanized film and paper processor operation, maintenance and processor monitoring skills are introduced and practiced. (0872-142) **Lab 6, Credit 3 (F, W, S)**
- 0872-181** **Basic Image Design**  
Students learn technical skills and develop a sense of aesthetics and design in still imaging. Emphasis is on identifying, defining and applying the concepts of density, contrast and composition. (0872-100) (Corequisite: 0872-141) **Lab 4, Credit 2 (F, W, S)**
- 0872-182** **Image Design**  
Students create images by practicing technical and aesthetic knowledge learned in Basic Image Design. Skills controlling density, contrast, composition and design in color imaging are emphasized. Concepts of color theory and color temperature are introduced. (0872-181) **Lab 2, Credit 2 (F, W, S)**
- 0872-183** **Presentation Media I**  
Students utilize the electronic desktop, file management techniques, graphical user interface and graphic applications to produce basic presentation images. (0872-121) **Lab 6, Credit 3 (F, W, S)**
- 0872-224** **Image Manipulation II**  
Students build on skills learned in Image Manipulation I. Production planning is introduced as a key to producing a variety of photographic-quality electronic images. (0872-123) **Lab 6, Credit 3 (F, W, S)**
- 0872-225** **Image Manipulation III**  
This is a production-oriented course. Students use skills learned in Image Manipulation I and II to continue to produce photographic-quality electronic images. (0872-224) **Lab 6, Credit 3 (F, W, S)**
- 0872-244** **Imaging Lab IV**  
Students continue to apply principles of color theory and densitometry to produce and evaluate color negatives and prints. Topics such as calibration and production of conversion images, color matching prints and production-level skills in mechanized processing are taught. (0872-143) **Lab 6, Credit 3 (F, W, S)**
- 0872-245** **Imaging Lab V**  
Students learn advanced production techniques for display images, reproduction printing and process monitoring. (0872-244) **Lab 6, Credit 3 (F, W, S)**
- 0872-246** **Imaging Lab VI**  
Students produce and evaluate mural prints as well as make black-and-white prints from color negatives and color prints from transparencies. (0872-245) **Lab 6, Credit 3 (F, W, S)**
- 0872-261** **Videography**  
Introduction 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. (0872-181, 284) **Lab 6, Credit 3 (F, W, S)**
- 0872-268** **Survey of Image Processes**  
Overview of several imaging systems, ranging from conventional photography (silver halide) to electronic imaging systems. Different methods of recording, manipulating and displaying images are emphasized. Includes lectures and demonstrations with some hands-on experience, including group activities. **Lab 4, Credit 2 (F, W, S)**
- 0872-284** **Presentation Media II**  
Students apply design principles and intermediate digital techniques to prepare presentation media. Various input sources and output devices are introduced. (0872-182 or 268) **Lab 6, Credit 3 (F, W, S)**
- 0872-285** **Image Sources II**  
Students build upon image-capture skills learned in Image Sources I. Current processes, calibration and production techniques of image capture are emphasized to produce copy images. (0872-122) **Lab 6, Credit 3 (F, W, S)**
- 0872-286** **Presentation Media III**  
Students plan and produce professional presentations. A variety of presentation systems is used to prepare portfolio work. (0872-284) **Lab 6, Credit 3 (F, W, S)**
- 0872-299** **Co-op Work Experience**  
**Credit 0 (F, W, S)**
- 0872-347** **Display Imaging**  
Students learn to produce large mural display media. Assembly and specialized finishing techniques are introduced. (0872-246) **Lab 6, Credit 3 (F, W, S)**
- 0872-348** **Composite Imaging**  
Students produce prints that combine photographic images composed from a variety of originals. (0872-246) **Lab 6, Credit 3 (F, W, S)**
- 0872-349** **Retouching/Restoration**  
Students learn to retouch and/or restore digital images using digital and hybrid technologies. (0872-225, 246) **Lab 6, Credit 3 (F, W, S)**
- 0872-387** **Presentation Media IV**  
Students combine presentation graphic skills and image manipulation skills to produce professional presentations. Students expand on the use of grids, templates and storyboards to produce presentations. (0872-286) **Lab 6, Credit 3 (F, W, S)**
- 0872-388** **Multimedia**  
Students use desktop animation and digital editing programs to create titles, captions, transitions and video overlays for video presentations. In addition, students manipulate graphics, photographs and video for inclusion in these video presentations. (0872-387) **Lab 6, Credit 3 (F, W, S)**
- 0872-389** **Multimedia Interactive**  
Students combine various desktop media produced in other courses to create an interactive multimedia presentation including slides, video, animation and graphics. (0872-268 or 284 or 387) **Lab 6, Credit 3 (F, W, S)**
- 0872-399** **Independent Study**  
**Credit Variable**

## Sign Communication

0863-101

### Sign Communication I

Assists 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. Includes conversational vocabulary, fingerspelling, 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)**

0863-103

### Sign Communication II

Assists students in continuing their development of both receptive and expressive skills in ASL and natural sign English for academic and social settings. Strengthens 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 0863-101) **Class 2, Credit 2 (F, W, S)**

0863-105

### Sign Communication III

Assists students in continuing their development of receptive, expressive and conversational skills in advanced ASL and natural sign English for both academic and social settings. 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 0863-103) **Class 2, Credit 2 (F, W, S)**

0863-111

### American Sign Language for Sign English Users

Assists 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 0863-105) **Class 2, Credit 2 (F, W, S)**

0863-131

### Signing Basic English Idioms

Assists 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)**

0863-133

### Signing Idiomatic English

Assists 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)**

0863-135

### Public Presentations

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)**

0863-141

### Understanding American Sign Language as a Language

Assists 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)**

0863-145

### Linguistics of Sign Communications

Assists 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 0863-111) **Class 2, Credit 2 (F, W, S)**

0863-151

### Sign Language Interpreting: Consumer Awareness

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)**

0863-161

### Introduction to Sign Language Teaching

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, 0863-141 or 0863-145) **Class 2, Credit 2 (F, W, S)**

0863-163

### Practicum in Teaching Sign Language

Strengthens 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 0863-161) **Class 2, Credit 2 (F, W, S)**

0863-399

### Independent Study

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 adviser. **Credit variable**

## Speech-Language

0860-101

### Speech Therapy I

Helps students improve their spoken English. Special tests allow the teacher to evaluate individual needs. Students meet with a speech/language 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 grammar. Students practice words, phrases, sentences and conversations. (Speech priority rating of C) **Class 2, Lab 1, Credit 2 (F, W, S)**

0860-102

### Speech Therapy II

Helps students improve their spoken English. Special tests allow the teacher to evaluate individual needs. Students meet with a speech/language 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 grammar. (Therapist's recommendation, 0860-101) **Class 2, Lab 1, Credit 2 (F, W, S)**

0860-103

### Speech Therapy III

Helps students improve their spoken English. Special tests allow the teacher to evaluate individual needs. Students meet with a speech/language instructor for two hours and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds) and grammar. (Therapist's recommendation, 0860-102) **Class 2, Lab 1, Credit 2 (F, W, S)**

0860-115

### Pronunciation A

Students practice pronunciation of vocabulary through the use of *Merriam-Webster Dictionary* and knowledge of pronunciation rules. (Speech score of 2.0-3.5) **Class 2, Lab 1, Credit 2 (F, W, S)**

0860-116

### Pronunciation B

Students practice independent pronunciation of vocabulary through the use of *Merriam-Webster Dictionary* and knowledge of pronunciation rules. (Speech score higher than 3.5) **Class 2, Lab 1, Credit 2 (F, W, S)**

0860-120

### Speech and Listening Lab I

Appropriate for students who wish to improve articulation, listening and self-monitoring skills. Students meet with a speech/language instructor to establish goals. Students work individually at their own pace using a variety of prerecorded audiotapes. The instructor monitors students and provides feedback. (Speech scores higher than 3.5, auditory reception score higher than 16 percent) **Class 2, Lab 1, Credit 2 (S)**

- 0860-121** **Speech and Listening Lab II**  
Continuation of Speech and Listening Lab I. Students continue to work on speaking and listening skills. (Recommendation from instructor of 0860-120) **Class 2, Lab 1, Credit 2 (S)**
- 0860-124** **Speech Improvement Using Songs and Poems**  
Students use singing and poetry readings to improve their speech. Exercises in pitch control, loudness control and breath support are used to improve voice, vocal quality and listening skills. (Speech score higher than 3.0 and auditory reception score higher than 16 percent) **Class 2, Lab 1, Credit 2 (S)**
- 0860-130** **Strategies for Organizing Word Knowledge/A**  
Introduces strategies for organizing word knowledge. Helps students better understand the relationships among concepts, including similarities, differences, classification, association and analogies. (California Reading Test score lower than 8.5) **Class 2, Credit 2 (F, W, S)**
- 0860-131** **Strategies for Organizing Word Knowledge/B**  
Introduces strategies for organizing word knowledge. Helps students better understand the relationships among concepts, including similarities, differences, classification, association and analogies. (California Reading Test score higher than 8.5) **Class 2, Credit 2 (F, W, S)**
- 0860-132** **Vocabulary Development**  
Students use a workbook, textbook and computer laboratory practice to develop vocabulary. Students develop strategies to determine vocabulary meaning through use of contextual clues and knowledge of prefixes and suffixes. (Michigan Test score lower than 70) **Class 2, Lab 1, Credit 2 (F, W, S)**
- 0860-133** **Understanding Vocabulary in Context**  
Focuses on and develops students' ability to determine the meaning of unfamiliar words encountered in everyday reading. Students identify specific types of vocabulary difficulties in their reading. Using newspaper and magazine articles in class, students practice word attack skills based on context. Implications, connotations and a knowledge of prefixes, suffixes and roots are used to determine meaning in reading passages. (Michigan Test score higher than 70) **Class 2, Lab 1, Credit 2 (F, W, S)**
- 0860-136** **Spoken Language Learning I/A**  
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, conveying basic information and brief descriptions. Uses a text and workbook for grammar development and the self-instruction laboratory for speech and speechreading practice. (Corequisite: 0862-100) (Speech score higher than 3.0, California Reading Test score lower than 7.0) **Class 2, Lab 1, Credit 2 (F)**
- 0860-137** **Spoken Language Learning II/A**  
Focuses on using spoken English correctly in the organization and expression of personal experiences. Practice is provided in some common complex sentence forms. Uses the self-instruction laboratory for speech and speechreading practice. (0860-136) **Class 2, Lab 1, Credit 2 (W)**
- 0860-138** **Spoken Language Learning I/B**  
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)**
- 0860-139** **Spoken Language Learning II/B**  
Focuses on using English correctly in the organization and expression of personal experiences. Practice is provided in some common complex sentence forms. (0860-138) **Class 2, Lab 1, Credit 2 (W)**
- 0860-140** **Spoken Language Learning I/C**  
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)**

- 0860-160** **Interpersonal Communication**  
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 instructor) **Class 2, Lab 1, Credit 2 (F, W, S)**
- 0860-162** **Building Relationships Through Communication/A**  
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)**
- 0860-163** **Building Relationships Through Communication/B**  
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)**
- 860-170** **Group Presentation**  
Helps students improve their ability to search for, organize and present information to groups. 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)**
- 0860-171** **Public Speaking**  
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 deafness 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)**
- 0860-172** **Group Discussion Techniques**  
Develops an awareness of group process and interaction. It introduces the principles and techniques necessary for successful communication in group situations. Group dynamics and leading and participating in group discussions are taught. Topics for group discussions include social and job-related information. (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)**
- 0860-175** **Improving Your Conversations/A**  
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)**

**0860-176** **Improving Your Conversations/B**  
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 focus on expanding their conversational repertoire and skills when conversing with nonsigning partners. (Speech score higher than 3.9, speechreading 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)**

**0860-177** **Strategies to Aid Functional Communication**  
Suitable for students who want to develop and practice receptive and expressive strategies to aid in oral/aural communication with a nonsigning 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. Not appropriate for students with severe voice disorders as noted by a speech/language instructor) **Class 2, Lab 1, Credit 2 (F, W, S)**

**0860-178** **Communication for the Job Interview: Speaking**  
Focuses on improving the communication aspect of the job interview through a series of practice interviews. For students who have difficulty communicating during an interview. The focus 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, 0806-101) **Class 2, Lab 1, Credit 2 (W, S)**

**0860-399** **Independent Study**  
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 adviser. **Credit 1-4 (F, W, S)**

**0864-101** **Video Résumé Preparation**  
Provides students with a state-of-the-art format in which to use their communication skills to express personal/professional information. Students develop and produce a 3-5 minute video résumé that describes their job qualifications and communication skills. Students consider their communication strengths and preferences to determine how to communicate on the video, using either speech with captions or sign with a voice interpreter. The students' employment advisers confer with them to decide how the résumé might be used in the job search process. Students may borrow or copy the video for their own use. (Approval of employment adviser, enrollment in or completion of Job Search course) **Class 1, Credit 1 (F, W, S)**

**0864-102** **Communication for Job Search**  
Provides information and experience to assist students in optimizing communication during the job search process. Students review and discuss communication test results and critique a mock interview to decide how they can most effectively communicate with employers and colleagues. Information is included about using an interpreter's services on a job interview, preparing an effective résumé and cover letter, and understanding and answering questions during a job interview. Videotaped practice interviews are reviewed by the communication instructor and employment adviser to evaluate students' application of the principles presented. Follow-up instruction in communication is recommended based on this information. (Referral by technical chairperson) **Class 1, Credit 1 (F)**

## Technical Mathematics

**0817-110** **Concepts of Measurement**  
Explores the mathematical concepts involving linear measurement, proportion and percent through the use of examples from printing, photo/media and applied art. **Class 4, Credit 3 (F, W)**

**0817-120** **Introduction to College Mathematics**  
Improves students' fundamental understanding and 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)**

**0817-140** **Fundamentals of College Mathematics I**  
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. Development of problem-solving skills, verbal and non-verbal mathematical communication skills, and a positive attitude toward learning mathematics are emphasized. (0817-120 or approval of the offering department) **Class 5, Credit 3 (F, W)**

**0817-141** **Fundamentals of College Mathematics II**  
The application of the basic tools of algebra, geometry and trigonometry as solutions to problems. 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. (0817-140 or approval of the offering department) **Class 5, Credit 3 (W, S)**

**0817-142** **Fundamentals of College Mathematics III**  
The application of a variety of algebraic and geometric techniques to problem solving. Emphasis is 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. (0817-141 or approval of the offering department) **Class 5, Credit 3 (F, S)**

**0817-150** **Integrated College Mathematics I**  
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. Emphasis is on the development of careful work habits as a foundation for technical study. (0817-142 or approval of the offering department) **Class 5, Credit 4 (F, W)**

**0817-151** **Integrated College Mathematics II**  
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, including those capable of drawing graphs, are used extensively as aids in problem solving. (0817-150 or approval of the offering department) **Class 5, Credit 4 (W, S)**

**0817-152** **Integrated College Mathematics III**  
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. (0817-151 or approval of the offering department) **Class 5, Credit 4 (F, S)**

**0817-163** **Mathematics for Data Processing**  
Provides basic mathematical skills relevant to the field of data processing. Emphasizes arithmetic operations in various number systems and logical formulation of problems. **Class 3, Credit 3 (F, W, S)**

**0817-210** **Advanced Mathematics I**  
Advanced topics from precalculus mathematics are studied with an emphasis on functions and graphs. A graphing calculator is used to facilitate exploration of mathematical concepts and to help develop deeper understanding. 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)**

**0817-211** **Advanced Mathematics II**  
Linear structures and advanced topics from trigonometry and precalculus are explored. Vectors, matrices and complex numbers, transformations, trigonometric identities, inverse trigonometric functions and polar graphing are studied. Use of a graphing calculator to explore mathematical concepts is integral to the course. **Class 4, Credit 3 (W, S)**

**0817-212** **Concepts of Calculus**  
Topics traditionally encountered 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)**

**0817-399** **Independent Study**  
**Credit Variable**

## Technical Physics

**0818-168** **Optical Finishing Physics**  
The study of light, reflection and refraction. These principles are applied to the study of the behavior of spherical and plano mirrors, prisms and lenses. The usefulness and application of dioptric power, the lens maker's equation, image and object dimensions and focal length measurements are addressed. Also included are basic optical instruments and a study of the electromagnetic spectrum. Emphasis is on geometrical (ray) optics. Includes a comprehensive laboratory experience that supplements and closely follows classroom instruction. (0817-141) **Class 4, Lab 1, Credit 3 (W, S)**

**0818-201** **Physics I**  
Physics I is the first course in a series designed to provide a broad background in general physics. 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)**

**0818-202** **Physics II**  
Physics II is the second course in a series designed to provide a broad background in general physics. Appropriate for students entering NTID engineering 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)**

**0818-203** **Advanced Topics in Mechanics**  
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)**

**0818-204** **Advanced Topics in Electricity**  
An elective course for students in all NTID engineering programs. Provides 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)**

**0818-399** **Independent Study**  
**Credit Variable**

## Prebaccalaureate Studies

### *College of Liberal Arts Courses*

#### Criminal Justice

**0501-201** **The Criminal Justice System**  
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**

**0501-203** **Criminology**  
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**

**0501-207** **Correction**  
Introduction to the basic organizations of the correctional system, their functions and performance. Prisons and jails as well as probation and parole agencies are discussed within the context of historical and contemporary philosophy. Attention also is focused on decision-making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness are surveyed. (0501-201) **Class 3, Credit 4**

**0501-306** **Paralegals**  
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. (0501-201, 0501; junior or senior status) **Class 3, Credit 4 (offered periodically)**

#### Language, Literature, Communication

**0502-220** **English Composition**  
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

**0516-210** **The Professional Social Work Role**  
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)**

**0516-212** **Self-Awareness in the Helping Role**  
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)**

### *College of Science Courses*

#### Biology

**1001-201** **General Biology**  
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; and nutrient procurement in plants and animals. (Corequisite: 1001-205) **Class 3, Credit 3 (F)**

**1001-202** **General Biology**  
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: 1001-206) **Class 3, Credit 3 (W)**

**1001-203** **General Biology**  
Includes a study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology. (Corequisite: 1001-207) **Class 3, Credit 3 (S)**

**1001-205, 206, 207** **General Biology Laboratory**  
Laboratory work complements the lecture material of General Biology (1001-201, 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: 1001-201 for 1001-205; 1001-202 for 1001-206; 1001-203 for 1001-207) **Lab 3, Credit 1 (1001-205, F; 1001-206, W; 1001-207, S)**

#### Chemistry

**1008-261** **Quantitative Analysis I**  
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: 1008-265, 1010-252) **Class 4, Credit 4 (W)**

## 310 National Technical Institute for the Deaf

**1008-262** **Quantitative Analysis II**  
A continuation of 1008-261. Fundamentals of electrochemistry, electrodes and potentiometry, redox titrations, electrogravimetric and coulometric analysis, polarography, spectrophotometry, nuclear chemistry and coordination compounds are discussed. (Corequisites: 1008-261, 266) **Class 4, Credit 4 (S)**

**1008-265** **Quantitative Analysis I Lab**  
Experimental techniques include using the analytic balance, calibration of glassware, gravimetric determinations, titrations of weak acids and bases, multi-endpoint titrations, iodometric and EDTA titrations and Gran plots. Emphasis is on record keeping and report writing. (Corequisites: 1008-261, 1010-252) **Lab 6, Credit 2 (W)**

**1008-266** **Quantitative Analysis II Lab**  
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: 1008-261, 1010-262) **Lab 6, Credit 2 (S)**

**1010-251** **General Chemistry I**  
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 equilibrium. (Corequisite: 1010-255) **Class 3, Credit 3 (F)**

**1010-252** **General Chemistry II**  
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: 1008-261, 265) (1010-251) **Class 3, Credit 3 (W)**

**1010-255** **General Chemistry I Lab**  
A variety of experimental techniques, including determination of Avogadro's number, qualitative analysis, Job's plot, acid rain, antacid buffers, heats of reaction, and syntheses of aspirin and polymers are conducted. (Corequisite: 1010-251) **Lab 3, Credit 1 (F)**

**1011-208** **College Chemistry I**  
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)**

**1011-209** **College Chemistry II**  
A continuation of 1011-208. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry and the chemistry of metals. (1011-208) **Class 4, Credit 4 (S)**

### Mathematics

**1016-204** **College Algebra and Trigonometry**  
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 equations. (Two years of high school algebra) **Class 4, Credit 4 (F, W, S)**

**1016-214** **Introduction to Calculus I**  
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. (1016-204 or equivalent) **Class 3, Credit 3 (F, W, S)**

**1016-215** **Introduction to Calculus II**  
A continuation of 1016-214, 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. (1016-214) **Class 3, Credit 3 (W, S)**

**1016-251** **Calculus I**  
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)**

**1016-252** **Calculus II**  
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. (1016-251) **Class 4, Credit 4 (F, W, S, SU)**

**1016-253** **Calculus III**  
Topics include improper integrals, formal limits of sequences, infinite series, Taylor series, polar coordinates and conic sections. (1016-252) **Class 4, Credit 4 (F, W, S, SU)**

### Physics

**1017-200** **Physics Orientation**  
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)**

**1017-311** **University Physics I**  
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 coregistration in 1016-252) (See 1017-371 for three-hour lab, 1017-375 for two-hour lab) **Class 4, Credit 4 (F, W, S)**

**1017-312** **University Physics II**  
Topics include fluids and elastic properties, heat and thermodynamics, wave motion, sound, geometrical and physical optics. (Credit or coregistration in 1016-253) (1017-311) (See 1017-372 for three-hour lab, 1017-376 for two-hour lab) **Class 4, Credit 4 (F, W, S)**

**1017-313** **University Physics III**  
Topics include electrostatics, Gauss's Law, electric field and potential, dielectrics, DC circuits, magnetic fields, Ampere's Law, Faraday's Law, inductance and capacitance, magnetism in matter and AC series circuits. (Credit or coregistration in 1016-253) (1017-311, 312) (See 1017-373 for three-hour lab, 1017-377 for two-hour lab) **Class 4, Credit 4 (F, W, S)**

**1017-371** **University Physics Lab I**  
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in 1017-311) **Lab 3, Credit 1 (F, W, S)**

**1017-372** **University Physics Lab II**  
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in 1017-312) **Lab 3, Credit 1 (F, W, S)**

**1017-373** **University Physics Lab III**  
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in 1017-313) **Lab 3, Credit 1 (F, W, S)**

# Academic Policies and Procedures

**R**IT's educational mission is to prepare men and women for living and working in a democratic and technological society by offering curricula that meet those needs, within an educational community that supports and encourages individual achievement in an atmosphere of pluralism and diversity. Moreover, it sets high standards that challenge students to develop values that will enhance their lives professionally and enable them to contribute constructively to society.

## Academic advising

Academic advising is an integral part of a student's education at RIT. Advising is provided through the student's home department. Please consult the individual college sections of this bulletin for more specific information.

## Confidentiality of records

In accordance with the Family Education Rights and Privacy Act of 1974 (commonly known as the Buckley Amendment), RIT students have the right to inspect, review and challenge the accuracy of their official educational records. Students are also accorded the right to receive a formal hearing if dissatisfied with responses to questions regarding the content of the record.

RIT policy ensures that only proper use is made of such records. Therefore, with the exception of copies made for internal use (those provided to faculty and staff who have a legitimate need to know their contents), in most cases no copy of a student's academic record (transcript), or other non-public information from student records will be released to anyone without the student's written authorization. The determination of those who have a "legitimate need to know" (e.g., academic advisers, government officials with lawful subpoenas) will be made by the person responsible for the maintenance of the record. This determination will be made carefully, in order to respect the student whose record is involved. If an employer, for example, requests a transcript, he or she will have to obtain a written request from the student or former student.

The Buckley Amendment allows RIT to declare certain pieces of information as "directory" and therefore releasable without the specific permission of a student. Such "directory information" could include: a student's name, date and place of birth, major field of study, participation records in official RIT activities and sports, weight and height of a member of an athletic team, dates of attendance at RIT, degrees and awards received. Students may make written request of the Office of the Registrar that such "directory information" not be released. Because requests for nondisclosure will be honored by RIT for only one year, requests to withhold such information must be submitted to the Office of the Registrar annually.

Copies of the full act and RIT's written policies relating to compliance with the law are on file in the Office of the Registrar. Also available is information regarding a student's right to file a complaint with the U.S. Department of Health and Human Services concerning the alleged failure of RIT to comply with the requirements for this act and the implementation of HHS regulations.

## Transcripts

A student's official academic record is maintained by the RIT Office of the Registrar and is normally reflected through a transcript. All requests for transcripts must be in writing and should include the student's full name (or name used while at RIT), Social Security number, dates of attendance and signature to assure proper identification of the record requested. There is a \$4.00 charge for each copy. Transcripts are usually prepared and available within 48 hours after the request is received. During exam and grading weeks, it may take longer to prepare the complete transcript.

Under no circumstances will a partial transcript be issued, nor will a transcript be issued to a student who is indebted to RIT. Transcripts issued directly to a student will be over-stamped "**This official transcript issued directly to the student.**" Transcripts from colleges other than RIT that have been received in support of admission applications and/or transfer credit evaluation will not be reissued by RIT. Students with credentials from non-United States institutions may need to make special arrangements for re-release of such documents.

## The grading system

RIT uses a single-letter grading system. All grades are determined and issued by the faculty in accordance with the *RIT Educational Policies and Procedures Manual* and the particular standards of the attempted courses. Individual instructors have an obligation to carefully describe the standards and grading practices of each course.

The accepted RIT letter grades are as follows:

A	Excellent	I	Incomplete *
B	Good	R	Registered **
C	Satisfactory	S	Satisfactory **
D	Minimum Passing	W	Withdrawn
E	Conditional Failure *	X	Credit by Exam
F	Failure	Z	Audit

\* E and I grades are considered "temporary" and will revert to a grade F unless changed by the faculty within a prescribed period of time.

\*\* R and S grades are restricted to specific types of courses.

For more specific descriptions and procedures concerning the above, see chapter VII, *Educational Policies and Procedures Manual*, available in the Office of Student Affairs or on reserve at Wallace Library.

**Course registration**

To be officially registered at RIT, a student must be academically eligible, have been properly enrolled in a course and have made the appropriate financial commitment. The registration process is uncomplicated and can be accomplished in a variety of ways. Typically, students start choosing courses 6–8 weeks before the academic term begins and can use a touch-tone telephone, the campus computer network, fax machine, mail or register in person at the Office of the Registrar. The registration period ends with the first six weekdays of the term, also called the “Drop/Add” period. Specific dates and procedures can be found in the quarterly *Schedule of Courses* booklet.

Students at RIT are free to choose their own courses and course loads. Colleges offering the courses are equally free to restrict enrollment to particular groups of students (for example, students in specific year groups or students who have already satisfied course prerequisites). Most courses also are restricted in class size. Students are strongly encouraged to seek out academic advice and plan their academic careers carefully.

Failure to make appropriate financial commitment, satisfy New York State Health Immunization requirements or fulfill course prerequisites can result in the loss of courses for which a student has registered.

**Auditing courses**

Courses which are taken on an audit basis will not count toward a student’s residency requirement, may not be used to repeat a course taken previously and do not satisfy degree requirements. Permission to audit a course is granted only by the college offering that course. Any changes in registration between credit and audit must be completed prior to the end of the Drop/Add period.

**Withdrawal from courses**

A student may withdraw from a course up to the end of the eighth week of the quarter. A grade of “W” will be assigned and the course retained on the student’s permanent academic record. Under exceptional situations, a dean may approve a course withdrawal following the eighth week. For policies pertaining to withdrawal from the Institute and tuition refund, see page 339.

**Dean’s List eligibility**

Matriculated students who earn at least 12 credit hours in an academic term, have a quarterly grade point average of 3.40 or better; have not been placed on probation due to a low cumulative grade point average; and do not have any grades of I, D, E or F in that term are eligible for selection to the Dean’s List of their college. Students who are pursuing their degree on a part-time basis are assessed for Dean’s List consideration based upon course work over a three-quarter period. Criteria for part-time students are essentially the same as those for full-time students. However, at least 18 credit hours must be earned during the three-quarter period, and each student must have accumulated at least 24 credit hours in his or her RIT career.

**Academic probation and suspension**

All matriculated students at RIT are expected to meet or exceed certain minimal academic standards. Failure to do so will result in being placed on academic probation or suspension. All such actions are taken by college deans at the end of each quarter, and, once the action is made, it may be changed or revoked only by a dean. The RIT educational policy governing probation and suspension is quite specific (*RIT Educational Policies and Procedures*, section VIII). Three grade point averages (GPAs) are calculated and used in probation/suspension decisions:

Program Quarterly GPA = grade average of all courses taken in a term that are applicable to a student’s degree requirements.

Principal Field of Study GPA = grade average of all courses a student has taken within his or her specialized field (usually from the student’s home college).

Institute Cumulative GPA = grade average of all course work taken as either an undergraduate or graduate student at RIT.

**Academic probation**

A student may be placed on probation if either his or her Program Quarterly GPA or Principal Field of Study GPA (based upon at least 20 credit hours earned) falls below 2.0\* (a C average). To be removed from probation, both averages must improve to at least a 2.0. (\*The physician assistant program requires a 2.8 grade point average.)

**Academic suspension**

A student may be suspended from the Institute if any of the following occurs:

1. A student on probation fails to be removed from that status within two quarters following the initial probation, or
2. While on probation, the student’s Institute Cumulative GPA falls below 2.0 (the physician assistant program requires a 2.8 grade point average), or
3. After being removed from probation, a student’s Institute Cumulative GPA falls below 2.0, and the student is unable to raise that average to at least a 2.0 within one quarter (the physician assistant program requires a 2.8 grade point average), or
4. A student’s Program Quarterly GPA falls below 1.0, or
5. A student is allowed to return to his or her original program from suspension and then goes on probation.

Suspended students generally must wait at least a year before reapplying for admission into an RIT degree program. While suspended, a student may not enroll in any RIT course work unless the suspension is waived by an academic dean, and then may be limited to taking courses on a non-matriculated basis.

**Class attendance**

Students are expected to fulfill the attendance requirements of their individual classes. Absences, for whatever reason, do not relieve students from responsibility for the normal requirements of the course. In particular, it is the student’s responsibility to make individual arrangements prior to missing class. Attendance at class meetings on Saturdays or at times other than those regularly scheduled may be required. RIT reserves the right to alter any of its courses at any time.

**Student retention**

Based on an average of the three most recent cohort survival statistics, RIT’s student graduation rate is 61 percent for students entering at the first-year level and graduating from a four- or five-year program.

Excluding part-time and nondegree students in the College of Continuing Education and NTID, 84 percent of first-year, full-time day students register for their second year; and 90 percent of third-year students continue through graduation (fourth or fifth year depending upon the program).

The statistics reported herein have been computed in a manner consistent with data reported to the State Education Department through the Institute’s Office of Institutional Research.

# Counseling and Academic Services

**R**IT wants you to succeed in your college experiences. The Institute provides a variety of counseling and academic services to allow you to achieve your personal, as well as educational, goals.

Counseling services can help you with questions regarding your orientation to new college experiences, your academic program requirements, career planning and job placement or other areas of concern to you. Personal and spiritual guidance is also available on campus.

You may find there are times when you need some special support to succeed in your classes. RIT provides a number of tutoring services, study centers and learning resources, from the library to the computer labs. Media resources are also available to assist in class assignments.

## Center for Campus Ministry

Although it has no formal religious affiliation, Rochester Institute of Technology recognizes the importance of religion in educating the whole person. Within the Division of Student Affairs, the Center for Campus Ministry strives to respond to the needs of students, faculty and staff by celebrating their faith traditions and addressing their ethical and personal concerns. Various religious traditions have assigned campus ministers to the Institute to serve as full- or part-time members of the center.

### **The Kilian J. and Caroline F. Schmitt Interfaith Center**

RIT's Interfaith Center, a gift of Kilian and Caroline Schmitt and other generous donors, is located on the east side of the Student Alumni Union. It is the focal point for the diverse religious traditions within the Institute, housing two chapels, meetings rooms and offices for campus ministers.

For more information, call the secretary of the Interfaith Center at 716-475-2135 (voice/TTY).

## Center for Student Transition and Support

The center's primary mission is to give students, particularly those who are new and those who are underrepresented, the tools they need to make the transition from home to school to graduation. This is accomplished through four program areas in the center, namely, Orientation, Freshman Seminar, International Students and AHANA (African, Hispanic, Asian and Native American students). The Center for Student Transition and Support also supervises the Women's Resource Center and the program for Non-Traditional Students who are over twenty-five years of age. The director and six program coordinators offer personal advising, programs and publications to students and their families. The center is located on the mezzanine level of the Student

Alumni Union and is open weekdays from 8:30 a.m. to 4:30 p.m. The phone number is 716-475-6943 (voice/TTY) and the fax number is 716-475-7419. Address e-mail to Barbara Letvin, director, at [BXL5137@ritvax.isc.rit.edu](mailto:BXL5137@ritvax.isc.rit.edu). Specific program areas are as follows:

### **AHANA**

The AHANA program helps students manage their transition to campus by offering personal advising, orientation, leadership-training opportunities and other services. Currently RIT has 1,350 African, Hispanic, Asian and Native American (AHANA) students. The Peer Tutor/Mentor Program (PTM) uses upper-class students to provide academic and social support to freshman students in various majors. The Loftus Carson Book Fund lends from one to three textbooks to AHANA students who have a financial need and whose GPA is 2.5 or greater. The AHANA program also has invited nationally prominent speakers and community leaders of color to campus to meet with students, faculty and staff. In addition, the two AHANA program coordinators advise the Black Awareness Coordinating Committee (BACC), the Latin American Student Association (LASA), and the Native American Student Association (NASA) and work closely with AHANA student leaders. Both AHANA program coordinators also serve as adjunct teachers in the College of Liberal Arts.

### **Freshman Seminar**

The Freshman Seminar Program offers new students an extended orientation to the campus, an introduction to higher-education learning, an opportunity to make a connection with their academic department in an informal but structured format, and the chance to meet others and become involved members of the RIT community. Approximately 1,000 new students take a freshman seminar course each year in eighteen departments of seven colleges. Although each course is designed specifically to address the needs of students in a particular department, all courses attempt to assist new students in making a successful academic and personal transition to campus life. Course topics can include career exploration, communication skill building, problem solving, ethical issues, personal responsibility, appreciation of others and campus resources. Many of these topics are revisited as the student continues his or her education. Most students who are enrolled in a freshman seminar class participate in activities that introduce them to other students, faculty, alumni and professionals in their field of study.

### **International Student Program**

The International Student Program is the primary resource for approximately 700 hearing and deaf international students on visas from 83 different countries and for those members of the campus community seeking cross-cultural information. The program provides assistance with immigration regulations and travel documents, helps international students adjust to the academic and cultural expectations in the U.S. and provides cross-cultural programming for international students

and the campus at large. The staff works closely with international student clubs and International House, a special-interest house in the residence halls for both international and American undergraduates. Off-campus hospitality is coordinated with the Rochester International Friendship Council, which extends friendship to international students.

#### **New Student Orientation**

Each year, RIT provides freshman and transfer students with seven orientation programs designed to help them make the adjustment to life in a new environment. The summer and fall programs are developed for both students and parents and address the academic and social issues involved in beginning college or changing from one college to another.

Three Summer Orientation programs are offered in July, one specifically for transfers and two for freshmen. An orientation program for new students also is offered in the fall before classes begin. The summer programs provide opportunities to meet other new students, register for classes, receive academic information, learn about support services and housing and be involved in community activities. While the summer programs are not required, students are strongly urged to attend either a summer or fall program to ease their transition to RIT.

All students are encouraged to stay in the RIT residence halls during the summer programs. This live-in experience is designed to allow all students to sample on-campus living regardless of their long-range housing plans.

All new full-time, day, matriculated, fall-entry students are charged a program fee to cover program development costs, whether they choose to attend an orientation program or not.

#### **Women's Resource Center**

The Women's Resource Center at RIT welcomes all women who become part of the RIT community by addressing issues such as safety, networking and health, while also promoting personal and society change. The center unites women of any race, creed, ideology, national or ethnic background, sexual orientation, age, marital and family status, and health condition.

The center sponsors the Big Sister/Little Sister Program. This program provides support for incoming women students at RIT. Upper-class students serve as mentors for new students. Other programs and services include referrals, Think Tank Group and library loan.

The Women's Resource Center is located in room A454 of the Student Alumni Union. The phone number is 716-475-7464 (voice/TTY). Address e-mail to Phyllis Hoffman, Student Coordinator, at RITWRC@rit.edu.

## Cooperative Education and Career Services

The Office of Cooperative Education and Career Services supports the Institute's commitment to preparing students for the "making of a living and the living of a life." The cooperative education program was started at RIT in 1912. Since that time it has grown into one of the largest in the world.

Last year more than 1,300 employing organizations across the country participated in the program, hiring more than 2,500 RIT students involved in mandatory and optional co-op programs. Co-op gives student and employer an opportunity to look each other over. It gives the student the opportunity to try out personal and professional abilities in a real-world environment and to enhance classroom learning.

In the Office of Cooperative Education and Career Services each student has a program coordinator who provides assistance with career counseling and the job search from the beginning of the co-op process right through career entry upon graduation. The office also provides a variety of job search seminars, career and employer research materials, job listings for co-op and full-time positions, an on-campus interview program and a reference service for graduating students. Services of the office remain available to alumni for a lifetime.

Office staff spend considerable time developing opportunities with employers nationwide, as well as monitoring and fostering current relationships. These linkages with business and industry enhance RIT's ability to provide an education that meets the needs of the job market and aids students and graduates in their pursuit of successful careers.

## Counseling and Human Development Center

The Counseling and Human Development Center, located in the Hale-Andrews Student Life Center, offers a variety of services to RIT students. These services include:

- Personal/Psychological Counseling
- Career Counseling
- Career Walk-In Center
- Career Resource Center
- DISCOVER (a computerized guidance system)
- IMPACT: Alcohol/Drug Assessment and Referral
- Developmental Programs and Groups
- Testing
- Consultation

#### **Counseling and Human Development Center hours**

Counseling and Human Development Center hours are 8:30 a.m. to 4:30 p.m., Monday, Thursday and Friday; 8:30 a.m. to 6 p.m., Tuesday; and 8:30 a.m. to 8 p.m., Wednesday. Services are confidential and free. For more information about services, please call 716-475-2261 (voice/TTY).

#### **Personal/psychological counseling**

Individual and group counseling are available for students who could benefit from meeting with a counselor to explore, for example, more effective ways of dealing with conflict and stress, managing feelings and emotions, developing satisfying relationships, communicating with others or coping with personal crises.

#### **Career exploration counseling**

Counselors can assist students in making thorough appraisals of their interests, abilities and personality traits so that they can use this information in developing educational and vocational plans. Tests of aptitude, interest and personality may be used in this assessment process.

### Career exploration resources

Located in the reception area of the Counseling and Human Development Center, the career resources contain occupational information on a variety of careers, vocational and educational reference books, and college catalogs on microfiche. The center and its resources are available on a walk-in basis.

### DISCOVER

DISCOVER is a career guidance system that uses a computer to help students learn more about:

- the career planning and decision-making process
- themselves, especially their interests, abilities and work-related values
- careers that may be appropriate based on interests, abilities and/or values
- the world of work, including descriptions of more than 40 occupations
- graduate and professional school opportunities

### Developmental programs and groups

The Counseling and Human Development Center staff offers groups each quarter that assist students in their personal development. These groups offer a supportive environment in which to explore a variety of issues that typically affect the lives of students—such as forming relationships, handling loss, managing stress, clarifying values and choosing careers.

In addition, center staff members will present special programs to student groups and organizations. Presentations include communication skills, team building, leadership development and goal setting. Individuals should contact the center at least three weeks in advance of program date.

### Testing

The Counseling and Human Development Center administers a number of psychological tests and interest inventories as part of the counseling process. In addition, it administers a number of national tests; advance credit exams (CLEP) also are given.

### Sexual Assault Information Hotline (716-258-3399 voice/TTY)

The Sexual Assault Information Hotline is a service coordinated by the Division of Student Affairs. This is a 24-hour phone service for any individual (student, faculty or staff) who seeks information or counseling regarding any aspect of sexual assault. Trained faculty and staff respond to calls, providing information, crisis counseling and appropriate referrals.

### IMPACT

IMPACT is an alcohol and drug education and prevention program. Individual assessment and referral services are available for persons having concerns about their (or others') use or abuse of alcohol or other drugs. For more information, contact the IMPACT office at 716-475-7081 (voice) or 716-475-2255 (voice/TTY).

### Consultation

Staff members of the Counseling and Human Development Center will provide consultation services to interested student groups, faculty and organizations regarding a number of areas within their scope and expertise.

## Educational Technology Center

The Educational Technology Center (ETC) provides television and audio-visual support services to faculty, students and staff. These services include a campus-wide cable television network, satellite teleconferencing and delivering media to classrooms. ETC also provides a Media Resource Center, which houses the RIT media collections and an extensive art slide library. Many faculty members place materials on

reserve in the MRC for students to study, such as videotapes, films and audio tapes.

ETC staff members assist faculty and students in finding and preparing media for classroom presentations, club meetings or personal use. Our color laser copier is a popular tool used by many photographers and artists at RIT. Others find the photo and graphic design services of ETC helpful in preparing for presentations and lectures. Audio-visual and television equipment such as slide projectors, videoplayers, overhead projectors and telephone conferencing equipment is available for instruction and other campus events.

RIT instruction extends beyond the campus classrooms. Courses are delivered to distant sites by a variety of techniques, including offerings on local cable and broadcast television, videotapes, computer and audio-conferencing, and use of other interactive systems. Workshops and lectures that originate at RIT are delivered by satellite to audiences throughout the United States, Mexico and Canada. ETC supports these efforts with course development, equipment and production of materials.

ETC offices and the Media Resource Center are located on the lower level of Wallace Library. More than 60 students work in ETC assisting with video production, photography, graphic design and office routine. Individuals are invited to drop in and explore these resources.

## English Language Institute

The English Language Institute offers both full- and part-time study of English to non-native speakers. Class offerings include conversation, grammar, writing, vocabulary, reading, presentation skills, business communication and TOEFL preparation. For more information about the English Language Institute's program offerings, visit the English Language Institute (2321 Eastman) or call 716-475-6684 (voice/TTY).

### Full-time program

The intensive English Language Program consists of 20 hours of class instruction and five hours of language lab per week at beginning, intermediate and advanced levels. There is a fee for this program. This intensive study program meets the immigration requirements for the Certificate of Eligibility I-20 for F-1 student status.

Before a course of study can be selected, students are tested to determine their levels of English proficiency and to diagnose their specific language needs.

### Part-time program and individualized instruction

In addition to the full-time program, students may register for one or more ESOL courses. The English Language Institute also offers private English classes tailored to individual needs. Pronunciation and conversation as well as grammar, writing, reading and vocabulary may be studied in this manner. There is a fee for instruction, but students enrolled for 12 academic credits at RIT receive a reduced rate.

### Foreign language instruction

The English Language Institute offers a program in which international students teach their native languages. The international student meets with a trained language instructor who assists in curriculum development and provides language teaching methodology. The international student then instructs in his or her native tongue. Language, culture and customs can all be part of this program. Some of the languages offered in the past include Chinese, Japanese, Spanish, Portuguese, Hindi, Tagalog, Korean, French and German. For more information about learning a new language or teaching your native language, call the English Language Institute or pick up an application at 2321 Eastman.

**Translation Service**

The English Language Institute's Translation Service provides quick and efficient translation of documents, reports, letters and manuals for RIT students, faculty and staff as well as businesses in the Rochester area. For a fee, documents of all types, general to technical, can be translated.

## Information Systems and Computing

Information Systems and Computing (ISC) manages a large VMScuser (networked Digital VAX computers), a high-speed Digital Unix system, an IBM mainframe, a campus-wide network—including access from residence halls—dial-in access and user computing facilities containing micro-computers and workstations. Complete descriptions of our systems and facilities are available from the VTX Information Access System on the VMScuser on the RIT home page of the World Wide Web, outside the ISC HelpDesk office (A291 Ross) or by calling 716-475-6929 (voice) or 716-475-2810 (voice/TTY). All facilities are available at no cost, except for a nominal charge for laser printing.

RIT Menu Services provides easy access to the most popular features on the RIT computer facilities and network, which include:

- SIS student information access (access to grades, courses, financial information, course registration and more)
- electronic mail, including Internet access (used extensively by students, faculty and staff) and the ability to ask questions on-line directly to several RIT departments
- on-line library services, including a catalog of books, media, articles and journals; CD-ROM and Dow Jones access; and interlibrary loan requests
- the VTX Information Access System
- the Campus Events System
- the Job Viewing System
- word processing
- the Notes Conferencing System.

Many faculty have incorporated these features, particularly e-mail and Notes, into their courses, resulting in innovative and interesting courses not available elsewhere.

The use of computer systems managed by ISC is guided by the RIT Code of Conduct for Computer Use. ISC has adapted the general code for use in its facilities and supplemented it with other policy statements; e.g., guidelines for using Wide Area Networks and game playing. Copies of these policies are available in electronic form in the VAX/VMS VTX Information Access System or in printed form from ISC.

Computer accounts are issued to students, faculty and staff so that they can perform activities to support internal RIT functions. Students can obtain accounts at the ISC HelpDesk by showing their RIT ID card. Forms may be available in your department or can be obtained by calling 716-475-6926 (voice) or 716-475-2810 (TTY).

ISC Client Support Services (located in room A291, Ross Building) helps users of mainframe computers, minicomputers and microcomputers. Contact them electronically by using the ASK command on the VMScLuster or by calling the numbers listed above.

ISC Facilities Management operates 15 user computing centers and microcomputer labs containing microcomputers, terminals, workstations, printers and plotters. These facilities are available mainly to students for general computing use and to faculty for reserved class work. Lab assistants are on hand to help people use the hardware and software available in the labs.

Staff also provide consulting, training and seminars. Contact ISC staff for advice on hardware, software and network selection and installation in order to help ensure an effective campus-wide computing environment. Computer equipment repair is available by calling 716-475-2591 (voice) or 716-475-2810 (TTY). Our service center is factory-authorized for repair of Apple and Digital equipment.

## Learning Development Center

The Learning Development Center, an academic support unit at RIT, offers students, faculty, staff and the community a variety of services. The College Program offers courses in reading, writing, math and study skills as well as a math and writing lab open on a drop-in basis. The College Restoration Program assists students who are on probation or suspension while the Academic Success in College (ASC) Conference is for students who need additional preparation before matriculating into a college program. For more information about these programs, see the following descriptions.

### Academic Assessment Program

The Academic Assessment Program in the Learning Development Center helps students determine why their academic performance is not what they, or others, would like it to be. The variety of factors that may interfere with academic performance ranges from personal or interpersonal problems to unclear college major and career path choices to ineffective or underdeveloped study skills.

Outcomes of the assessment process include identification of the problem or problems and may include referrals to various campus support services. For more information or an appointment, contact the Learning Development Center at 716-475-6682.

### Academic Success in College Conference

The Academic Success in College (ASC) conference is an innovative, interactive four-day conference offered each summer on campus. The ASC conference introduces entering college freshmen to the skills, strategies, use of resources and self-knowledge necessary for academic success in college.

High school graduates headed for an RIT college or any other college or university can attend. Presentations and workshops on time management, personal organization, math study skills, memory improvement, campus technology, advocacy skills, textbook strategies and many more topics assist high school students in making a confident and successful transition to college.

The cost of the Academic Success in College (ASC) conference is \$495. For more information and/or registration materials, please call 716-475-6682.

### Alternative Learning Department

The Alternative Learning Department is founded on current neurophysiological research and is committed to helping individuals recognize and access their natural learning abilities, rather than disabilities. ALD recognizes that each student is unique and responds to this by offering three levels of support.

- Level 1 allows students to self-direct their program needs; a learning specialist is available on an informal basis.
- Levels 2 and 3 (require additional fee) provide students with daily or weekly, individual or group, structured monitoring sessions facilitated by a learning specialist.

Students with identified learning disabilities may access all academic modifications available by law under ALD coordination. Students may select their level of participation on a quarterly basis. For more information, contact the ALD chair at 716-475-2215.

### College Program

The College Program is the LDC unit devoted to providing academic assistance for students enrolled at RIT. It offers workshops, classes and labs for instruction in reading, writing, mathematics and study skills.

The College Program has services for all levels of students, from freshmen to graduates. In addition to basic skill development, it offers courses that teach students how to improve study techniques and how to assess and make the most of their individual learning abilities.

**Reading and Writing Department:** Courses and workshops include Textbook Strategies, Proofreading, Summary Writing, Documentation, Vocabulary and Spelling. The Writing Lab provides individualized instruction to improve students' abilities to complete college writing assignments. Individual instruction in reading is available by appointment.

**Mathematics Department:** The department is concerned with supporting students' progress in the learning of mathematics. General offerings include assessment for placement in appropriate courses, tutoring and instruction in a variety of formats. An individualized math course offering diagnostic testing and carefully prepared review materials is offered. The Math Lab offers free tutoring in most math courses as well as "math-related" areas such as chemistry, physics and statistics. In the lab there are review packets on a variety of topics in algebra, trigonometry and calculus as well as a list of math videos available in Wallace Library. Review sessions are offered each quarter on Techniques for Differentiation and Integration for Calculus I and II. A sequence of noncredit math courses designed for returning adults also is offered.

**Study Skills Department:** The focus of this department is on the development of good study skills to promote academic success. Diagnostic evaluation, individual instruction and mentoring and "tailor-made" courses for various RIT groups are available. A series of mini-workshops, the Lunch 'n' Learning Series, is offered each quarter. Topics covered include time management, listening and notetaking, text reading, test taking and preparation, and memory improvement.

College Program services are free to RIT students. For more information concerning these services, contact the Learning Development Center at 716-475-6682 (voice/TTY).

### College Restoration Program

The College Restoration Program is a full-time specialized program of instruction, with matriculated status, for students who have experienced academic difficulty and suspension from a college.

A course of action can be recommended only after the reason for academic difficulty has been established. If it is determined (after an interview and diagnostic and achievement tests have been administered) that CRP can be helpful, a very structured program, including one or two content courses and LDC instruction, is arranged.

The student meets regularly with an LDC faculty mentor to clarify directions and goals, to discuss relationships between the skills courses and to review progress.

The entire program is designed to strengthen the student's self-confidence. Successful completion of this program could qualify students for readmission to the college or department of their choice or for entrance into another educational program.

Although the College Restoration Program does not guarantee a participant readmission to his or her former college or admission as a transfer student at another school, the center provides recommendations and résumés of student achievement in the program to colleges upon request of the student.

For more information, contact the Learning Development Center at 716-475-6682 (voice/TTY).

#### **Disability Services Coordination Office**

RIT is committed to the support of members of our learning community who have disabilities. The Disability Services Coordination Office will provide, coordinate or supervise the delivery of academic access accommodations to those students who identify themselves to the office and who notify the Disabilities Coordinator of their needs. The office will also provide counseling to students with disabilities and advocate for their needs to other faculty and staff on campus as requested. The office works closely with other disability support services on campus such as the Alternative Learning Department and the Office of Special Services to provide advocacy and academic accommodations.

The major academic access programs consist of proctoring, extended time, readers, scribes, quiet spaces, text taping, note taking, lighter course load and extension of time for degree requirements. The office will provide text books read onto audio tapes for those text books that cannot be provided by Recordings for the Blind. Note taking in lectures and labs is provided for students who are eligible for that accommodation but cannot be served by the extensive note-taking support program provided by NTID. The office works closely with the Disabled Student Coordinators of each of the eight colleges at RIT to ensure support for students with disabilities within each college. The office coordinates services with the Physical Assess committee, Residence Life and Campus Safety, who supervise the Mobility Van to provide transportation around campus for those who are mobility impaired. For more information, call the disabilities coordinator at 716-475-7804.

#### **Higher Education Opportunity Program**

The Higher Education Opportunity Program is a New York State and RIT funded service that qualifies students for additional financial and academic support for up to five full years, not including periods during which students may be enrolled in cooperative education. This supplemental assistance is available for students who need extra time to complete their academic requirements. While both New York State and RIT provide financial support, HEOP students must also qualify for the New York State Tuition Assistance Program (TAP) and Federal Pell Grant program and be personally responsible for loan and college work-study contributions. The HEOP program is dedicated to each individual student's academic success and personal growth.

To qualify, a student must meet strict academic and financial guidelines set by the New York State Education Department prior to attending college. Any student who has taken college courses following high school graduation, matriculated or not, is ineligible. Students must have graduated from high school or the equivalent and be New York State residents. Transfer students are eligible if they are coming from a like program at another institution in the State: HEOP, EOP, SEEK or College Discovery. Transfers must apply to and be accepted by both the HEOP office and the Admissions office for entrance. Space in the program is limited.

Services for all students include personal, academic, financial and career counseling. Tutoring is available in all subjects, and the HEOP staff act as campus resources and advocates. Students accepted as freshmen must attend a three- to six-week summer program prior to Fall Quarter entrance. They live on campus and attend a selection of skills-building classes carefully designed to facilitate their entry into standard RIT courses.

Throughout its 21 years on the RIT campus, HEOP has been applauded for its high graduation rate. Inquiries in regard to the program should be directed to 716-475-2221 (voice/TTY).

#### **Special Services**

Pursuing a college education is a major challenge. The goal of the Office of Special Services is to provide the necessary academic and personal support that will enable students who qualify to fully realize their potential and to successfully complete their college career. The Office of Special Services is a federally funded program that has been hosted at RIT for 20 years. There are four components that make up the office. Each has a distinct purpose while remaining integrally linked with the others.

**The Academic component** has developed a full complement of services—including tutoring, math mentoring, advisement and skills development—to assist students with academic concerns and to enable them to understand and refine their learning process and to use academic resources more effectively. The academic staff help students develop success strategies and experience positive responses to academic endeavors.

**The Counseling component** works to bring students into the program and provides the appropriate personal support that enables them to direct their energies into positive pursuits. Understanding that each student brings a unique set of circumstances to the learning environment, a counselor assists the student in understanding all that is available to him or her and how to access the assistance each may need. A counselor also is available to work with students on areas of general concern.

**The Programming component** provides complementary experiences that enhance the student's academic and personal perspectives by drawing on RIT and other community resources. When used effectively, this component can provide the student with new opportunities for personal and professional growth.

**The Disabled Student component** deals with a broad range of issues faced by students with disabilities. The staff provides services related to academic and physical accessibility and works to raise the awareness of the RIT community.

The ultimate purpose of the Office of Special Services is to help students meet their unique challenges and become a part of the larger community. It works to make systems work. It often serves as a bridge between the learning community that it creates and RIT in order to foster success.

For further information, contact the office at 716-475-2832 or -2833. It is located in the RITreat in the Student Alumni Union. Eligibility for the program is determined by financial aid, physical or learning disability and first-generation college status. Any full-time, undergraduate student who is a United States citizen and meets one of the eligibility requirements may become a member of Special Services.

## NTID Learning Consortium

The NTID Learning Consortium consists of distinct yet inter-related parts: a Math/Science Center; a Language, Literature, Humanities and Social Sciences Center; a General Education Learning Center; the Self-Instruction Lab; a Computer Center; and a state-of-the-art Computer Classroom.

**The Mathematics Learning Center** provides tutoring assistance to students enrolled in mathematics classes.

**The Language, Literature, Humanities and Social Sciences Center (LLHS)** provides reading and writing labs that allow students to practice their skills independently. Skilled tutors provide students with feedback related to course work in the Language, Literature, Humanities and Social Sciences.

**The General Education Learning Center (GELC)** supports deaf students in specific general education and liberal arts core courses not carried out by either the Math/Science or LLHS centers. Skilled peer tutors and faculty members provide students with feedback related to their reading and writing assignments. Reference books and computers also are available for assistance with assignments. The GELC offers general tutorial services and provides workshops and mini-classes.

**Communication Learning Centers** include the Self-Instruction Lab, where students can practice skills they have learned in listening, speaking and sign/simultaneous communication, and the Telecommunications Lab, where students can practice their telephone skills.

## NTID Counseling Services

NTID Counseling Services is committed to the goal of helping students realize their full potential for a successful college experience. In pursuit of this goal, each NTID-sponsored student is assigned a professionally trained counselor who provides a full complement of counseling, advising, assessment,

advocacy and referral services. The counseling faculty are trained in counseling and career development theory and techniques, hold individual certifications from the National Board for Certified Counselors and follow the guidelines for ethical standards set forth by the American Counseling Association. Counselors assist students with student orientation, educational and career planning, adjustment to college life, study skill development, access and referral to on-campus and community resources, and a wide range of personal and interpersonal concerns. Counseling faculty also assist in coordinating special services for physically challenged students. For additional information regarding NTID Counseling Services, call 716-475-6371 (voice/TTY) or send a fax to 716-475-6500.

## NTID Psychological Services

As part of the newly formed Counseling and Human Development Center, NTID Psychological Services provides confidential mental health counseling and assessment to all deaf and hard-of-hearing students requesting assistance. Psychological Services faculty members work closely with RIT's Student Health Center, Center for Residence Life, NTID Career and Counseling Services Department, Campus Safety and other related campus units.

Some concerns that students may need help in resolving include adjustment to hearing loss, depression, anxiety, family conflicts, intimate relationships, and sexual and personal identity matters. Workshops, discussion groups and group counseling experiences on topics such as stress management, dating/relationships and assertiveness training also are offered to assist students' mental health growth and development.

Psychological testing and assessment are available to students whose personal/social problems affect their academic performance. Consultation often is done with faculty and staff members so that students are assisted in planning remedial programs that emphasize their academic as well as personal needs.

A 24-hour emergency crisis intervention service for students experiencing mental or emotional trauma is provided in conjunction with other relevant campus units.

## NTID Summer Vestibule Program

The Summer Vestibule Program (SVP), an orientation program for new deaf students, assists and prepares them for complex tasks of career awareness, decision making, adjustment to college life, and assessment of academic skills and competencies. During SVP, students learn about the programs offered at NTID and the other colleges of RIT, while faculty and staff members evaluate students' skills, abilities and motivation. Through this process, students gain information that assists their selection of an appropriate program.

Acceptance into SVP does not automatically guarantee admission to the program the student selects during SVP. The final decision on acceptance into a program of study for the Fall Quarter is the responsibility of each academic department. Admission to a program depends on successfully completing SVP, having adequate skills to begin the program and availability of space in the program.

During SVP, students participate in various activities, including orientation to college services, program sampling, career planning, math and communication evaluation/assessment and general education seminars. Recreational and leisure activities, including intramural sports, dances, picnics, swimming and captioned movies, also are a part of SVP.

While most deaf students do attend SVP, there are some who are not required to attend based on clear career goals, previous college experience and past academic performance. An admissions committee reviews each student's credentials to determine if SVP is appropriate.

## STOP Program

The Support Team Orientation Program (STOP) is designed for deaf students who have been accepted into an RIT bachelor's degree program. This orientation provides students with information on how to use the various NTID educational access services available to them, acquaints them with RIT's campus and services, and allows them to meet other new students and their department's chairperson and faculty members, who will assist them with Fall Quarter class registration.

## Veteran Enrollment Services

Active service persons, reservists, members of the National Guard, veterans and their dependents often begin their educational programs in RIT's Office of Veteran Enrollment Services (OVES). We know the transition from the military to a successful civilian career is dependent upon proper preparation, and education is the key to this transition process.

Veterans attending college usually have the added responsibility of a family, the added financial pressures of maintaining a home and often work at a full-time job. Because of these demands, veterans attending college need several types of assistance. Our OVES staff members are veterans, too—veterans helping veterans is an important aspect of our services.

The OVES staff is composed of a director, program secretary, peer counselors and VA work-study students, who are available to handle inquiries and assist veterans with VA-related and college-related information. The OVES is located on the first floor of the Bausch & Lomb Center and is easily accessible for both day and evening students. The office is open from 8 a.m. to 8 p.m., Monday through Thursday, and until 4:30 p.m. on Friday. Students may visit the office or telephone 716-475-6642 (voice) to speak with an OVES counselor.

Active-duty service men and women can apply through their commanding officers or the nearest Post Education Service Officer for active-duty benefits such as ACES tuition assistance or New G.I. Bill. The amount to be paid to these service members is equal to the monthly amount for single veterans, not to exceed the cost of tuition.

Reservists eligible for the New Montgomery G.I. Bill for Reserves, ACES, student loan repayment program and/or other educational incentives are encouraged to apply through their commands for a Notice of Basic Eligibility, DOD Form 2384. When received by OVES, the Notice of Basic Eligibility will be forwarded to the Veterans Administration to ensure prompt payment. Payment for reservists is \$197.90 per month for full-time attendance for each month completed as a full-time student. Benefits at less than full-time are determined relative to the number of credit hours taken. Questions regarding Reserve G.I. Bill benefits, loan repayment, tutorial or other programs that Reservists and members of the National Guard may be entitled to can be directed to OVES or to the service member's command.

Vocational Rehabilitation, offered to service-connected disabled veterans, is a priority program for OVES. These veterans are eligible for tuition, fees, books, supplies and other costs directly related to attending the program approved by the U.S. Department of Veterans Affairs. Additional monies are sent to these veterans each month to help offset the cost of living while attending school. Vocational Rehabilitation, the monthly supplement and disability benefits make RIT an attractive choice for the disabled veteran.

Veterans eligible for Veterans Educational Assistance Program (VEAP), Chapter 32, should bring a certified copy of the DD214 to the Office of Veteran Enrollment Services, where the benefit paperwork can be initiated. These benefits, payable by the U.S. Department of Veteran Affairs, are prorated relative to the contribution made by the service member.

Chapter 30, commonly referred to as the New G.I. Bill, is a significantly different benefit than the aforementioned. While service members have contributed out of their monthly pay, they must have completed the initial term subsequent to separation in order to be eligible for the full amount of their G.I. Bill. This monthly amount is paid directly to the veteran and is self-certified once the enrollment has been reported by the institution.

All veterans and participants in veterans' dependent programs are eligible for counseling assistance and tutoring. Evaluations of military training for possible transfer credit are available as well. Veterans often find that the evaluation of their military training provides them with transfer credit that can be applied in their major or as elective credit toward graduation. Evaluations are processed as recommendations of transfer credit and are subject to academic department approval. Veterans are encouraged to discuss their military evaluations with the academic department and the Office of Veteran Enrollment Services prior to enrolling.

Veterans have shown significant interest in the RIT Amvets Post #1829. Amvets has created a veterans' learning center—fully computerized with both DOS and Macintosh connections to the RIT VAXs. The center is located in the lower level of the Student Alumni Union and is open daily, 8 a.m. to 11 p.m.

Veterans who are planning to attend college should consider the difference that a campus veteran service office can make. Students coming from schools unable to serve a veteran population's needs find RIT a model place to begin and continue their education.

## Wallace Library

Wallace Library is the primary information resource center on campus. A balanced combination of electronic networks and quality-oriented staff, coupled with a modern and accessible building, make RIT's up-to-date library a multimedia facility.

Contained within the library are the Educational Technology Center; the Media Resource Center; the RIT Archives; and the Cary Library, which contains more than 14,000 volumes on the history of printing, rare book illustration, book design and other aspects of the graphic arts.

Wallace Library houses more than 750,000 items, which include 350,000 books, 4,700 journals, 3,100 audio recordings, 6,700 film and video recordings and 392,000 microforms. There also is a variety of seating options and small-group study rooms, which together can accommodate more than 1,000 users.

The on-line Infonet menu provides 24-hour access to a wide selection of CD-ROM resources, several commercial databases, the Internet and Einstein (an electronic catalog of Wallace Library's holdings). Interlibrary loan services and in-house book requesting also are accessed on-line. In addition, VIA (the VAX Internet Area) provides users access to graphic interface workstations, image scanning and a host of interactive CD titles.

For library hours, call 716-475-2046 (voice); for Reference Desk, call 716-475-2564 (voice) and 716-475-2563 (TTY) or e-mail 610WMLREF (RITVAX); for Circulation Desk, call 716-475-2562 (voice) and 716-475-2962 (TTY).

# Campus Life

What goes on in the classroom is one part of a college education; what happens outside the classroom can be just as important. RIT is a remarkable and diverse university with faculty and staff who are concerned about students' success and who are very interested in challenging them to achieve their full potential. The Student Affairs Division hosts an array of stimulating and enjoyable programs and activities that complement classroom learning, provide recreation and encourage growth and development toward becoming successful professionals and citizens.

The division consists of ten centers that provide the programs and services that are an integral component of the learning process and complement the academic curriculum. The centers are: Campus Life, Campus Ministry, Counseling and Human Development, Learning Development, Physical Education and Recreation, Intercollegiate Athletics, Residence Life, Student Health, Student Transition and Support and the English Language Institute.

Life on campus is a living—as well as a learning—experience. Students, with the counseling of trained resident staff, have their own governing organizations and develop social programs. A wide variety of athletic, social and professional activities are available to all students.

## Student Housing

### The Residence Halls

RIT recognizes the significance of the on-campus living experience and its effect on the student's academic and social development. The Center for Residence Life therefore, in keeping with the educational mission of the Institute, has as its overall purpose the general well-being and growth of students. To ensure this goal, the atmosphere, conditions and services within RIT's residence halls provide for much more than just a place to sleep. The antiquated term "dorm" is no longer an accurate description. The residence halls offer a living experience.

Many activities, programs and services are provided to residents by professional and paraprofessional staff members. Events are planned and regularly conducted on each floor and, on a larger scale, in each quad area. Social and developmental activities are specifically designed to help students meet one another, make friends, and become familiar with campus resources and generally to ease their transition to college life. Programs are continually offered throughout the year on a variety of topics, including study skills, communication abilities, personal safety and avoiding drug abuse. Many other topics also are covered, each designed to better prepare students to grow and mature as complete individuals.

Serving approximately 3,500 students, the residence halls offer many living options to meet diverse individual needs, interests, backgrounds and maturity levels. Students may choose living arrangements according to their own lifestyles: for example, same gender, coeducational, wellness, non-smoking, alcohol-substance free, intensified study, over 21 years of age, upperclass, ASL and mainstream (hearing and deaf/hard-of-hearing students living on the same floor). Also available are living options in Greek fraternities and sororities and Special Interest Houses such as Art House, Community Service Clubhouse, Computer Science House, Engineering House, International House, Photo House and Unity House. Special membership in Greek or special-interest houses is required, and dues may be charged.

A variety of room types also is available to the residence hall population. Entering students are assigned to double rooms, but limited-availability options for upperclass students include single rooms. On occasion, entering freshmen may initially be housed three to a room. This is a temporary arrangement, and as space becomes available, students are quickly reassigned to double-occupant rooms.

Before arriving at RIT, all students must sign and return the Room and Board Request and Assignment Form included in their housing information mailing. First-year students are required to live in residence halls, unless they live with their families within a 30-mile radius of RIT, while second-year students are required to live either in residence halls or RIT apartment housing. Students generally reside a minimum of two years in residence halls. Campus apartments are available to upperclass students through an annual housing selection process. RIT's residency requirement is for the full academic year (fall, winter and spring quarters). If a student

should become enrolled in a co-op program as part of educational study, he or she is charged only for the period of actual occupancy. Additionally, all residence hall students must participate in a board (meal) plan. Charges for meal plans are included in the Student Expenses section of this bulletin.

Within the residence halls, all rooms and corridors are carpeted, and each room is provided with beds, desks, chairs and dressers according to the number of students assigned to that room. Window coverings and closet space also are provided. Each corridor has its own bathroom equipped with showers, and floors have a community lounge area with a television. All residence hall rooms are equipped with telephones and cable television access, and each has a direct connection to RIT's campus computer system. In the Ellingson, Peterson and Bell residential area, suites are available in which three bedrooms are connected by a common bathroom. Coin-operated laundry facilities are available in all residence halls.

### **Apartment housing**

RIT's Apartment Life program is one of the nation's largest university-operated apartment systems, with approximately 2,800 students residing in nearly 1,000 individual townhouse and apartment units. Apartment housing is available to all upperclass students in the four apartment complexes owned and operated by RIT.

While single students compose the majority of apartment residents, a mixture of graduate and undergraduate students, single and married students and faculty/staff can be found in each apartment complex. Apartment contracts run September through August, but residents are permitted to leave for co-op employment and summer without penalty. All apartments are equipped with refrigerator and stove but are otherwise unfurnished. Furniture, however, may be leased from local rental companies. All Institute apartments are located less than a mile from the center of campus and are serviced by RIT's shuttle bus system. A brochure describing the four complexes—Colony Manor, Perkins Green, Riverknoll and Racquet Club—is available from the Center for Residence Life, Grace Watson Hall, 63 Lomb Memorial Drive, Rochester, NY, 14623-5603; 716-475-2572 (voice/TTY) or 716-475-2113 (TTY).

### **The Housing Connection**

A service of the Center for Residence Life, The Housing Connection is designed to meet the general housing needs of the RIT community. The center provides free referrals for students looking for on- or off-campus housing accommodations in the Rochester area. In addition, the center offers the only on-campus clearinghouse for apartment residents in need of additional roommates, providing a continual updated listing of available roommates and their specific interests.

Located on the first floor of Kate Gleason Hall, The Housing Connection provides free maps, information pamphlets and telephones for users of this service. A trained staff member will assist students in their research for housing or roommates. For more information, stop in or call 716-475-2575 (voice) or 716-475-2719 (TTY).

## **Student Clubs and Organizations**

### **Student Government**

The Student Government is the representative body for students. It works with RIT administration, faculty and staff to communicate the needs and desires of the student body and to communicate the decisions of the administration to RIT students. It encourages the student body to formulate and express its opinion and forms the Student Hearing Board, which provides for the self-discipline of the student body.

All full-time and part-time undergraduate and graduate students become members of the Student Government when they pay the Student Activities Fee. Other students may become members of the Student Government, if they wish to participate in student-sponsored activities, by paying the Student Activities Fee.

### **NTID Student Congress**

The NTID Student Congress (NSC) is an organization of and for deaf students. NSC helps interested students communicate their needs, ideas and concerns about campus life to faculty members, administrators and other student organizations within RIT; provides opportunities for developing new leadership skills; and encourages student activities and integration by providing deaf students with opportunities to interact with their peers socially, academically, athletically and culturally.

Students interested in getting involved may stop in at the NTID Student Congress office or call 716-475-6277 (TTY) for more information.

### **Off-Campus and Apartment Student Association (OCASA)**

OCASA is the representative student government for all RIT students who do not reside in a residence hall. The Off-Campus and Apartment Student Association, formed in 1978, is composed of students who live with their parents, or in the four RIT-operated apartment complexes, or in off-campus apartments. OCASA provides input from off-campus students to the RIT administration.

The OCASA main office, located in the RITreat, Student Alumni Union, offers complementary services. They include a typing room with typewriters and Macintosh computers, a copier and various office supplies. Also available is a microwave; refrigerator; coffee, tea and hot chocolate. A daily newspaper and a variety of magazines also are on hand. Each of two satellite offices in Colony Manor and Racquet Club apartments offers Macintosh computers, a copier and a TV lounge.

If you are interested in getting involved, stop in at the OCASA office or call 716-475-6680 (voice/TTY) for more information.

### **The College Activities Board (CAB)**

The College Activities Board, which is composed of students, is responsible for providing a balanced program of activities that reflect and enhance the special social, cultural, recreational and educational needs of the campus community. If you are interested in getting involved, stop by the office in the Student Alumni Union, or call 716-475-2509 (voice/TTY).

### **The Black Awareness Coordinating Committee (BACC)**

The Black Awareness Coordinating Committee is organized to foster an awareness of the role of black men and women in the total society and to create a greater understanding among black students at RIT. Each year the committee sponsors various social and cultural programs designed to achieve these objectives.

### **Residence Halls Association (RHA)**

Residence Halls Association was created to represent all resident students and to be a liaison between the student body and the administration. This association functions as the "resident community government," developing changes in rules and policies that will benefit the resident population. RHA also provides students with a variety of services, facilities and programs, equipment and appliances. RHA is located in the tunnel of Kate Gleason Hall and can be contacted at 716-475-6655.

### Greek Council

Greek Council is the governing body that represents all members of the Greek community. It deals with issues on their behalf in conjunction with the Panhellenic, Interfraternity and Pan-Hellenic Councils. The council is responsible for regulating rules and practices that affect the entire Greek system. It oversees the recognition procedure for special-interest groups that have the intention of becoming fraternities and sororities, as well as recognition procedures for local and national Greek-letter organizations. Programs sponsored or cosponsored by the council include Greek Week, system-wide philanthropy/service projects, a Greek league parallel to the intramural program, social programs and national speakers. For additional information, please call the Greek Council Office at 716-475-2735, or 716-475-7028 (TTY), or the Center for Residence Life at 716-475-2572 (voice/TTY) or 716-475-2113 (TTY).

Alpha Epsilon Pi	Phi Delta Theta
Alpha Kappa Alpha	Phi Kappa Psi
Alpha Phi Alpha	Phi Kappa Tau
Alpha Sigma Alpha	Phi Sigma Kappa
Alpha Sigma Theta	Sigma Alpha Mu
Alpha Xi Delta	Sigma Nu
Delta Phi Epsilon	Sigma Pi
Delta Sigma Phi	Sigma Sigma Sigma
Delta Sigma Theta	Tau Epsilon Phi
Kappa Alpha Psi	Tau Kappa Epsilon
Kappa Delta Phi	Triangle
Kappa Phi Theta	Zeta Phi Beta
Lambda Alpha Upsilon	Zeta Tau Alpha
Lambda Phi Delta	Order of Omega

### WITR

WITR is an FM radio station operated by RIT students. It is licensed by the Federal Communications Commission as a noncommercial, educational station. It is also licensed to be on the air 24 hours a day with a power of 910 watts, which covers the Rochester area.

Approximately 70 students make up the staff, working in five major departments: finance, engineering, news and public affairs, programming and promotions. WITR Radio has been operating for thirty-four years with two major goals: to provide a programming service to the RIT and surrounding community and to provide a noncommercial training ground for participating staff.

Participation in WITR can be an educational and enriching experience. It offers students practical experience in broadcasting, engineering and management. WITR disc jockeys gain the qualifications and experience to work in any radio station. Some of our former and current members now work full- or part-time at several commercial radio stations, while other members have attained positions with recording studios or are active representatives of record companies such as A&M, MCA, Sony, Mercury and Polydor.

WITR promotes RIT events, and public-service activities including both on- and off-air participation in many events. It is a major source of local music in the Rochester community. WITR is the primary broadcast source of RIT sports, such as hockey and campus events, such as the President's Institute address.

### Campus Club Involvement

For more information about the following clubs, please contact the Student Government Office at 716-475-2204 (voice/TTY) or stop by the office in the RITreat. Look for the quarterly Club Day in the Student Alumni Union. The following is a list of recognized clubs:

- Alpha Phi Omega
- Alternative Student Fellowship
- Amateur Radio Club
- American Marketing Association
- Amiga Computer Users of RIT
- Anime Club
- Asian Cultural Society
- Asian Deaf Club
- B'Strong
- Brotherhood Club
- Caribbean Students Association
- Charles H. Wesley Literary Society
- Chinese Student Society
- Comix Club
- Ebony Club
- Eta Sigma Delta
- Finance Club
- Formula SAE Team
- Friends of Veterans
- Gamma Epsilon Tau
- German Club
- Graduate Management Association
- Horizontal Ultimate Club
- Imaging Science and Technology
- Industrial Designers Society of America
- Information Systems Student Organization
- Information Technology Student Organization
- Institute of Food Technology
- Institute of Industrial Engineers
- Interior Design Club
- InterVarsity Christian Fellowship
- Latin American Student Association
- Life Science Club
- Medical Illustration Guild
- Muslim Students Association

National Press Photographers Association  
 National Society of Black Engineers  
 Native American Student Association  
 New York State Hotel Association  
 New York State Restaurant Association  
 Non-Traditional Student Organization  
 Photo Finishing Marketing Association  
 Physician Assistant Student Association  
 RIT Players  
 Rochester Wargamer Association & Guild  
 Science Fiction Association  
 Society of Automotive Engineers  
 Society of Hispanic Professional Engineers  
 Speak-Engineering  
 Student Accounting Association  
 Student Dietetic Association  
 Student Environmental Action League  
 Student Illustrator's Guild  
 Student Music Association  
 Taiwanese Student Association  
 Technical Photography Student Association  
 Traditional Student Organization  
 Travel and Tourism Club  
 Vietnamese Students Association

### Student professional associations

A number of national technical associations have student affiliate chapters on campus. Frequently sponsored by parent chapters in Rochester, these societies play an important part in Institute life by bringing together students who have common interests in special subjects. The associations serve a professional and social purpose.

### Student publications

RIT students produce some of the most professional collegiate publications in the country.

*Reporter* is published by students weekly, except during examinations and holidays, and serves as the student news magazine. *Reporter* has consistently won state and national awards.

A weekly calendar listing campus activities, "The CalendaRIT," is published in *Reporter*.

These publications draw their talented staffs—artists, photographers, writers, managers and printers—from the entire student body.

Publications produced by deaf students include *Rolling Bricks*, a literary/art magazine; *Eagle's Eye*, a newspaper published several times each quarter; and *NTIDLIFE*, the college's yearbook.

### Student Alumni Union

The Student Alumni Union, a primary focal point at the main entrance to the academic plaza, is designed specifically to service events sponsored by and for the entire campus community—students, faculty, and administrative groups, alumni and guests. A staff is available to assist and advise the various individuals and groups in planning and coordinating their activities. In addition, a complete information service is located in the main foyer.

The three-level facility, the center of co-curricular activities, features the 507-seat Ingle Auditorium; a complete game room, billiards, foosball and electronic games; a unisex hair-styling and tanning salon; a candy and tobacco counter; two separate dining areas consisting of the main cafeteria and the RITskeller; meeting rooms and lounges. Offices housed in the Union also include Special Services, Student Affairs, Alumni Relations, The Center for Student Transition and Support (including Orientation, First-Year Experience, International Students, African, Hispanic, Asian and Native American Students), Black Awareness Coordinating Committee, Food

Service, College Activities Board, The Center for Campus Life, Student Government, WITR radio station, RITV, *Reporter*, Off-Campus and Apartment Student Association, the Student Employment Office and other student organization offices.

### The RITreat

Through the efforts of the Student Life Advisory Board and several other student groups and individuals, the RITreat is a dedicated student area. The following resources can be found in the RITreat:

- Clubs and organizations space
- Computers/typewriters/word processors
- Stamp machine
- Department of Special Services
- Student Government office
- Mailfolders for SG clubs and organizations
- Off-Campus and Apartment Student Association
- Study tables/lounge area
- Center for Campus Life

### Social Events

Major social events on the activities calendar include Brick City Blast, Parents Weekend, Mardi Gras Weekend and Spring Fling.

Other dances, parties, speakers and events are sponsored by organizations such as the College Activities Board, the Residence Hall Association, NTID Student Congress, Greek Council, the Black Awareness Coordinating Committee, the Off-Campus and Apartment Student Association and various special-interest clubs. Students can also get involved with departmental and professional associations such as Alpha Chi Sigma, Delta Lambda Epsilon, Delta Sigma Pi and Sigma Pi Sigma.

### Community Service Opportunities

RIT students are known for their volunteerism, generosity and skills. Come and join us for some fun! There are many opportunities to get involved with local social service agencies. Call 716-475-7058 (voice/TTY) for details.

## RIT Creative Arts Program

### RIT Singers

An Institute-sponsored vocal ensemble, the RIT Singers is composed of about 40 members and is open to students, faculty and staff. No auditions are necessary; new members are welcome during the first three weeks of each quarter. The ensemble performs classical and popular music and gives several concerts yearly as well as joint concerts with the orchestra and jazz ensemble. For more information, call 716-475-6087 (voice/TTY).

### RIT Collegium Musicum

This ensemble of men's and women's voices performs a range of musical literature. Particular attention is given to building individual vocal skills. Opportunities for solo work and small ensemble singing are emphasized. For further information, call 716-475-6087 (voice/TTY).

### RIT Men's Octet

Selected through auditions, this is an ensemble of eight singers. Rehearsals for both on- and off-campus appearances are adjusted to fit ensemble members' schedules. For more information, call 716-475-6087 (voice/TTY).

**RIT Gospel Ensemble**

This group of approximately 25 members has developed a repertoire of black spirituals, modern gospel songs, interdenominational anthems and hymns. The group performs for religious services on campus as well as for special events. For more information, call Student Activities, 716-475-6650 (voice/TTY).

**RIT Jazz Ensemble**

Instrumentalists with a background in jazz and jazz rock will want to check out the Jazz Ensemble. The group performs monthly on-campus concerts in the RITskeller. For more information, call Student Activities, 716-475-6650 (voice/TTY).

**RIT/NTID Combo**

Each quarter more than 60 deaf students enroll in the world-model NTID music program. Four to six of these students are selected to perform with the internationally renowned NTID Combo. For more information, call 716-475-6797 (voice/TTY).

**RIT Tiger Band**

A combination of RIT and NTID students, faculty, staff, alumni and community members form the RIT Tiger Band and perform music for sports events, award ceremonies, dedications and student activities. For more information, call 716-475-6797 (voice/TTY).

**Sunshine Too**

Sunshine Too is NTID's acclaimed professional touring theater company. Each year a new company with different material is available for performances in public schools, schools for deaf students and colleges. The performers are three deaf and three hearing actors; all performances are done in sign language and voice. For more information, call 716-475-6251 (voice/TTY).

**RIT Dance Company**

The company provides an opportunity for deaf and hearing students to work together in modern dance and ballet classes. Each year students and faculty create new pieces and present them in concert. For more information, call 716-475-6250 (voice/TTY).

**Panara Theater**

Main Stage—Three plays are produced each year. They feature deaf and hearing actors and are performed in both sign language and voice.

Lab Theater—This includes experimental, new or unusual productions. New directors and student writers also use the space for developing their skills. For information, call 716-475-6250 (voice/TTY).

**NTID performing arts course offerings**

For information regarding acting, mime, technical theater, lighting, music instruction or dance classes, call NTID's department of performing arts, 716-475-6250 (voice/TTY).

**Literary Series**

A joint activity of the Institute Creative Arts Committee, College of Liberal Arts and various other campus organizations, the Literary Series brings both well-known and developing writers to campus. Students who wish to participate should call 716-475-2475 (voice/TTY).

**Visiting Artists & Critics Series**

This series is sponsored by the College of Imaging Arts and Sciences, the Creative Arts Program and the Student Affairs Office. Many of the country's leading artists and critics are included in the program, which deals with the issues of technology in art today. For more information, call 716-475-2646 (voice/TTY).

## Physical Education

Physical education courses are offered during all academic quarters, including summer. More than 60 courses are available during the year. Not all courses are offered every quarter. Registration for physical education classes coincides with the dates and times for the academic departments. A nominal lab fee is charged for most courses. (Please check quarterly schedule of courses for more information.)

The following classes are offered as selections in the Center for Physical Education. The Institute's physical education requirements are described on page 11 of this bulletin.

**Wellness options**

Total Fitness, Health: Mind-Body Connection and Sports Biology

**Cardiovascular and strength activities**

Aerobics, Aikido, Army Conditioning Drills, Jogging, Karate, Kung Fu, Yoga and Red Barn Ropes

**Recreation and sports activities**

Archery, Backpacking (Outdoor Experiential Education), Badminton, Ballet, Ballroom Dance, Billiards, Bowling, Canoeing, Country Line Dancing, Cross Country Skiing, Dance Performance I & II, Diving, English Horseback, Fencing, Fishing, Frisbee, Golf, Hunting, Ice Fishing, Ice Skating, Jazz Dance, Juggling, Latin American Dance, Racquetball, Rock Climbing, Scuba Diving, Self-Defense (women), Skeet & Trap, Skiing (downhill), Swimming, Tennis and Western Horseback

**Team activities**

Basketball, Softball, Volleyball, Soccer, Water Polo

**Life support and safety programs**

CPR and First Aid, Lifeguarding, Water Safety Instruction

**Support services for deaf and hard of hearing students in physical education and athletics**

NTID's Physical Education and Athletics Support Team provides educational support services for deaf and hard of hearing students on intercollegiate teams and those involved in physical education classes and intramural activities. It also provides direct instruction in physical education courses and ongoing in-service instruction, both formal and informal, to physical education teachers and athletic coaches regarding deafness and deaf/hearing interaction. Other services include tutoring and supervising notetakers for Physical Education.

## Intramural Activities

An extensive program of intramural activities is offered at RIT. Under the direction of the Center for Physical Education and Recreation, activities include co-rec, as well as men's and women's teams, in basketball, volleyball, softball, floor hockey, ice hockey, flag football, soccer, innertube water polo, bowling, tennis and golf.

## Recreation

RIT offers some of the finest recreational facilities available in colleges today. Indoor facilities feature five gymnasiums, an ice rink, swimming pool, elevated indoor running track, physical fitness and weight training center, dance studio, recreational equipment room, wrestling room and game room (video games, billiards). Outdoor facilities include nine lighted tennis courts, an all-weather track and numerous athletic fields. The equipment issue room provides quality equipment for recreation, physical education instruction, and intramural needs and interests. Services offered include general information, towel and lock service, and equipment loan-outs. The Center for Physical Education and Recreation also provides a series of health education and exercise programs throughout the year.

## Intercollegiate Athletics

For eight decades, intercollegiate athletics has developed a tradition of excellence at RIT. The Institute's heritage in competitive athletics is a rich one. It has grown to become highly successful and widely recognized on the regional and national levels.

RIT has won more than 50 percent of its contests in the past decade. Some of the men's team accomplishments have come in soccer (11 NCAA appearances and runner-up honors in 1988), cross country (nine Eastern College Athletic Conference crowns and six top-10 finishes in the last six NCAA championships), hockey (two national championships and four ECAC titles), basketball (ECAC crown in 1992-93 and the Chase Scholarship title in 1994-95), and lacrosse (five Empire Athletic Association crowns in the last seven years).

Women's teams also have excelled. Volleyball boasts six straight EAA crowns and third place in the 1993 NAAs. Women's softball is a perennial state contender. Women's tennis is 151-45 over the last 19 years, and women's ice hockey won its first ECAC title in 1989. RIT is one of only three schools in New York State to offer women's ice hockey on the varsity level.

Each year more than 350 athletes take part in 20 varsity sports offered at RIT. Fall competition features men's cross country, women's volleyball, women's and men's soccer, and women's tennis. Winter sports include men's and women's basketball, swimming, hockey, and indoor track and wrestling. Spring competition features baseball; men's and women's track, lacrosse and softball; and men's tennis.

A National Collegiate Athletic Association (NCAA) Division III member institution, RIT competes against schools in the Northeast with similar academic and intercollegiate athletic philosophies. Known as the Tigers, RIT teams are also members of the Eastern College Athletic Conference (ECAC), and New York State Women's Collegiate Athletic Association (NYSWCAA).

Since varsity sports began at the Institute in 1915-16, RIT teams have won 47 conference titles, 18 ECAC crowns and three NYSWCAA championships. Individually, the Tigers boast four national champions, including Barry Zacharias (swimming), Mark Stebbins (twice in track), Michele Jones (track) and Darrell Leslie (wrestling).

## Club Sports

In addition to intercollegiate sports and intramural programs, RIT offers several club sports. The program is a division of RIT Student Government with the purpose of providing extramural/intercollegiate competition. Some club sports, however, are solely for recreational or instructional purposes. Participation is open to students carrying a minimum of 12 credit hours.

The following sports are offered: badminton, kayak, outing club, bowling, crew, lacrosse (women, men), rugby (women, men), alpine skiing, volleyball (men), water polo club and field hockey.

## Student Health Center

The Student Health Center provides primary medical care on an outpatient basis. The staff includes physicians, nurse practitioners, registered nurses, an interpreter for the deaf and health educators. Allergy, psychiatric and gynecological services are available by appointment. Health education programs are provided also.

The Student Health Center is located on the walkway linking the academic and residence hall areas of the campus. Students are seen on a walk-in basis, Monday through Thursday, 8:30 a.m. to 7 p.m., with limited services only from 4:30 to 7 p.m.; and Friday, 8:30 a.m. to 4:30 p.m. Only emergencies are seen during the last half hour of each shift. Hours are subject to change and are posted.

The Institute requires students to maintain health insurance coverage—which they may purchase either on their own or through RIT—as long as enrolled at RIT.

**The quarterly student health fee is mandatory for all full-time undergraduate students.** All other students may pay either the quarterly fee or a fee for service. Some laboratory work ordered through the Student Health Center is not covered by this fee; there is a nominal charge for this service. Prescription medicines may be purchased from local pharmacies or, for some specific prescriptions, from the Student Health Center. The health fee does not include prescription medications.

Questions about the Student Health Center or health insurance should be directed to the office at 716-475-2255.

### RIT Ambulance

RIT Ambulance is a New York State certified volunteer ambulance service that serves the campus community, including its adjoining apartment complexes. The organization, an auxiliary of the Student Health Center, is governed by RIT students and staff and is staffed by emergency medical technicians. Twenty-four-hour ambulance service is available seven days a week.

For emergency assistance and/or transport, the RIT ambulance can be dispatched through Campus Safety at 716-475-3333 (voice) and 716-475-6654 (TTY).

### Health records

Medical records are confidential. Information will not be released without the student's written consent. Exceptions to this rule are made only when required by the public health laws of New York State.

## Campus Stores

RIT operates two campus stores. The main store, Campus Connections, is located on the west side of the Student Alumni Union. It consists of two selling floors and is divided into 11 departments selling everything from clothing to textbooks to computers. Store hours are Monday through Thursday, 8:30 a.m. to 8:30 p.m.; Friday, 8:30 a.m. to 4:30 p.m.;

and on Saturday, 11 a.m.–4 p.m. Store hours may change on holidays, during quarter breaks, and during Summer Quarter. For current information about hours and special sales, call 716-475-6033.

Campus Connections accepts cash, checks, MasterCard, VISA and RIT flexible debit cards for payment. Certain students may have arrangements with a government agency to pay for some of their books and supplies; this is handled at our service counter on the first floor.

The Candy Counter in the lobby of the Student Alumni Union sells candy, tobacco products, notions, sundries, magazines, daily newspapers, and snack items. Film can be dropped off here for processing.

## Campus Safety

The Campus Safety Department is open 24 hours a day and is located in Grace Watson Hall. The department provides the following services:

### Escort Service

Campus Safety strongly encourages students to use the Escort Service. The Escort Service is available to anyone, seven days a week. Simply call the Campus Safety Department at 716-475-2853/6654 (TTY), or use one of the blue-light courtesy call boxes located across the campus.

### Lost and Found and Operation ID

All campus lost and found property is stored by the Campus Safety Department. Each year Campus Safety disposes of a great deal of unclaimed property because it is not identifiable and the owners do not claim it. Students are encouraged to take advantage of the Operation ID program, which helps in the recovery of lost property by marking valuables and by registering them with Campus Safety.

### Emergency notification

There may be times when emergency notifications need to be made. If this should occur, contact the Campus Safety Department (716-475-2853 or -6654 TTY). Campus Safety will locate the student and relay your message.

### Campus courtesy call boxes

Campus courtesy call boxes, identified by a blue light, are located across the campus. These call boxes provide a direct line to Campus Safety 24 hours a day. The location of the call is automatically recorded at the Campus Safety Communications Center, making it possible for hearing-impaired individuals to use the call boxes also. The call boxes may be used to request an escort, assist a motorist, report any suspicious persons or activities, or request access to a locked building or room.

### Vehicle registration

All vehicles operated on the RIT campus must be registered with Campus Safety and stickers must be properly displayed on the vehicle. New York State motor vehicle and traffic laws are in effect on the RIT campus. Institute fines are imposed for operators in violation of parking and traffic regulations.

### Medical/Handicap parking permits

Campus Safety honors handicap and medical parking permits from every state. Temporary medical parking permits may be issued to persons in need of them.

### Public safety

Campus Safety conducts programs in fire safety practices and evacuation techniques (which are reinforced through fire drills that are held in accordance with New York State Education Laws), safety in the work place and Environmental Health.

**Presentation programs**

Throughout the year, Campus Safety hosts a variety of prevention programs on topics including Fire Safety (video and slide presentations), Crime Prevention (video presentation), Personal Safety, Alcohol Awareness/DWI (“Is It Worth the Risk?”) and Date/Acquaintance Rape.

**Sexual Assault Information Hotline**

RIT’s Sexual Assault Information Hotline provides counseling and educational services to the RIT community. The counselors are full-time professional staff, some of whom are skilled in sign language. The Sexual Assault Information Hotline also provides a confidential hotline for people who need to contact a counselor. The hotline number is 258-3399 (voice/TTY).

RIT provides a wide variety of security services and prevention programs to everyone in the campus community. Although each individual is ultimately responsible for his or her own personal safety, learning and practicing some basic precautions could enhance one’s well being.

**Transportation services**

The Campus Safety Transportation Division provides a shuttle service on campus Monday through Friday from 6 a.m. to 12 midnight during the regular academic quarter. Saturday service runs from 10 a.m. to 11 p.m. with off-campus service from 10 a.m. to 6 p.m. The Sunday service runs from 9 a.m. to 11 p.m. on campus. Over the holiday/break periods, service runs from 8:20 a.m. to 8:20 p.m., with off-campus stops at local malls and restaurants. The Mobility Impaired Van service runs Monday through Friday from 7 a.m. to 6 p.m. and at other times by prearranged appointment. There is a Mobile Escort service provided by the Campus Safety Transportation Division seven days a week from 11 p.m. to 4 a.m. Schedules are published quarterly and distributed for easy access to students. The Transportation Division also provides charter buses and vans for the use of student groups, clubs and organizations. For more information, please call the Transportation Office at 716-475-7200 (voice) or 716-475-4914 (TTY).

## Commission for Promoting Pluralism

The Commission for Promoting Pluralism was established to formulate a plan of action that would address seriously and deliberately the subject of pluralism and community building in every part of the university. Its evolution is the result of an identified need for RIT constituents to deepen their respect and appreciation for all people in the RIT community and beyond. This institutional focus attempts:

- to reflect and articulate an institutional commitment to a pluralistic campus environment;
- to promote diversity as an institutional value;
- to eliminate barriers that prohibit culturally diverse students, staff, faculty and administrators from taking full advantage of all educational opportunities within RIT, and thereby hindering the possibility of these individuals from becoming all of which they are capable;
- to create strategies that will remove any barriers that prohibit or restrict educational and social opportunities to all community members;
- to develop support systems that provide for greater comfort, congeniality and sincerity of effort for diverse groups; and
- to identify and recommend sources of assistance to staff, faculty and administrators as they attempt to enhance cultural diversity in their various functions and work areas.

## Standards for Student Conduct

The RIT community intends that campus life will provide opportunities for students to exercise individual responsibility and places high priority on self-regulation by its members. All members of the community are responsible for encouraging positive behavior by others, as well as preventing or correcting conduct by others that is detrimental to RIT’s educational mission and values.

As an educational community, RIT strives for a campus environment that is free from coercive or exploitative behavior by its members. Moreover, it sets high standards that challenge students to develop values that enhance their lives professionally and that will enable them to contribute constructively to society.

RIT enjoys a diversity of backgrounds, lifestyles and personal value systems among those who compose the academic community. Students, however, are expected to observe and respect the policies and standards of the Institute and the right of individuals to hold values that differ from their own and those expressed by RIT.

## Summary of Conduct Policies

The following broad areas of conduct for students, although not all-inclusive, indicate, in general terms, the standards of student conduct that are important to the educational mission of RIT and to the quality of campus life. The RIT Conduct Code and disciplinary process is printed in its entirety in *The Student Rights and Responsibilities Handbook*. All policies and procedures relating to student and organization conduct are printed in this document and should be reviewed by all RIT students.

### Human rights and dignity

Students are expected to follow RIT's Discrimination and Harassment Policy. All students should practice high regard for the rights and dignity of other people, preventing all types of discrimination. RIT attempts to resolve conflicts between individuals and groups with differing backgrounds and views through discussion and clarification of values and attitudes. Students should not physically or verbally abuse any person on RIT premises or at RIT-sponsored or supervised events.

### Alcohol and drug abuse

Students are expected to follow RIT's Drug and Alcohol Policy. RIT considers drug and alcohol abuse as issues of health and safety, and thereby recommends that students who abuse substances seek counseling and treatment. Similarly, if a student thinks another individual is abusing drugs or alcohol he or she should suggest that the suspected abuser seek treatment. Students who evidence problems with alcohol or drugs will be offered, and if necessary, be required to avail themselves of counseling or other appropriate treatment.

Individuals will be held responsible through RIT judicial processes for their behavior despite impairment from drug or alcohol use. RIT prohibits violations of federal, state and local laws, and will not shelter students from prosecution.

### Computer use

Students are expected to follow RIT's Code of Conduct for Computer Use. A variety of computing resources is available at RIT, ranging from application-specific microcomputers to central multiuser systems. Computer abuse is expensive and can have far-reaching consequences. Students should not intentionally disrupt the educational process through deletion of another's course assignment, dampen the creative process through theft of intellectual property, violate an individual's privacy or institutional confidentiality, or infringe on copyright.

### Off-campus conduct

The conduct of RIT students off campus will be held to the same standards and policies as on campus. Any off-campus action which interferes with the completion of the educational mission of RIT or any member of the RIT community is subject to disciplinary action.

### Academic honesty

Students are expected to follow RIT's Policy on Academic Honesty. Students should not engage, or allow others to engage, in any form of academic dishonesty. These acts include, but are not limited to, plagiarism in any form or using information and materials not authorized by the instructor during an examination.

Dishonesty includes furnishing false information to RIT and forgery. Alteration or use of RIT documents or instruments of identification with intent to defraud are prohibited.

### Disruption of RIT activities

Students should refrain from unreasonable disruption or obstruction of teaching, research, administration, organizational activities, disciplinary proceedings or any other RIT activities.

### Parking and traffic

All drivers on campus should follow RIT's Parking and Traffic Regulations. New York State motor vehicle and traffic laws are in effect on campus. RIT may enact supplemental parking and traffic regulations for RIT-owned properties. The regulations are intended to promote order and ease of movement of pedestrians and motorists and to safeguard people and property.

### Regard for property

Students are expected to exercise appropriate care for RIT property and the property of others. Theft, damage or unauthorized possession of either RIT property or the property of a member of the academic community on RIT premises is subject to disciplinary action.

Library materials and laboratory facilities are of utmost importance to the completion of RIT's academic mission. Consequently, students should show considerable care in the handling of these items.

### RIT officials

Students must furnish proof of enrollment through valid student identification card upon request from RIT officials. Students should comply with the directions or instructions of RIT officials acting in performance of their duties.

### Safety

Safety is an issue about which all students should care deeply—not only the safety of oneself, but the safety of others. Students should behave sensibly to protect the welfare of others and to minimize hazardous situations. Safety is of critical importance at all places on the campus, but particularly important in the apartments and residence halls where the carelessness of one individual can affect the lives of hundreds. Willful violations of safety, such as causing false fire alarms, will result in immediate disciplinary action according to judicial procedures.

### Sexual harassment/ sexual misconduct

RIT acknowledges that an individual student's sexual attitudes and values are a matter of choice; nonetheless, responsible sexual behaviors must take into account the dignity, privacy and rights of others. RIT's Harassment and Discrimination Policy should be observed at all times. Moreover, no individual should be subjected to exploitative actions.

### Study environment

Students need a campus environment that is conducive to studying, especially in facilities that are designed primarily for study. Individuals should respect the rights of others to study and should be understanding of different study habits.

### Student-sponsored events

In the planning and scheduling of events, students should consider the safety and overall welfare of members of the academic community. Students should not knowingly conduct events that might inhibit the completion of the academic mission of the Institute or any member thereof.

### RIT judicial process

RIT has established well-defined processes for handling student misconduct cases, while protecting the civil and academic rights of all members of the Institute community. Judicial and appeals processes are administered through the Office of the Vice President for Student Affairs. Sanctions

imposed upon those found responsible for violating the RIT Conduct Code may range from a written warning to restitution to disciplinary suspension and expulsion from the Institute. Students suspended from RIT may not enroll in any course work until such time as the suspension is waived by the assistant to the vice president for judicial affairs.

## Postsecondary Complaint Registry

Section 494C(j) of the Higher Education Act of 1965, as amended, provides that a student, faculty member or any other person who believes he or she has been aggrieved by an institution of higher education has the right to file a written complaint.

In New York State, a complaint may be filed by any person with reason to believe that an institution has acted contrary to its published standards or that conditions at the institution appear to jeopardize the quality of the institution's instructional programs or the general welfare of its students. Any person who believes he or she has been aggrieved by an institution on or after May 4, 1994, may file a written complaint with the Department of Education within three years of the alleged incident.

### How to file a complaint

1. The person should first try to resolve the complaint directly with the institution by following the internal complaint procedures provided by the institution. An institution of higher education is required to publish its internal complaint procedure in a primary information document such as the catalog or student handbook. (The department suggests that the complainant keep copies of all correspondence with the institution.)
2. If a person is unable to resolve the complaint with the institution or believes that the institution has not properly addressed the concerns, he or she may send a letter or telephone the Postsecondary Complaint Registry to request a complaint form. Please telephone 212-951-6493 or write to:  
New York State Education Department  
Postsecondary Complaint Registry  
One Park Avenue, 6th Floor  
New York, NY 10016

3. The Postsecondary Complaint Registry Form should be completed, signed and sent to the above address. The completed form should indicate the resolution being sought and any efforts that have been made to resolve the complaint through the institution's internal complaint processes. Copies of all relevant documents should be included.
4. After receiving the completed form, the department will notify the complainant of its receipt and make any necessary requests for further information. When appropriate, the department will also advise the institution that a complaint has been made and, when appropriate, the nature of the complaint. The complainant will also be notified of the name of the evaluator assigned to address the specific complaint. The evaluator may contact the complainant for additional information.
5. The department will make every effort to address and resolve complaints within ninety days from receipt of the complaint form.

### Complaint resolution

Some complaints may fall within the jurisdiction of an agency or organization other than the State Education Department. These complaints will be referred to the entity with appropriate jurisdiction. When a complaint concerns a matter that falls solely within the jurisdiction of the institution of higher education, the complainant will be notified and the department will refer the complaint to the institution in question and request that the matter receive a review and response.

Upon conclusion of the department's complaint review or upon a disposition of the complaint by referral to another agency or organization, or to the institution of higher education, the department will issue a written notice to the complainant describing the resolution of the complaint. The complainant may contact the department evaluator directly for follow-up information or for additional assistance.

# Admission

Admission to RIT is competitive, but our admissions process is a personal one. We are interested in learning about your interests, abilities and goals in order to provide the best information and guidance we can as you select the college that is right for you.

Students applying for freshman admission for the Fall Quarter (September) may apply through an **Early Decision Plan** or **Regular Decision Plan**. The Early Decision Plan is designed for those who consider RIT their first choice and wish to receive an early notification regarding admission. Early Decision requires that candidates file their applications and supporting documents by December 15 in order to receive admission notification by January 15.

Freshmen who choose not to apply for Early Decision are considered under our Regular Decision Plan. Regular Decision applicants who have provided all required application materials by March 1 will receive admission notification by March 15. Applications received after March 1 will be reviewed on a “rolling” basis, with notification letters mailed four to six weeks after the application is complete.

All applications for transfer admission and all freshman applications for Winter, Spring or Summer Quarter entry are reviewed as they are received, and notification letters are mailed four to six weeks after the application is complete.

**Specific instructions for completing the application process are contained in our application packet. Be sure to read the instructions carefully before applying.**

Factors considered in the admissions decision include, but are not limited to, past high school and/or college performance (particularly in required academic subjects), admission test scores, competitiveness of high school or previous college, and post-educational experiences (work, military, etc.). Recommendations from those familiar with your academic performance and interviews with admissions counselors are often influential.

If you are accepted for admission, a \$200 nonrefundable enrollment deposit reserves a place in your class and is credited to your first-quarter costs at RIT. The due date for this deposit is indicated with your offer of admission.

**Applying to NTID**

All applications for admission to RIT's National Technical Institute for the Deaf are reviewed, and admissions notification is sent out two weeks after all application materials have been provided to NTID's Department of Recruitment and Admissions. There is no Early Decision Plan for admission to NTID.

Students applying to RIT through NTID must complete both the standard RIT and the NTID Supplemental Application forms, available from NTID's Department of Recruitment and Admissions. If deaf students want to enroll directly in one of RIT's other seven colleges, they still must complete both applications. In addition to meeting NTID requirements, students also must fulfill requirements for admission to the selected college.

NTID students should submit their applications in the fall of the year before they wish to attend. The date of application is the date the Application for Undergraduate Admission has been received by NTID's Department of Recruitment and Admissions. The NTID admission year is October 1–June 30. NTID requires a \$100 deposit from accepted candidates.

**Application requirements**

In order to complete the application process, you need to submit the following:

1. a fully completed application for admission (includes Part 1, Part 2 and any supplemental forms)
2. a nonrefundable \$40 application fee
3. an official high-school transcript for all freshmen and for transfers with fewer than 30 semester hours or 45 quarter hours completed at the time of application
4. official Scholastic Assessment Test (SAT-I) or American College Test (ACT) results for all freshman applicants. NTID applicants may submit results from the Stanford Achievement Test as an alternative to the SAT or ACT examinations.
5. official transcripts of all completed college course work and a listing of any courses in progress (and not on the transcript) or courses to be completed before enrolling at RIT.

**New York State immunization requirement**

New York State Public Law 2165 requires that all matriculated students enrolled for more than six quarter credit hours in a term and born after January 1, 1957, must provide RIT's Student Health Center with proof that they have received the appropriate immunizations against measles, rubella and mumps. Immunization requirements include two measles vaccinations, at least one month apart, with a live virus, after January 1, 1968, and after the first birthday; and one vaccination each against mumps and rubella (after January 1, 1969, and after the first birthday). Additional information concerning the necessary documentation and where it must be sent is included with the Admissions Office acceptance packet or available from the Student Health Center office.

**Early admission**

Students occasionally complete the prescribed number and adequate distribution of high school units in three years, with the exception of fourth-year English and/or history. In such instances they may seek admission to RIT under the Early Admission Program.

**Transfer credit**

Because approximately 35 percent of RIT students are transfers, we have a strong commitment to providing services for them. Students who have completed studies at another accredited college before coming to RIT will be awarded transfer credit for all prior course work that is judged to be applicable to their RIT program. Usually a grade of C or better is required for a course to transfer.

Deaf students may transfer into an NTID program, or they may qualify for transfer directly into a program in another RIT college with NTID sponsorship. Deaf students accepted to the Summer Vestibule Program will have their transfer credit evaluated in the fall when they are accepted into a specific program.

**Credit by exam**

RIT grants credit for satisfactory scores on examinations covering objectives and contents parallel to the RIT courses for which students seek credit. Usually these are advanced placement (AP), college-level examination placement (CLEP), New York State proficiency examinations or RIT-prepared examinations.

**Diagnostic Testing in Mathematics**

Students who are not sure about the appropriate mathematics course with which to begin their studies at RIT may contact the department of mathematics at 716-475-5780 to arrange for a special mathematics diagnostic test.

**Admissions services and campus visits**

Selecting the appropriate college is a difficult decision, and visiting a campus often helps students form more accurate impressions. We encourage campus visits and personal admission interviews because they allow students to see our outstanding facilities firsthand and get answers to questions they may have.

We encourage all students—whether high-school age or adults exploring a second career—to seek our assistance while clarifying or reexamining personal and career goals.

To obtain answers to questions about RIT programs and procedures, contact the Admissions Office. Counselors are available to help students with questions and concerns. An appointment for an admissions interview and campus tour may be scheduled by writing RIT Admissions, Bausch & Lomb Center, 60 Lomb Memorial Drive, Rochester, N.Y., 14623-5604, or calling 716-475-6631 (Monday through Friday, 8:30 a.m. to 4:30 p.m.).

Deaf students who wish to enter NTID or another RIT college may write to NTID Department of Recruitment and Admissions, Lyndon Baines Johnson Building, 52 Lomb Memorial Drive, Rochester, N.Y. 14623-5604, or call 716-475-6700 (voice or TTY).

Deaf students may take regularly scheduled tours offered at NTID and arrange personal interviews. Both of these are optional and are not required for admission.

**Office of Part-time and Graduate Enrollment Services**

This office provides a central information and counseling service for students interested in enrolling in part-time undergraduate studies offered through the Institute's various schools and colleges. We encourage you to contact this office if you need assistance in selecting an academic program, exploring financial aid opportunities, registering for classes or receiving information about any aspect of part-time or graduate study at RIT.

Staff members are available to assist you from 8:30 a.m. to 6 p.m., Monday through Thursday, and from 8:30 a.m. to 4:30 p.m., Friday. We invite you to call 716-475-2229 for enrollment information or visit our offices on the first floor of the Bausch & Lomb Center on campus.

## Freshman Admission Guidelines

College	Academic Program	High School Preparation Required <sup>1</sup>
<b>Applied Science and Technology</b>	<b>Computer Science:</b> Computer Science, Software Engineering	Algebra, Geometry and Trigonometry required. Biology, Chemistry or Physics required for Computer Science. Both Chemistry and Physics required for Software Engineering.
	<b>Engineering Technology:</b> Civil, Computer, Electrical, Manufacturing, Mechanical and Telecommunications Engineering Technology programs; Undeclared Option <sup>2</sup>	Algebra, Geometry, Trigonometry, and Physics or Chemistry required. Technology courses desirable.
	<b>Food, Hotel and Travel Management:</b> Food Management, Hotel/Resort Management, Nutrition Management, Travel Management, Food Marketing and Distribution, Undeclared Option <sup>2</sup>	College preparatory program including Algebra and one year of Science. Chemistry required for Nutrition Management Program. Foreign language courses desirable.
	<b>Information Technology:</b> Information Technology	Algebra and Geometry required. Technology courses desirable.
<b>Business</b>	<b>Packaging Science:</b> Management, Technical and Printing Options	Algebra and one year Science required. Technical option also requires Geometry and Trigonometry.
	Accounting, Finance, Information Systems, International Business, Management, Marketing, Photographic Marketing Management, Undeclared Business Option <sup>2</sup>	College preparatory program including Algebra and one year of Science. Courses emphasizing writing skills also desirable.
<b>Engineering</b>	Computer, Computer/Software, Electrical, Industrial, Industrial/Ergonomics, Industrial/Manufacturing, Mechanical, Mechanical/Aerospace, Mechanical/Environmental, Microelectronic and Software Engineering programs; Undeclared Engineering Option <sup>2</sup>	Algebra, Geometry, Trigonometry, Physics and Chemistry required. Calculus desirable.
<b>Imaging Arts and Sciences</b>	<b>School of Art and Design:</b> Graphic Design, Industrial Design, Interior Design, Painting, Printmaking, Illustration, Medical Illustration, Undeclared Option <sup>2</sup>	Studio art experience in addition to a balanced academic program with courses in English, Social Studies, Mathematics and Science. Mechanical Drawing is also desirable for Industrial or Interior Design applicants. Medical Illustration Program requires two years of Science (Biology preferred). <b>A portfolio of original art work is required for all programs, with drawing skills being most important.</b> Craft students should also show examples of work in their area of interest, if possible.
	<b>School for American Crafts:</b> Ceramics/Ceramic Sculpture, Glass, Metalcraft/Jewelry, Weaving/Textile Design, Woodworking/Furniture Design	
	<b>School of Photographic Arts and Sciences:</b> Advertising Photography, Fine Art Photography, Photojournalism, Film/Video	College preparatory program including two years of Mathematics (one year for Fine Art Photography) and one year of Science.
	Biomedical Photographic Communications, Imaging and Photographic Technology	Two years of Mathematics and one year of Science. Biology required for Biomedical Photographic Communications.
<b>Liberal Arts</b>	<b>School of Printing Management and Sciences:</b> Newspaper Management, Printing Management	Algebra, Trigonometry and one year Science (Physics or Chemistry preferred)
	Printing and Applied Computer Science	Algebra, Geometry, Trigonometry; Chemistry or Physics
<b>NTID</b>	Criminal Justice, Economics, Professional and Technical Communication, Psychology, Social Work, Technical and Liberal Studies <sup>3</sup>	College preparatory program including two years Mathematics and one year Science required. Strong performance in English and social studies courses also expected.
<b>Professional Studies</b>	Business, Science and Engineering, and Visual Communications programs for deaf and hard-of-hearing students; Advanced degree (bachelor's and master's) options through other colleges of RIT.	Refer to application packet for NTID admission requirements. Deaf and hard-of-hearing students also may apply for freshman or transfer admission to other RIT colleges through NTID.
	Applied Arts and Science	Freshmen should first apply to Technical and Liberal Studies option.
<b>Science</b>	Environmental Management	Three years of Mathematics, including Trigonometry, and Chemistry or Physics
	Applied Mathematics, Applied Statistics, Computational Mathematics	Algebra, Geometry, Trigonometry and one year of Science
	Biology, Biotechnology	Algebra, Geometry, Trigonometry, Biology and Chemistry
	Biochemistry, Chemistry, Polymer Chemistry	Algebra, Geometry, Trigonometry and Chemistry
	Physics	Algebra, Geometry, Trigonometry; Chemistry or Physics
	Biomedical Computing, Diagnostic Medical Sonography (Ultrasound), Medical Technology, Nuclear Medicine Technology, Physician Assistant	Algebra, Geometry, Trigonometry and Biology required for all programs. Chemistry or Physics recommended for Biomedical Computing, Nuclear Medicine Technology and Ultrasound programs. Chemistry required for Physician Assistant program.
	Undeclared Science Option <sup>2</sup> , Premedical Studies Predentistry, Preveterinary, Preoptometry <sup>4</sup>	Algebra, Geometry, Trigonometry, Biology, Chemistry and Physics are recommended.
	<b>Center for Imaging Science:</b> Imaging Science	Algebra, Geometry, Trigonometry and Chemistry required. Calculus and Physics desirable.

<sup>1</sup> Students attending high schools in New York State should note that Algebra, Geometry and Trigonometry are the equivalent of Mathematics Course I, II and III.

<sup>2</sup> A one-year program for students wishing to explore alternatives before selecting a specific degree program within this RIT college or school.

<sup>3</sup> A one-year program for students undecided on a major who wish to explore program options in one or more of RIT's colleges. Students receive special advising and complete a one-credit seminar covering the full range of academic programs offered at RIT.

<sup>4</sup> Students interested in premedicine, predentistry, preveterinary, preoptometry may select any major in the College of Science. An adviser will help you select the appropriate course work and counsel you on applying to professional schools.

## Transfer Admission Guidelines

College	Program at RIT	Co-op <sup>1</sup>	Entry Term	Appropriate Associate Degree Program	Transfer Course Recommendations without Associate Degree
Applied Science and Technology	<b>Computer Science:</b> Computer Science Software Engineering	1	Fall preferred	Computer Science, Engineering Science	Courses in computer science, calculus, liberal arts; calculus-based physics, chemistry or biology
	<b>Engineering Technology:</b> Civil Engineering Technology	1	Fall preferred	Civil, Construction, Environmental, Architectural, Transportation or Surveying Technology; Engineering Science	Courses in mathematics, science and engineering technology
	Computer Engineering Technology	1	Fall preferred	Computer Technology, Electrical or Electronic Technology or Computer Science	Courses in computer science, math, science and engineering technology
	Electrical Engineering Technology	1	Fall preferred	Electrical Technology, Electronic Technology, Engineering Science	Courses in mathematics, science and engineering technology
	Manufacturing Engineering Technology	1	Fall preferred	Manufacturing, Mechanical, Drafting and Design, Robotics or Electromechanical Technology; Engineering Science	Courses in mathematics, science and engineering technology
	Mechanical Engineering Technology	1	Fall preferred	Mechanical, Design and Drafting Technology, Air Conditioning or Electromechanical Technology; Engineering Science	Courses in mathematics, science and engineering technology
	Telecommunications Engineering Technology	1	Fall preferred	Telecommunications Technology, Electrical Technology or Electronic Technology; Engineering Science	Courses in mathematics, science and engineering technology
	<b>Food, Hotel and Travel Management:</b> Food Management Food Marketing & Distribution Hotel/Resort Management Nutrition Management Travel Management	1	Any quarter	Dietetics or Nutrition, Foodservice Management, Hotel/Resort Management, Travel/Tourism Management, Agriculture & Technology, Business and Liberal Arts will also transfer into each program.	Courses in business and economics, foreign language, math, science and liberal arts. Science courses are required for Nutrition Management program.
	<b>Information Technology:</b> Information Technology	1	Any quarter	Computer Applications, Computer Science	Courses in programming, computer applications, calculus, lab sciences, liberal arts
	<b>Packaging Science:</b> Management Option Technical Option Printing Option	1	Any quarter	Business Administration, Marketing, Management, Graphic Arts, Engineering Science, Liberal Arts with a math/science option.	Courses in business, mathematics, science, liberal arts, statistics or computer science
Business	Accounting	1	Any quarter	Accounting or AS degree in Business Administration	Courses in economics, accounting, liberal arts, science and mathematics
	Finance International Business Management Marketing	1	Any quarter	AS degree in Business Administration or Liberal Arts, (opportunity for two-year liberal arts graduates to enter a career-focused field).	Courses in economics, liberal arts, science and mathematics
	Information Systems	1	Any quarter	Data Processing/Management Information Systems or AS in Business Administration	Courses in liberal arts, math, science, economics and computer science
	Photographic Marketing Management	1	Any quarter	AS degree in Business Administration or Liberal Arts	Courses in liberal arts, math, science and economics
Engineering	Computer Engineering Electrical Engineering Industrial Engineering Mechanical Engineering Mechanical/Aerospace Option Mechanical/Environmental Option Microelectronic Engineering Software Engineering	1	Fall preferred	AS degree in Engineering Science (plus computer science electives for computer engineering and software engineering applicants)	Pre-engineering courses such as calculus, calculus-based physics, chemistry and liberal arts. Computer science courses for computer engineering and software engineering applicants.
	<b>Transfer Adjustment:</b> Electrical Engineering only		Summer only	AAS degree in Electrical Technology with one year of engineering calculus	
Imaging Arts and Sciences	<b>School of Art and Design:</b> Graphic Design Industrial Design Interior Design Illustration Medical Illustration Painting Printmaking	4	Fall only	Related programs or studio art experience in desired disciplines. A portfolio of original artwork is required to determine admissions, studio art credit and year level in the program.	Courses in studio art, art history and liberal arts. Portfolio of original artwork is required to determine admission, studio art credit and year level within the program.
	<b>Transfer Adjustment:</b> All Art and Design programs		Summer only	Summer courses can lead to third-year status (based on portfolio evaluation and academic record) in Graphic, Industrial and Interior Design; Illustration and Medical Illustration. Alternate summer courses can lead to second-year status in all programs.	
	<b>School for American Crafts:</b> Ceramics/Ceramic Sculpture, Glass, Metalcrafts/Jewelry, Weaving/Textile Design, Woodworking/Furniture Design	4	Fall only	Transfer as a third-year student is uncommon, as comparable programs are not generally available at other colleges. A portfolio of original artwork is required.	Courses in art history, studio art and liberal arts. Portfolio of original artwork is required to determine admission, studio art credit, and year level within the program.

<sup>1</sup> Cooperative Education: 1-required; 2-optional; 3-internship or practicum required; 4-no specific requirement.

College	Program at RIT	Co-op <sup>1</sup>	Entry Term	Appropriate Associate Degree Program	Transfer Course Recommendations without Associate Degree
<b>Imaging Arts and Sciences</b>	<b>School of Photographic Arts and Sciences:</b> Biomedical Photographic Communications	3	Fall preferred	No common program	Courses in biology, photography and liberal arts. Portfolio required for photo credit.
	Film/Video	2	Fall preferred	No common program	Courses in liberal arts, science, design, drawing and film or video. Portfolio required for film and video credit.
	Imaging and Photographic Technology	1	Fall preferred	No common program	Courses in college physics, mathematics, photography and liberal arts. Portfolio required for photo credit.
	Imaging Systems Management	3	Fall preferred	AS in Business Administration or Management, or AAS in Photography	Courses in business, economics and liberal arts.
	Advertising Photography, Fine Art Photography, Photojournalism	4	Fall preferred	Applied Photography. Portfolio required for photo credit.	Courses in liberal arts, photography, design and art history. Portfolio required for photo credit.
	<b>Transfer adjustment:</b> Available in all photography programs		Summer only	Transfer adjustment leading to second- or third-year status in most programs	
	<b>School of Printing Management and Sciences:</b> Newspaper Operations Management Printing Management	1	No summer entry	Transfer from associate degree programs considered on an individual basis	Courses in liberal arts, college math, physics and chemistry, business management and graphic arts
Printing and Applied Computer Science	1	No summer entry	Computer Science or transfer from other associate degree programs considered on an individual basis	Courses in chemistry, physics, calculus, computer science and liberal arts	
<b>Liberal Arts</b>	Criminal Justice	2 or 3	Any quarter	Criminal Justice, Human Services or Liberal Arts	Courses in criminal justice or related areas, liberal arts, math and science
	Economics	2	Any quarter	AS degree in Business Administration or Liberal Arts	Courses in business, liberal arts, math, science and computer science
	Professional and Technical Communication	1	Any quarter	Liberal arts with emphasis in communication and a technical field such as business, photography or computer science	Courses in liberal arts, math, science and computer science
	Psychology	1 or 3	Any quarter	Liberal Arts with science or social science	Courses in liberal arts, sciences, social sciences.
	Social Work	3	Any quarter	Human Services or Liberal Arts with Human Services minor	Courses in liberal arts, math and science
<b>NTID<sup>2</sup></b>	Business, Science and Engineering, and Visual Communications programs for deaf and hard-of-hearing students; Educational Interpreting program for hearing students			Refer to RIT Undergraduate Bulletin for requirements.	Refer to RIT Undergraduate Bulletin for requirements.
	Applied Arts and Science	2	Any quarter	Transfer from associate degree programs considered on an individual basis.	Courses in liberal arts, sciences and math
<b>Professional Studies</b>	Environmental Management	1	Any quarter	Biology, Chemistry or Environmental Sciences; Business or Public Administration; Liberal Arts with math, science or environmental options	Math through Calculus I, micro and macro economics, introductory courses in biology, chemistry and physics
	Biology	2	Fall preferred	Biology or Liberal Arts with biology option	Courses in liberal arts, sciences or math
<b>Science<sup>3</sup></b>	Biomedical Computing	2	Fall preferred	Computer Science, Liberal Arts with biology option or General Science	Courses in liberal arts, sciences, math and computer science
	Biotechnology	2	Fall preferred	Biotechnology or Liberal Arts with biology	Courses in liberal arts, sciences and math
	Biochemistry, Chemistry, Polymer Chemistry	2	Any quarter	Liberal Arts with chemistry option; Chemical Technology, Laboratory Technology	Courses in liberal arts, chemistry, math and physics
	Applied Mathematics Computational Mathematics Applied Statistics	2	Any quarter	Liberal Arts with math/science option, Computer Science, Engineering Science, Sciences	Courses in math, computer science and liberal arts
	Physics	2	Fall preferred	Liberal Arts with math/science option	Liberal arts, physics, math, chemistry
	Medical Technology	3	Fall preferred	Medical Laboratory Technology; Liberal Arts with biology option	Courses in liberal arts, sciences and math
	Nuclear Medicine Technology Diagnostic Medical Sonography	3	Fall preferred	Liberal Arts with science option; Allied Health; Radiologic Technology	Courses in liberal arts, sciences and math
	Physician Assistant	3	Fall only	Liberal Arts with science option; Allied Health; Radiologic Technology	Courses in liberal arts, sciences and math
	<b>Center for Imaging Science:</b> Imaging Science	2	Fall preferred	No common program available	Courses in calculus or higher mathematics, college chemistry, calculus-based physics and liberal arts

<sup>1</sup> Cooperative Education: 1-required; 2-optional; 3-Internship or practicum required; 4-no specific requirement.

<sup>2</sup> For more information about transferring into one of NTID's programs, contact NTID's Department of Recruitment and Admissions, 716-475-6700 (voice/TTY).

<sup>3</sup> Students interested in premedicine, predentistry or preveterinary may select any major in the College of Science. An adviser will assist in selecting appropriate course work.

# Expenses and Financial Aid

## Costs and Payment Procedures: Matriculated Day College Students

Charges for tuition, fees, room and board are computed on a quarterly basis. Quarterly bills are mailed approximately four weeks before the beginning of the quarter. Payment sent by mail should be made by check, payable to Rochester Institute of Technology. Due dates for the 1996-97 school year are as follows:

<b>Fall Quarter</b>	<b>August 21, 1996</b>
<b>Winter Quarter</b>	<b>November 21, 1996</b>
<b>Spring Quarter</b>	<b>February 20, 1997</b>
<b>Summer Quarter</b>	<b>May 29, 1997</b>

Students who have not participated in the early registration process for the quarter must first attend Open Registration to register for their courses. Payment of the quarterly charges (tuition, fees, room, and board) is due at the time of registration. Students may pay the quarterly charges in a single payment at registration or by the partial payment plan. Partial payments are due twice per quarter: 50 percent (plus a \$25 processing fee) at registration and the remainder by the end of the fourth week of classes.

Students whose college costs are paid by the G.I. Benefit Plan or their employer are required to submit the properly authorized deferment form. Quarterly bills will be mailed to the student's permanent address.

A late payment fee will be charged to all student accounts that become past due. This includes, but is not limited to, the deferred payment plan and company deferred payment plan.

### Tuition assessment policies

1. Matriculated Day College students are charged the day rate for ALL courses taken, including Evening Division courses and courses taken while on co-op.
2. Students on co-op will not be charged tuition for those quarters unless they are also enrolled in classes.
3. Non-matriculated students are charged for the type of course taken (evening rate for Evening Division courses; day rate for day courses; graduate rate for graduate courses).
4. Students taking courses during Summer Quarter should refer to the Summer Quarter Bulletin for policies and procedures.

### Other fees

In addition to the fees specified below, certain groups of students may incur other fees, as follows:

<b>Orientation fee</b>	\$40
(one-time charge for new students)	
<b>Quarterly photo facilities fee</b>	\$98
(charged to all full-time photo students; \$49 per quarter charged to all part-time photo students)	

### Costs for books and supplies

These costs vary widely with the program followed and, to some extent, the electives chosen. In programs with minimal expenses (e.g., liberal arts, business, hospitality), books and supplies will average \$600 annually; in the arts and crafts, costs may range from \$800-\$1,000; and in photographic illustration, a realistic allowance is \$2,000 per year in addition to cameras.

## FEE SCHEDULE 1996-97 (MATRICULATED DAY COLLEGE STUDENTS EXCEPT NTID) \*

	<u>Per Quarter</u>	<u>Per Year— 3 Quarters</u>
<b>Tuition</b>		
Full-time Undergraduate (12-18 Credit Hrs.)	\$5,125	\$15,375
Part-time Undergraduate (Less than 12 Credit Hrs.)	367/Cr. Hr.	367/Cr. Hr.
<b>Student Activities Fee (Mandatory Charge)</b>		
Full-time Undergraduate	42	126
Part-time Undergraduate	19	57
<b>Student Health Fee (Mandatory Charge)</b>		
Full-time Undergraduate	50	150
<b>Residence Hall Room Charges †</b>		
Double Occupancy	1,106	3,318
Single Occupancy	1,275	3,825
<b>Board/Meal Plans ‡</b>		
20 Meals per Week	966	2,898
Any 14 Meals (Includes \$60 debit each qtr.)	939	2,817
Any 12 Meals (Includes \$100 debit each qtr.)	939	2,817
Any 10 Meals (Includes \$140 debit each qtr.)	939	2,817

\* See page 132

† Additional single-occupancy rates are available depending on square footage of rooms.

‡ Additional meal plans are also available providing for different meal and debit account amounts. Information can be obtained from RIT Food Service upon request.

**Student sickness insurance plan**

A charge of \$224.00 is assessed Fall Quarter to all full-time students who have no other medical insurance and have not signed a waiver option.

**Monthly payment plan**

For the 1996-97 academic year, RIT will offer a monthly payment plan. This combines the elements of a prepayment and deferred payment plan. For further information, contact the Bursar's Office at 716-475-6059.

**Vocational Rehabilitation**

1. Students receiving Vocational Rehabilitation (VR) support for fees and tuition must file authorization with RIT's VR billing supervisor before registration. If authorization has not been received before registration, students must either obtain from their VR counselors a letter of commitment stating the dollar amount that is authorized and present it to the VR billing supervisor or be prepared to pay for the charges in question. If authorization is received after a student has paid the charges, he or she will receive a refund.
2. Students must pay all charges not paid by VR before the quarterly due date.
3. VR counselors should specify each charge that they are covering on their authorization forms.
4. Clarification of VR authorization and/or billing procedures should be addressed to:  
Rochester Institute of Technology  
NTID/VR Supervisor  
Bursar's Office  
25 Lomb Memorial Drive  
Rochester, N.Y. 14623-5603

NTID students receiving monthly Social Security benefits can make arrangements to pay at the Bursar's office. Students need to sign a promissory note quarterly with the Bursar's office. For additional information, call 716-475-2080 (voice/TTY) or 716-475-5489 (voice/TTY).

**Financial standing**

Students, former students, and graduates are in good financial standing when their account is paid in full in the Bursar's Office. Those whose account is not paid in full will not receive transcripts, diplomas, or other forms of recognition or recommendation from the Institute.

THE INSTITUTE RESERVES THE RIGHT TO CHANGE ITS PRICES AND PRICING POLICIES WITHOUT PRIOR NOTICE.

## Costs and Payment Procedures: Evening Division Students

Charges at RIT are computed on a quarterly basis. Quarterly bills are mailed approximately four weeks before the beginning of each quarter. Payments sent by mail should be made by check, payable to Rochester Institute of Technology. Registration and billing procedures are published each quarter in the "Schedule of Courses." Due dates for the 1996-97 school year are as follows:

<b>Fall Quarter</b>	<b>August 21, 1996</b>
<b>Winter Quarter</b>	<b>November 21, 1996</b>
<b>Spring Quarter</b>	<b>February 20, 1997</b>
<b>Summer Quarter</b>	<b>May 29, 1997</b>

**FEE SCHEDULE (Matriculated Evening Division students)****Tuition—Undergraduate**

<b>Upper level</b>	<b>\$242/Credit Hour</b>
(Courses in 400, 500, 600 series)	
<b>Lower level</b>	<b>\$221/Credit Hour</b>
(Courses in 100, 200, 300 series)	

**Other fees**

Some courses require additional charges to cover laboratory, studio, or supply fees. (Consult the registrar's quarterly schedule for those courses with additional fees.)

**Tuition assessment policies**

1. Matriculated students are assessed the tuition rate associated with their program, regardless of the courses taken.
2. Non-matriculated students are assessed tuition consistent with the program(s) in which their course(s) are offered.
3. Students taking courses during Summer Quarter should refer to the Summer Quarter Bulletin for policies and procedures.

## Refund Policies

The acceptable reasons for withdrawal with *full refund* during the quarter are:

1. Active military service: A student called to active military service during the first eight weeks of the term may receive a full tuition refund. If called after the eighth week, he or she may elect to complete the course by making special arrangements with both the instructor and department or may withdraw and receive a full tuition refund. If he or she withdraws, the course must be repeated at a later date.
2. Academic reasons: Students sometimes register before grades for the previous quarter are available. If such a student later finds that he or she is subject to academic suspension, or has failed prerequisites, the student will be given a full refund upon withdrawal.
3. If part-time students drop a course during the official drop/add period (first six days of classes in any quarter), they may contact the Bursar's Office for a full refund for the course dropped.

A full-time student must officially withdraw from all courses or take a leave of absence from the Institute in order to be eligible for a *partial tuition refund*. Students must complete a leave of absence or withdrawal which can be initiated with their academic department. A partial refund will be made during a quarter if withdrawal/leave of absence is necessitated for one of the following reasons:

1. Illness, certified by the attending physician, causing excessive absence from classes
2. Withdrawal for academic reasons at the request of the Institute during a quarter.
3. Transfer by employer, making class attendance impossible.
4. Withdrawal for academic or personal reasons at the request of the student, approved by the student's adviser or department representative, the Institute coordinator of academic advising, and the bursar.

**Partial refund schedule: Tuition**

Partial refunds will be made according to the following withdrawal schedule and percentage of tuition reduction:

During official drop/add period (first six days of classes)—100 percent tuition reduction

From the end of the official drop/add period through the end of the second week of classes—70 percent tuition reduction

During the third week of classes—60 percent tuition reduction

During the fourth week of classes—50 percent tuition reduction

During the fifth week of classes—25 percent tuition reduction

Sixth and subsequent weeks—no tuition reduction

**NOTE: NON-ATTENDANCE DOES NOT CONSTITUTE AN OFFICIAL WITHDRAWAL.**

A student is not “officially withdrawn” until he or she receives a copy of the withdrawal form. The date on which a withdrawal form is properly completed will be the date of “official withdrawal” used to determine the refundable amount.

If the student drops his or her course load from full-time (12 or more credits) to part-time (less than 12 credits) status during the official drop/add period, he or she may contact the Bursar’s Office for a refund based on the difference between the full-time tuition charge and the total per-credit charge for the part-time load.

No refund will be made for classes dropped after the official drop/add period unless the student is officially withdrawing from the Institute.

Advance deposits and fees are not refundable.

All students in their first quarter of attendance who are receiving Title IV federal financial aid funds are eligible for tuition, fee, room and board prorations through the end of the sixth week of classes.

If institutional charges are reduced due to withdrawals, financial aid programs are reimbursed before a cash refund is issued to the student. The student is also responsible for any unpaid balance at the time of withdrawal. Aid programs are reimbursed in the following sequence: Federal Direct Loans, Perkins Loans, Federal Pell Grants, Federal SEOG, other financial aid, state aid, institutional aid. If a credit balance still remains, the student is then issued a refund.

For further information or comments regarding refund policies and specific withdrawal dates, contact the Bursar’s Office.

**Appeals process**

An official appeals process exists for those who feel that individual circumstances warrant exceptions from published policy. The inquiry in this process should be made to Richard B. Schonblom, director of Bursar and Payroll Services.

**Room and board\***

To complete a withdrawal from RIT, a resident student or a nonresident student on a meal plan must check out with the Center for Residence Life and/or Food Service. Refunds, when granted, are from the date of official check-out.

**Partial refund schedule:****Room**

1. During the first week of classes—90 percent of unused room charge
2. During the second week of classes—75 percent of unused room charge
3. During the third week of classes—60 percent of unused room charge

4. During the fourth week of classes—50 percent of unused room charge
5. Fifth and subsequent weeks—no refund

**Board**

Any student who intentionally defrauds or attempts to defraud the Institute of tuition, fees or other charges, or who gives false information in order to obtain financial aid, is subject to legal liability, prosecution and Institute disciplinary action.

1. During the first four weeks —75 percent of unused room charge
2. After the first four weeks—50 percent of unused room charge
3. After the last two weeks—no refund

\* Room and board policies are established by the Center for Residence Life and Food Service.

## Financial Aid

We feel strongly that no qualified student should refuse to consider RIT because of cost. With this in mind, RIT offers a full range of traditional financial aid programs and a number of innovative financing plans as well.

In 1995–96, approximately 70 percent of our full-time undergraduate students received financial aid awards from RIT. These students qualified for over \$76 million in financial assistance from federal, state and institutional sources. Many families also took advantage of RIT’s monthly, interest-free payment plan and a four-year prepayment plan that guarantees participants no increase in tuition (the RIT Tuition Prepayment Plan).

**Your financial need**

Eligibility for need-based financial aid at RIT begins with three basic requirements: graduation from high school or its equivalent, enrollment in a degree program, and the ability to demonstrate financial need.

Financial need is the difference between the cost of an education and the amount that a student and his or her family can afford to pay toward meeting that cost. Financial aid programs are designed to supplement family contributions. Attending college with assistance does not limit the student to a less expensive school that might not offer a program reflecting his or her educational interests.

A student’s financial need is determined by analysis of the Free Application for Federal Student Aid (FAFSA). The FAFSA is available through high school guidance offices or college financial aid offices. Continuing students may obtain the required form from the Office of Financial Aid.

**The process of applying for aid should begin during the month of January in the the year the student wishes to enroll.** In order to receive full consideration, it is vitally important that the FAFSA is filed by March 15. Applications received after March 15 receive secondary consideration because funds are limited. Therefore, students should file the form as soon after January 1 as possible. For transfer students, RIT also requires a financial aid transcript from each college attended.

To be awarded financial aid, individuals must be admitted as matriculated students. Most financial aid programs require at least half-time enrollment. Students must reapply for aid each year by completing the FAFSA. Every effort is made to continue financial assistance to students each year, provided they remain in good academic standing and maintain satisfactory progress, file the required applications by the recommended deadline, and demonstrate continued financial need.

First-year and transfer students may expect notification of financial aid awards beginning in March; returning upper-class students may expect award notification beginning in May.

Students are encouraged to apply for financial aid. Students and their families should not try to decide by themselves if they qualify; that decision should be left to the Student Financial Aid Office and other agencies to which students have applied. Denial of aid from one or more sources does **not** necessarily mean that students will be denied aid by all sources. Students are urged to pursue all available sources of financial aid.

### Types of aid

At RIT there are five general categories of financial aid: scholarships, grants, entitlements, loans and employment. An applicant for financial aid is considered for each of these categories.

- **Scholarships** are generally awarded on the basis of academic record and financial need. RIT awards many such scholarships each year. Other typical scholarship sources are competitions, corporations, private donors, foundations, fraternal organizations, unions, and local and state governments.  
**RIT offers academic merit scholarships through annual Outstanding Freshman Scholarship and Outstanding Transfer Scholarship programs.** Winners are chosen on the basis of their academic record, recommendations, extracurricular activities and requirements for their intended major. Please contact the Admissions Office for more details on either program.
- **Grants** are gifts of financial assistance that are awarded on the basis of demonstrated need. RIT awards institutional grants that vary from \$100–\$10,000 for the academic year. RIT also awards grants under the federally funded Supplemental Education Opportunity Grant (SEOG) program. The Federal Pell Grant and New York Assistance Program (TAP) are additional examples of grants. Many other states offer state grants, as well.
- **Entitlements** are a special type of grant. They are funded by state and federal governments. Eligibility for entitlements can be based on special characteristics of a recipient. Examples of entitlements based on special student qualifications are the G.I. Bill and vocational rehabilitation benefits. Entitlements need not be repaid.
- **Loans** are a lien on future earnings. The money you receive on loan is a formal financial obligation that must be repaid. You need to be aware of the interest charges, the method of payment after graduation and the effect that loans will have on your ability to meet all of your later financial obligations. Student loans are generally not repaid until after graduation or termination of study.

Many students will utilize the Federal Direct Loan or the Unsubsidized Federal Direct Loan in meeting their costs. RIT also awards Federal Perkins Loans. These programs are administered by colleges for eligible students as part of financial aid awards.

Parents are also eligible to participate in several educational loan programs designed to enhance funds available for college expenses. Federal PLUS Loans are available to supplement other aid programs in meeting educational costs. While this parent loan is not based on need, the amount borrowed in any year cannot exceed educational costs minus other financial aid received.

RIT has also developed some special loan programs to assist families in meeting educational expenses. RIT loan plans are available to both parents and students, using variable or fixed rates of interest. Information is available from the Office of Financial Aid.

- **Employment** opportunities are also available to assist RIT students in meeting college expenses. Whether or not students seek financial aid, they may choose to defray some of their expenses through student employment while attending the Institute.

As part of a financial aid award at RIT, students may be offered employment in the Federal Work-Study program. Over 3,000 students were employed on campus in 1995.

The Student Employment Office also helped a number of students secure part-time employment off campus.

**Full-time salaried employment through RIT's cooperative education program can also contribute to meeting college expenses.** RIT students on co-op earned in excess of \$14 million from employment last year. Students are encouraged to contact the Office of Cooperative Education for additional salary data.

- **NTID Grant-in-Aid**  
Federal Grant-in-Aid funds, awarded on the basis of financial need, are an important source of financial aid for deaf students who do not have adequate financial resources from the sum of their parental and personal contributions and assistance from outside agencies to cover educational costs.

### Payment plans

The RIT Monthly Payment Plan combines the elements of a deferred payment plan and a prepayment plan to allow students and their families to finance educational costs over a 10-month period with **no interest or finance charges**. Participating families make their first payment by July 1 preceding the academic year in which it would be utilized. Fixed costs include: tuition, fees, residence hall charges and RIT meal plans. Dormitory residents must contract for a meal plan. Rental charges incurred for RIT apartments or with private landlords cannot be financed through the plan. The enrollment deposit required of all new undergraduates and the advance housing deposit, required of returning students, will be credited against annual charges. Approved financial aid may also be deducted from student charges to reduce the amount financed through the plan.

Additional information, as well as applications for the monthly payment plan, may be obtained from the Bursar's Office.

RIT also offers a Tuition Prepayment Plan for two, three or four years of tuition costs. Families who borrow under the Prepayment Plan are guaranteed no tuition increases for the years covered by the loan. Borrowers may take up to 10 years to repay the loan. Information is available from the Office of Financial Aid or the Bursar's Office.

NTID-sponsored students may contact the NTID/VR Billing Department at 716-475-2080 or 716-475-5489 (voice) or 716-475-2960 (TTY) for more information about payment options.

## Academic Progress Requirements for State Aid Programs

### New York State Tuition Assistance Program (TAP)

In order to receive a Tuition Assistance Program grant, an individual must be admitted as a full-time matriculated student, meet New York State residency and income requirements, must pursue the program of study in which he or she is enrolled, and must make satisfactory progress toward completion of his or her program of study. The three tables on page 342 list the approved standards of satisfactory progress for associate, bachelor and graduate degrees, respectively.

In addition to accruing degree credits and earning a minimum grade point average as specified in the tables on page 342, TAP recipients must:

Complete 6 credits per quarter to receive TAP payments 2–4

Complete 9 credits per quarter to receive TAP payments 5–7

Complete 12 credits per quarter to receive TAP payments 8–12.

Completion of a course is defined as meeting course requirements and receiving a letter grade of A, B, C, D or F.

State regulations mandate that if a student repeats a course in which a passing grade acceptable to the institution was previously received, the repeated course does not count toward the minimum 12 credit hour course load required for TAP and other state programs.

### Waiver of academic progress standards for TAP

Students who have been denied Tuition Assistance Program benefits due to failure to maintain satisfactory standards of academic progress may *request* a one-term waiver of those standards. State regulations require that these waivers be granted only under extraordinary circumstances. Accordingly, waivers are normally granted for the reasons listed below. Students failing to meet satisfactory progress standards will be given the opportunity to contact an institutional representative in the Office of Financial Aid to discuss their situation. The institutional representative will require documentation as appropriate and establish deadlines for submission of this documentation.

Under the regulations established by the Commissioner of Education, the decision of the institutional representative will be final. Students, who in the judgment of the institutional representative, satisfactorily meet the criteria for the waiver may have one waiver at the undergraduate level. One waiver also may be granted at the graduate level. Those wishing to apply for waivers must do so during the quarter in which notification of TAP denial was sent.

Reasons for which a waiver may be granted include the following:

1. Verifiable physical/mental illness of the student or member of the student's immediate family during the quarter in which academic standards were not met
2. Death of a member of the student's family during the quarter in which standards were not met
3. Divorce/separation within the student's immediate family creating a demonstrable financial/emotional disruption sufficient to affect progress
4. Students may submit waiver applications for circumstances that the student feels were extenuating. Applicants must explain why circumstances were extenuating and beyond their control.

## Academic Progress Requirements for Federal Aid Programs

Federal regulations require financial aid recipients to maintain minimum standards of satisfactory academic progress for receipt of federally sponsored aid. All students receiving federal assistance must maintain matriculated status in a degree program. Regulations require a maximum time frame for degree completion, a quantitative measurement (credits earned toward a degree), and a qualitative measurement (cumulative grade point average). The annual review of academic progress considers all terms of enrollment, including terms in which no federal aid was received.

Full-time students who have never attended another college are allowed a maximum of six academic years (18 full-time academic quarters) to attain the bachelor's degree. Those pursuing associate degrees are allowed three academic years (9 academic quarters) for degree completion.

Students enrolled in eligible certificate or diploma programs in colleges other than NTID must complete credit hours on a full-time equivalent basis. Certificate/diploma program students are allowed a maximum of 150 percent of the published number of quarters required to complete their program.

Academic progress is reviewed at the end of Spring Quarter each year and includes a review of cumulative grade point average and degree credits completed. Minimum cumulative grade point average standards for full- and part-time students in RIT or NTID programs are as follows:

Completion of:

First Quarter—Minimum Cumulative GPA = 1.0

Second Quarter—Minimum Cumulative GPA = 1.2

Third Quarter—Minimum Cumulative GPA = 1.4

Fourth Quarter—Minimum Cumulative GPA = 1.6

Fifth Quarter—Minimum Cumulative GPA = 1.8

Quarters 6–18—Minimum Cumulative GPA = 2.0

Full-time students in colleges other than NTID are expected to complete 30 degree credits every three academic quarters as detailed below:

Completion of:

First Academic Year (3 Academic Qtrs.)—  
30 degree credits required

Second Academic Year (6 Academic Qtrs.)—  
60 degree credits required

Third Academic Year (9 Academic Qtrs.)—  
90 degree credits required

Fourth Academic Year (12 Academic Qtrs.)—  
120 degree credits required

Fifth Academic Year (15 Academic Qtrs.)—  
150 degree credits required

Sixth Academic Year (18 Academic Qtrs.)—  
180 degree credits required

Part-time students must accumulate credit hours on a full-time equivalent basis.

Students enrolled in certificate, diploma or associate degree programs at NTID must meet the same grade point average standards as are required for other RIT colleges. However, for NTID programs, the qualitative standard is based on successful completion of 66 percent of annual credit hours attempted. In addition, the maximum time frame for program completion is equal to attempting a maximum of 150 percent of the published credit hours required for a particular NTID certificate, diploma or degree.

The federal standards of satisfactory academic progress listed below are applicable to the following aid programs: Federal Work-Study, Federal Pell Grants, Federal SEOG Grants, Federal Perkins Loans, Federal Direct Loans, Federal Direct Unsubsidized Loans and Federal Direct PLUS Loans.

Student loan recipients should also note that all Federal Direct Loan Programs have specific annual and cumulative maximum amounts. The loan limits are listed in the Undergraduate Financial Aid Programs 1996–97 chart (see page 344) and in the U.S. Department of Education “Student Guide.” Copies of the guide are available in RIT’s Office of Financial Aid.

#### Notification and appeal

Students whose academic progress is not in compliance with federal requirements will be notified of the deficiency and advised of the appeal process. Copies of the policy are available upon request.

## Academic Progress Requirements for RIT Financial Aid

Full-time students receiving RIT-sponsored grants and scholarships are expected to complete a sufficient number of academic credits during each quarter of enrollment to complete their baccalaureate degree requirements within a maximum of 14 academic quarters. The 14-quarter limit may be appealed. Quarters in which a student is enrolled in cooperative education and not receiving RIT-funded grants and scholarships are not counted towards the 14-academic-quarter limit.

Eligibility for RIT-sponsored grants and scholarships also requires that a student maintain a satisfactory cumulative grade point average. The minimum cumulative grade point averages used for RIT grant and scholarship eligibility are the same as those used for federal aid programs (see tables below). Academic progress is reviewed at the end of Spring Quarter each year.

Academic requirements and award duration for merit or special-purpose scholarship programs sponsored by RIT may differ from those used in RIT’s need-based programs. Recipients are advised of merit scholarship terms and conditions at the time awards are made.

### Standard of Satisfactory Progress for the Purpose of Determining Eligibility for New York State Student Aid\*

#### Associate Degree—Quarter System

Before being certified for this payment	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
a student must have accrued at least this many credits	0	3	9	20	32	44	56	68	80
with at least this grade point average	0	.50	.75	1.00	1.20	1.30	2.00	2.00	2.00

#### Bachelor Degree—Quarter System†

Before being certified for this payment	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th
a student must have accrued at least this many credits	0	3	9	20	32	44	56	68	80	92	104	116	132	148	164
with at least this grade point average	0	.50	.75	1.00	1.20	1.30	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

†Only students in the HEOP program at RIT are eligible for more than 12 quarters of undergraduate awards.

#### Graduate Degree—Quarter System

Before being certified for this payment	1st	2nd	3rd	4th	5th	6th
a student must have accrued at least this many credits	0	12	24	36	48	60
with at least this grade point average	0	2.00	2.50	2.70	2.80	2.90

\*Information correct as of July 1996

## Additional Eligibility Requirements

### Transfer students

Cumulative grade point average requirements are the same as for non-transfer students (i.e., students must obtain a 2.0 GPA at the end of six academic quarters). Transfer students also are expected to accumulate 30 degree credits for each three-quarter academic year. However, the maximum number of quarters allowed for full-time students to accumulate remaining degree credits may be reduced. For every 10 credits, or fraction thereof, granted as transfer credit by RIT, the maximum number of quarters to accumulate remaining degree credits is reduced by one. For example, a student transferring from another college and granted 30 transfer credits would have 15 rather than 18 quarters to accumulate remaining degree credits; the same student transferring to an associate degree program would be allowed six rather than nine quarters to complete the degree. The calculations used in the reduction in maximum quarters allowed for degree completion apply to both federal aid programs (18 academic quarters maximum) and RIT-sponsored awards (14 academic quarters maximum).

### Part-time students

Students registering for 6 to 11.5 credits per quarter and receiving federal financial assistance must meet the same grade point average requirements as full-time students (i.e., attainment of a 2.0 GPA after six academic quarters). The established time frame for part-time students is 12 academic years (36 half-time quarters) for completion of bachelor's degree requirements. Associate degree candidates are allowed six academic years (18 half-time quarters) for degree completion. At the end of each three-quarter academic year, 15 credits must be accumulated toward the degree. Quarters in which a student is registered for less than six credit hours will be counted on a prorated basis toward the maximum time frame.

### Student responsibilities

Recipients of financial aid are responsible for reporting any significant changes in their financial situation during the year to the director of Financial Aid, who will review and may revise the applicant's financial aid accordingly.

New students should begin the process of applying for aid during the month of January. In order to receive full consideration, it is recommended that your FAFSA be submitted by March 15 prior to the fall quarter of your entrance. Applications received after March 15 are considered as long as funds remain available. We suggest that new students file application forms as soon after January 1 as possible.

## Financial Aid Refund Policy

According to the Federal Refund Formula, if institutional charges are reduced due to withdrawal or leave of absence, RIT must determine the percentage of total institutional charges that are eligible for financial aid payment. This is equal to total institutional charges for tuition, fees, room and board times the percentage of tuition retained by the bursar in accordance with the RIT Tuition Refund Schedule. Any unpaid balance is subtracted from the amount of charges that are eligible for financial aid payment.

The percentage of institutional charges actually retained by RIT will not normally coincide with the percentage of charges which are eligible for financial aid payment. This is because institutional fees are not normally refundable, and room and board charges are adjusted using a formula that differs from the schedule of tuition refunds.

For example, a student might incur total quarterly charges of \$6946 (\$4890 tuition, \$90 fees, \$1966 room and board). If \$6,000 of these charges were paid from financial aid, the student's expected payment would be \$946. If the student withdrew in the fourth week and received a 50 percent tuition reduction equal to \$2445, and no reduction in room, board or fee charges, the revised amount of financial aid eligibility would equal  $\$6946 \times 50\% = \$3473$ . If the student made no payment, \$946 would be subtracted from revised aid eligibility, leaving final aid eligibility at \$2527. Remaining aid disbursed (\$3473) would be returned to the aid programs.

Federal aid eligibility for undergraduate students who withdraw on or before the 60 percent point in time of their first quarter of enrollment is determined using a Federal pro-rata formula. Calculations are based on withdrawal within the first six weeks of a 10-week quarter. Percentage of charges eligible for aid is 0 percent (first week), 20 percent (second week), 30 percent (third week), 40 percent (fourth week), 50 percent (fifth week) and 60 percent (sixth week). Under pro-rata, unpaid charges are subtracted from the amount of financial aid returned to the financial aid programs. A first-quarter undergraduate who withdraws in the fourth week would have 40 percent of institutional charges eligible for aid payment. Unpaid charges would be subtracted from the amount returned to the aid programs. In this example, the amount returned to the aid programs would be equal to  $\$6946 \times 60\%$  minus unpaid charges ( $\$946$ ) = \$3221.60

Under both the federal and pro-rata calculations, aid programs are reimbursed in the following sequence: Federal Direct Loans, Federal Perkins Loans, Federal Pell, Federal SEOG, other financial aid, state aid, private scholarships and institutional aid. If a credit balance remains, the student is issued a refund.

### Late disbursement

If the student is otherwise eligible, the first disbursement of Federal Direct Loan or Federal Direct Unsubsidized Loan proceeds is allowed up to 60 days after the student has ceased to be enrolled. Subsequent disbursements are not allowed. First-year students who withdraw during the first 30 days of the loan period are not eligible.

### State scholarships

Regulations vary. Any adjustments are done in accordance with the specific requirements of the sponsoring state.

### Privately funded grants and scholarships

In the absence of specific instructions, 100 percent of the quarterly award will be credited to the student's account.

### RIT grants and scholarships

If a credit balance remains after all federal, state and private adjustments, a percentage of the remaining credit balance is returned to the RIT scholarship account according to the following formula:

$$\begin{array}{l} \text{Remaining Credit} \times \text{Scholarship} = \text{Amount Returned} \\ \text{Balance} \qquad \qquad \text{Scholarship Plus} \qquad \text{to Scholarship} \\ \qquad \qquad \qquad \text{Student Payments} \qquad \text{Program} \end{array}$$

# UNDERGRADUATE FINANCIAL AID PROGRAMS 1996–97\*

RIT FINANCIAL AID	WHO IS ELIGIBLE ?	CRITERIA FOR SELECTION	HOW MUCH ? †	HOW AND WHEN TO APPLY
RIT Alumni Scholarships and RIT Grants	Full-time students who demonstrate financial need	Awards based on academic record and financial need.	Amounts vary depending on student's financial need.	File Federal FAFSA by priority deadline. ‡
Presidential Scholarships Quality Cup Scholarships SAE Scholarships National Merit Scholarships Portfolio Scholarships	Prospective freshmen who apply for admission by February 1 and meet selection criteria.	Awards based on academic record, recommendations, activities and requirements for intended major. Awards are not dependent upon financial need.	Amounts range from \$1,000 to \$6,500 per academic year. Awards are based on three quarters of full-time study per academic year and are renewable with a GPA of 3.0 or higher.	Must apply for admission to RIT by February 1 to be considered.
RIT Outstanding Transfer Scholarships	Third-year transfer applicants who apply for admission by February 15 and meet selection criteria.	Awards based on academic record, recommendations, activities and requirements for intended major.	Amounts vary up to one-half tuition. Awards are renewable with GPA of 3.0 (B) or higher.	Must apply for admission to RIT by February 15 to be considered for Outstanding Transfer Scholarship Program.
RIT-Urban League, Ibero/PYRD and Minority Transfer Scholarship Programs	Awarded to African American, Hispanic or Native American students meeting selection criteria.	Applicants must demonstrate financial need, academic achievement and leadership potential.	\$2,500 per academic year for full-time study. Renewable.	File Federal FAFSA by priority deadline.
RIT Phi Theta Kappa Scholarships	Transfer students elected to Phi Theta Kappa at previous college.	Must document Phi Theta Kappa membership.	\$1,000 per academic year for full-time study. Renewable with GPA of 3.0 (B) or higher.	Contact RIT Admissions Office for scholarship information.
RIT Endowed Scholarships	Full-time RIT students meeting selection criteria.	Selection criteria established by the donor for each program. Most awarded to upperclassmen based on financial need and academic performance at RIT.	Amounts vary.	File Federal FAFSA by priority deadline.
RIT Nathaniel Rochester Society (NRS) Scholarships	Awarded to RIT upperclassmen with high academic achievement.	Winners selected from second-year students enrolled full-time who have completed minimum 60 credit hours at RIT with a GPA of 3.4 or higher. Winners selected by NRS Scholarship Committee.	\$750 for junior year of study (3 academic quarters). \$900 for senior year of study (3 academic quarters).	Contact NRS Scholarship Committee through Dean's Office in each RIT college. File scholarship application in March.
NTID Grant-in-Aid	Full-time students enrolling in RIT's National Technical Institute for the Deaf (NTID).	Must demonstrate financial need due to insufficient support from outside sources.	Minimum award is \$100; maximum award varies.	File Federal FAFSA by priority deadline.
RIT-NY State Higher Education Opportunity Program (HEOP)	Must be a NYS resident, attend a NYS college sponsoring the program and meet opportunity program guidelines.	Must meet economic and educational eligibility criteria of the program. Contact RIT HEOP Office at 716-475-2221.	HEOP awards are based on individual need and available funding; undergraduates only.	Students must be accepted to RIT through HEOP. Must file FAFSA form.
RIT/ROTC Room Subsidy	Army, Air Force and Navy ROTC cadets. Awarded three- or four-year scholarships prior to enrollment.	Must be an ROTC Scholarship cadet and reside in RIT campus residence hall.	Normally \$2,000 per year. Holders of three-year ROTC scholarships become eligible in sophomore year.	File Federal FAFSA by priority deadline.
RIT/ROTC Tuition Subsidy	Holders of Air Force or Army scholarships. Awarded prior to enrollment.	Students must have a Type II or Type III scholarship.	Normally 20 percent of tuition.	File Federal FAFSA by priority deadline.
RIT Employment Program	All students enrolled at least half time in a degree program.	No financial need requirement. Hiring criteria may vary by position.	Varies, depending on hours worked and wage rate.	Contact RIT Student Employment Office.
RIT College of Continuing Education (CCE) Scholarship	Enrolled in CCE course work as a full-time or part-time student.	Financial need and academic record considered.	Varies.	Request scholarship application from CCE Office, 716 475-2234.
RIT Part-time Studies Scholarship	Matriculated or nonmatriculated students registered for 2–11 credits each term in an undergraduate program.	Need considered, but no fixed income maximum.	10–50% of tuition charged. (Part-time Scholarship plus other grants cannot exceed 50% of tuition.)	Submit RIT Part-time Student Financial Aid Application.
Aid for Part-time Studies (NY State Funded)	Matriculated undergraduates registered for 6–11 credits per term.	Financial need (based on taxable income as defined in current guidelines) and availability of	\$2,000 maximum per academic year. Funding dependent upon state allocation.	Submit Aid for Part-time Studies Application to RIT Financial Aid Office.

\* Information correct as of June 1996

† Scholarship amounts indicated are based on RIT tuition rates. Awards may be prorated for NTID-sponsored students.

‡ Priority deadline is March 15 for new students and April 1 for continuing students. Filing by these deadlines will ensure priority consideration for all RIT programs. Applications filed after this date will receive consideration as long as funds are available.

FEDERAL FINANCIAL AID PROGRAMS*	WHO IS ELIGIBLE ?	CRITERIA FOR SELECTION	HOW MUCH ?	HOW AND WHEN TO APPLY
Federal Pell Grant	Undergraduate students who are pursuing their first bachelor's degree and meet federal need criteria.	An expected family contribution that qualifies the student for an award, as determined by a system approved by Congress.	Awards may range from \$400 to \$2,470, depending on the cost of attendance and the amount of money appropriated in the federal budget.	Must file the Free Application for Federal Student Aid. Forms available at financial aid offices and high school guidance departments.
Federal Supplemental Educational Opportunity Grant (FSEOG)	Undergraduate students who are pursuing their first bachelor's degree, and meet federal need criteria.	Students with high financial need. (Normally those who qualify for Federal Pell Grant.)	\$100 to \$4,000 per year.	Must file the Free Application for Federal Student Aid (FAFSA).
Federal Perkins Loan	College students who meet financial need requirements established by the federal government.	An expected family contribution that qualifies the student for an award, as determined by a system approved by Congress.	Up to \$3,000 per year. (\$15,000 limit for undergraduate study.)	File the Free Application for Federal Student Aid (FAFSA).
Federal Work-Study Program	College students in full-time and part-time degree programs with financial need. Most jobs provided through departments on campus.	An expected family contribution that qualifies the student for an award, as determined by a system approved by Congress.	Varies, depending on hours and wage rate. RIT wage scale begins at \$4.89/hour.	File the Free Application for Federal Student Aid (FAFSA).
Federal Direct Loan Program (1) Subsidized  (2) Unsubsidized	(1) Subsidized Federal Direct Loans are based on demonstrated need. Federal government pays the interest while you attend school on at least a half-time basis and for six months afterward (grace period). (2) Unsubsidized Federal Direct Loans are available to those unable to demonstrate need, but accumulate interest during periods of enrollment.	An expected family contribution that qualifies the student for an award, as determined by a systems approved by Congress.	Undergraduates limited to \$2,625 for first year, \$3,500 for second year, \$5,500 for third, fourth and fifth years; cumulative borrowing limit of \$23,000. Independent undergraduates have additional unsubsidized eligibility of \$4,000 for first and second years, \$5,000 for third, fourth and fifth years; additional cumulative borrowing limit of \$23,000.	Must file the Free Application for Federal Student Aid form available at financial aid offices and high school guidance departments.
Federal Direct Parent Loan for Undergraduate Students (PLUS)	Parents of dependent undergraduate students.	Parents of dependent undergraduates with good credit histories. FAFSA is not required.	Student's total cost of attendance minus financial aid.	Contact RIT for PLUS loan application. Completed form should be submitted to Financial Aid Office.
Reserve Officer Training Corps (ROTC) Scholarships	Army, Navy and Air Force offer financial assistance to qualified students.	Competitive; selection based upon high school record and other criteria.	Up to full tuition, plus fees, an allowance for books and a monthly stipend awarded to qualified men and women.	Contact high school guidance counselor or call Army ROTC, 716-475-2881; Air Force ROTC, 716-475-5196; Navy ROTC, 716-275-4275.
Veterans Administration	Eligible veterans and children of deceased veterans or service-connected disabled veterans.	Contact any regional Veterans Administration Office for information, details and forms.	Varies.	Contact any regional Veterans Administration Office in your area or call 1-800-635-6534.
Aid to Native American Indians	U.S. Bureau of Indian Affairs offers grants to needy applicants who are at least 1/4 American Indian, Eskimo or Aleut.	Must meet eligibility requirements.	Awards may vary depending on need and availability of funds.	Applications are available from: US Department of Interior Bureau of Indian Affairs Federal Bldg. Room 523 100 South Clinton Street Syracuse, New York 13202

\*Additional information covering Federal financial aid programs is provided in U.S. Department of Education Student Guide. Contact RIT Financial Aid Office to request a copy.

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STATE OF NEW YORK FINANCIAL AID PROGRAMS	WHO IS ELIGIBLE ?	CRITERIA FOR SELECTION	HOW MUCH ?	HOW AND WHEN TO APPLY
<p>Tuition Assistance Program (TAP)</p> <p>(Income levels and award amounts listed apply to 1996-97 first-time recipients only.)</p>	<p>U.S. citizen or permanent resident and also NY State resident enrolled (matriculated) for 12 credits or more in degree program; cannot be in default on any guaranteed education loan.</p> <p>Must attend NYS college or school.</p>	<p>Undergraduate students who are dependent or independent and married OR have tax dependents: \$50,500 NET taxable income or less. Single independent with no dependents: \$10,000 NET taxable income or less. Income adjusted for number of family members in full-time college attendance.</p>	<p>*** TAP awards based on net taxable income. Awards for first-time recipients range from \$275 to \$3,900 per year for dependent undergraduates or independent students with dependents. Single independent students' (without dependents) awards range from \$100-\$3,025.</p>	<p>In addition to the FAFSA, you must file either a NYS TAP application or the NYS version of the CSS FAF. These forms are available in your high school Guidance Office or RIT Financial Aid Office. You may also contact: NYS Higher Education Services Corp. at 518-473-7087.</p>
<p>Regents Award for Child of Veterans (CV)</p> <p>Child of Police Officer - Firefighter (CPF)</p> <p>Correction Officer Awards (CO)</p>	<p>Children of veterans who are deceased, disabled or missing in action as a result of service during World War I, World War II, Korean Conflict or Vietnam (CV) or who died as a result of injuries sustained in line of duty.</p>	<p>Must meet eligibility requirements. Contact your local Division of Veterans Affairs for information or call 1-800-635-6534 (NYS Div. of Veteran Affairs).</p>	<p>\$450 per year, for up to five years, depending on the normal length of the program.</p>	<p>Same as TAP above. In addition, file the CV, CO or CPF Award Supplement available on request from NYSHESC: 518-473-7087. May 1, 1997, deadline for 1996-97.</p>
<p>Memorial Scholarships for Children of Deceased Police Officers and Firefighters</p>	<p>Those students qualifying for Child of Police Officer, Firefighter Awards.</p>	<p>Must meet eligibility requirements.</p> <p>Must submit documentation supporting eligibility as noted in special supplement.</p>	<p>Award amounts are based on tuition and non-tuition costs-of-attendance. In combination with certain other state and federal grants, may equal the average cost-of-attendance at the State University of N.Y.</p>	<p>Same as TAP above.</p> <p>In addition, file the appropriate award supplement, available on request from NYSHESC: 518-473-7087. May 1, 1997, deadline for 1996-97 awards.</p>
<p>Aid to Native Americans</p>	<p>Member on the official tribal roll of a New York State tribe or child of a member.</p>	<p>Must provide documentation.</p>	<p>Up to \$1,350 per year for a maximum of four years or five years in certain programs.</p>	<p>Contact: Native American Indian Education Unit, NY State Education Dept., Room 543, Education Building, Albany, NY 12234. Call 518-474-0537 for information.</p>
<p>Vietnam Veterans Tuition Award Program</p>	<p>Undergraduates must meet New York State residency requirements, have served in the armed forces in Indochina between January 1963 and May 1975 and meet other requirements.</p>	<p>Students who complete all eligibility requirements including filing for TAP and Pell grants may receive up to maximum minus any TAP awarded.</p>	<p>Awards are \$2,000 per year for full-time study or \$1,000 per year for part-time study.</p>	<p>Same as TAP above. In addition, file the Vietnam Veterans Tuition Award Supplement to establish eligibility. Call NYSHESC at 518-473-7087 for information.</p>
<p>Regents Professional Opportunity Scholarship</p>	<p>U.S. citizen and permanent New York State resident as defined by legislation. (For certain approved professional programs, e.g., accounting, engineering, physician's assistant.) Must agree to practice for 12 months in chosen profession in New York State for each annual payment received.</p>	<p>Recipients must be chosen in the following order of priority:</p> <ol style="list-style-type: none"> <li>1. Economically disadvantaged minority group members historically underrepresented in the approved profession.</li> <li>2. Minority group members underrepresented in profession.</li> <li>3. Candidates enrolled or graduates of SEEK, EOP, HEOP.</li> </ol>	<p>\$1,000 to \$5,000 per year. TAP and some other benefits may supplement this award.</p>	<p>Contact the Bureau of Post-Secondary Grants Administration, Rm. 5B68, Albany, NY 12230. Call 518-474-5705.</p>
<p>New York State Health Service Corps Scholarship</p>	<p>U.S. citizen and permanent New York State resident. Must agree to practice in state facility for 18 months for each year of aid received.</p>	<p>Awards based on academic performance, work experience and interest in institutional work.</p>	<p>Up to \$15,000 per year, depending on educational expenses. Must be within 24 months of graduation or certification in order to apply.</p>	<p>Applications available from NYS Health Service Corps, Corning Tower, Room 1602, Empire State Plaza, Albany, NY 12237. 518-473-7019.</p>
<p>Robert C. Byrd Honors Scholarship Program (Federally Funded)</p>	<p>U.S. citizen and permanent New York State resident, attending New York State or out-of-state college.</p>	<p>Must demonstrate outstanding academic achievement &amp; show promise of continued academic achievement. Scholarships are based on SAT or ACT scores.</p>	<p>\$1,500 for the first academic year only. 310 awards statewide (10 to each of 31 Congressional Districts).</p>	<p>Applications available in high school guidance offices, or from Bureau of Elementary and Secondary Testing, NYS Education Dept., Albany, NY 12234. Call 518-474-5099.</p>
<p>Paul Douglas Teacher Scholarship Program (Federally Funded)</p>	<p>U.S. citizen and permanent New York State resident as defined by legislation. Service component. Must teach two years for each annual payment received.</p>	<p>Top 10% of high school graduating class or high G.E.D. scores. Registered in a program leading to certification in a teacher shortage field.</p>	<p>Up to \$5,000/yr. for up to four years of undergraduate study (full-time).</p>	<p>Applications available in high school guidance offices, financial aid offices or from the Bureau of Post Secondary Grants Administration, Cultural Education Center, Rm. 5B68, Albany, NY 12230. Call 518-474-5075.</p>
<p>National Science Scholars Program</p>	<p>Two students from each New York State Congressional district. Must be nominated by State nominating committee.</p>	<p>Must enroll in a program in sciences, computer science, math or engineering.</p>	<p>Up to \$3,300 per year for 1995-96.</p>	<p>Students must apply to the NYS Department of Education. Call 518-474-5075 for information.</p>

\*\*\* TAP award amounts are dependent upon action in the 1996-97 State Budget.

## Named Scholarships

Each year the University awards "named" scholarships made possible through the generosity of hundreds of individuals and organizations. Awards are made by RIT's Financial Aid Office in accordance with the special criteria of each scholarship. All applicants for financial aid are considered for scholarships for which they meet the established criteria.

Harriet Thayer Adams Scholarship  
 Max Adler Scholarship  
 Alcom Printing Scholarship  
 George Alden Scholarship Fund  
 Mary R. Alexander Scholarship  
 Fanny Knapp Allen Scholarship  
 Alling & Cory Scholarship  
 Altier & Sons Scholarship  
 Avis Mason Andrews Graduate Scholarship  
 Arthur Anderson Scholarship  
 Robert Anderson Scholarship  
 Betsy L. Andrews Scholarship  
 Clara L. Andrews Scholarship  
 Ezra R. Andrews Scholarship  
 Kate Rider Andrews Scholarship  
 Randall Andrews Scholarship  
 Howard Applegate Scholarship  
 Atex Newspaper Group Scholarship  
 Lee Augustine Memorial Scholarship  
 Ralph Avery Scholarship  
 David Baldwin Scholarship  
 Thomas Ward Ball Scholarship  
 George & Theresa Barlow Endowed Scholarship  
 Bausch & Lomb Scholarship  
 John Bausch Scholarship  
 Clarence & Birdice Beal Scholarship  
 Bennett Award  
 Ruth L. Bernhardt Scholarship  
 Fanny R. Bigelow Scholarship  
 Roscoe Bills Scholarship  
 Helen & Frederick Blaessig Memorial Scholarship  
 Harriet Blickwede Scholarship  
 Boeing Corporation Scholarship  
 Bogen Corporation Scholarship  
 Bonadio/Insero Corporation Scholarship  
 Austin Bonis Scholarship  
 Boston Litho Club Scholarship  
 Farid Bozorgi Scholarship  
 Braverman Scholarship  
 Joseph Briggs Endowed Scholarship  
 Chester W. Brink Scholarship  
 Stephen Briody Scholarship  
 Harold Brodie Scholarship  
 Steffan Brown Scholarship  
 Nettie Bullis Scholarship  
 Business Alumni Scholarship  
 Orilla Butts Scholarship  
 Harold Cadmus Memorial Scholarship  
 Caldwell Manufacturing Scholarship  
 Richard Capilla Scholarship  
 Chester Carlson Scholarship

Howard F. Carver Scholarship  
 Melbert Cary Scholarship  
 Howard T. Case Scholarship  
 Theodore Chapman Scholarship  
 John and Ruth Christie Scholarship  
 Citi Corp Citibank Scholarship  
 Adele Hathaway Clark Scholarship  
 Florence Clark Scholarship  
 H. E. Clark Scholarship  
 Class of '69 Scholarship  
 Albert G. Coenen Scholarship  
 Eugene Colby Scholarship  
 Wells Coleman Scholarship  
 Coleman Corporation Scholarship  
 Ward D. Collister Scholarship  
 Computer Consoles Scholarship  
 Comstock Foundation Scholarship  
 Consolidated Paper Award  
 Construction Specifications Institute Scholarship  
 Continental Corporation Scholarship  
 Continental Insurance Co. Scholarship  
 Cortland Brovitz Corporation Scholarship  
 Lillian Cowin Scholarship  
 Cray Foundation Scholarship  
 Walter Crighton Scholarship  
 Alvin Cronig Scholarship  
 Bryon Culver Scholarship  
 Curtice Burns Scholarship  
 Alfred L. Davis International Student Scholarship  
 Alfred L. & Ruby C. Davis Continuing Education Scholarship  
 Alfred L. & Ruby C. Davis Leadership Award  
 Nancy J. Davis Scholarship  
 Deloitte, Touche, Haskins & Sells Scholarship  
 De Ridder Corporation Scholarship  
 Ronald Dodge Engineering Scholarship  
 Ronald Dodge NTID Scholarship  
 Elizabeth Dunlap Sargent Scholarship  
 Dupont Undergraduate Scholarship  
 Dupont Graduate Fellowship  
 Eastman Kodak Merit Scholarship  
 Eberly Family Scholarship  
 Eisenhart Memorial Scholarship  
 Ellingson Foundation Scholarship  
 Isabel & Benjamin Emerson Scholarship  
 Fred Emerson Foundation Scholarship  
 Fred Emerson Graduate Scholarship  
 Raymond Englert Scholarship  
 Engineering Women of Rochester Scholarship  
 Gerald Ephraim Scholarship  
 Eyer Foundation Scholarship  
 Max Factor Scholarship  
 Farash Scholarship  
 John Doane Fay Scholarship  
 Rose and George Feigenbaum Scholarship  
 William & Mildred Feinbloom Scholarship  
 Ruth H. Fenyevessy Scholarship  
 Fisons Corporation Scholarship  
 Flora J. Foley Scholarship  
 Food/Hotel/Tourism Hospitality

Foundation Scholarship  
 Maurice & Maxine Forman Scholarship  
 Ron Francis Scholarship  
 Freedom Forum Scholarship  
 R. T. French Scholarship  
 Richard A. Freund Scholarship  
 Dr. Robert Frisina Award  
 Karl Fuchs Scholarship  
 Fuji Corporation Scholarship  
 Gamma Epsilon Tau Scholarship  
 Garlinghouse Scholarship  
 Gegeheimer/McClure Scholarship  
 Frank Geist Scholarship  
 General Motors Scholarship  
 General Railway Signal Technical Foundation Scholarship  
 Sarah Margaret Gillam Scholarship  
 Jean Gillings Scholarship  
 E. B. Gleason Scholarship  
 Arthur King Goldsmith Scholarship  
 Good Samaritan Association Scholarship  
 Allen and Gloria Gopen Scholarship  
 Isaac Gordon Scholarship  
 Gould Pumps Inc. Award  
 Graflex Scholarship  
 Phillip L. Graham Scholarship  
 Graphic Arts Technical Foundation  
 Graphic Controls Scholarship  
 Gravure Foundation Scholarship  
 Frank Grum Memorial Scholarship  
 Hakes Assoc. Scholarship  
 Edward Hableib Scholarship  
 Ezra Hale Scholarship  
 William B. Hale Scholarship  
 Mildred F. Hall Scholarship  
 Sil Hall Scholarship  
 Carter Harmon Scholarship  
 E. E. Harris Semiconductor Tuition Scholarship  
 Harris Semiconductor Scholarship  
 Franz Haverstick Scholarship  
 G. Sherwon Haxton Scholarship  
 Safford Hazlett Scholarship  
 Healthcare Purchasing Scholarship  
 William R. Hearst Scholarship  
 Heidelberg/Harris "Printers Hall of Fame"  
 Sol Heumann Scholarship  
 John & Catherine Hill Scholarship  
 Hiroo Sato Memorial Scholarship  
 Hoffend Scholarship Fund  
 Hogadone & Larwood Scholarship  
 Charles C. Horn Scholarship  
 Frank Horton Scholarships  
 F. R. Huberlie Memorial Scholarship  
 Arthur Ingle Scholarship  
 Imaging Science Kodak Lab Scholarship  
 Imaging Science-Xerox Scholarship  
 Louis & Sylvia Jackson Scholarship  
 Jack Jenkins Endowment Scholarship Fund  
 Lucille R. Jennings Scholarship  
 Jephson Trust Scholarship  
 Helen Lucille Jones Memorial Scholarship  
 John Wiley Jones International Scholarship

- Michael Jones Memorial Scholarship  
 Abraham & Teresa Katz Scholarship  
 Henry & Mary Kearse Memorial Fund  
 Paul Kessler Printing Award  
 Drew and Francis King Scholarship  
 David Klieman Scholarship  
 Lowell Koening Scholarship  
 E. M. Kohler Scholarship  
 Robert Krups Industrial Design Scholarship  
 Sara L. Kuhnert Scholarship  
 Lancer Graphics Scholarship  
 Francis Lang Scholarship  
 Lasky Corporation Scholarship  
 Lawyer's Cooperative Publishing Scholarship  
 Lehigh Press Scholarship  
 Abe Lincoln Scholarship  
 Milton Loder Memorial  
 Lomb Citizen Soldier Scholarship  
 Lomb People Scholarship  
 Los Angeles Times Mirror Scholarship  
 Max Lowenthal Memorial Scholarship  
 Patrick T. Lynch Memorial Scholarship  
 Mack Printing Scholarship  
 Lois C. Macy Scholarship  
 Magazine Publishers Scholarship  
 Jack & Judy Maltby Scholarship  
 Donald Margolis Scholarship  
 William Mariner Scholarship  
 Clara Martin Scholarship  
 John McIntee Scholarship  
 McIntosh Education Fund  
 Dean McWhirter Memorial Scholarship  
 Alice Melnyk Scholarship  
 Bernadette Merkel Memorial Scholarship  
 Mengel, Metzger & Barr Scholarship  
 Manufacturers Hanover Scholarship  
 Marine Midland Fellowship  
 Barbara Milliman Scholarship  
 Abraham & Sadie Milstein Scholarship  
 Mobil Corporation Scholarship  
 Earl Morecock Scholarship  
 Clifford Waite Morgan Scholarship  
 Catherine Morse Scholarship  
 Moscom Corporation Scholarship  
 Charles W., Sue L., Freda L. Muffitt Endowed Scholarship Fund  
 Morris Mulligan Memorial Fund  
 Dr. Gengi Murai Scholarship  
 Michelle Nageotte Scholarship  
 National Metal Decorators Scholarship  
 National Cash Register Scholarship  
 Nathaniel Rochester Society Scholarships  
 C. B. Neblette Memorial Scholarship  
 New England Graphic Communications  
 New York Times Minority Scholarship  
 Grace B. Norton Scholarship  
 NTID Architect/Tech Award  
 NTID Business Careers Scholarship  
 NTID Endowed Scholarship  
 NTID Performing Arts Scholarship  
 NTID Printing Production Scholarship  
 NTID Science/Engineering Scholarship  
 NTID Visual Communication Scholarship  
 Carol L. Oelkers Memorial Fund  
 Florence Ohringer Art Scholarship  
 Milton & Ray Ohringer NTID Scholarship  
 Robert Panara Scholarship  
 Barbara Paul Memorial Scholarship  
 Peat Marwick-Mitchell Scholarship  
 William Farley Peck Scholarship  
 Martha Perry Scholarship  
 David J. Phelan Scholarship  
 Philips ECG Inc. Scholarship  
 Edward A. Pike Scholarship  
 A. C. Powers Memorial Scholarship  
 David Presco Scholarship  
 Praxis Biologics Scholarship  
 Pulver Endowed NTID Scholarship  
 Queens Group Scholarship  
 Radisson Scholarship  
 Harold Raphael Memorial  
 Redcom Scholarship  
 Russell Reilly Scholarship  
 R. Bruce Reinecker Scholarship  
 Jack Renfro Scholarship  
 Rexham Scholarship  
 Edward J. Ries Memorial Scholarship  
 RIT Greek Organization Scholarship  
 RIT International Student Association  
 RIT Women's Club Scholarship  
 RIT Women's Council NTID Scholarship  
 Frank Ritter Memorial Scholarship  
 Archibald & Mary Robinson Scholarship  
 Rochester Community Savings Bank Scholarship  
 Rochester Sales & Marketing Executives Scholarship  
 Rochester Telephone Scholarship  
 Roosevelt Paper Scholarship  
 Robert Root Award  
 Rebecca Rosenberg Scholarship  
 Laura Bradford Russell Scholarship  
 David & Fannie Rutty Memorial Scholarship  
 Esther G. Sanders Scholarship  
 Nelson & Celeste Sanford Memorial Scholarship  
 Elizabeth Sargent Scholarship  
 Ryoichi Sasakawa Scholarship  
 Paul & Katherine Schmidt Scholarship  
 Charles W. Schmitt Scholarship  
 Kilian & Caroline Schmitt International Scholarship  
 William J. Schmitt Memorial Scholarship  
 School for American Craftsmen Fund  
 Ruth S. Schumacher Fund  
 Marlene E. Scott Memorial Scholarship  
 Scripps-Howard Scholarship  
 Wilfrid and Isabel Searjeant Scholarship  
 Sarah Shelton Scholarship  
 Igor Shot Scholarship  
 Carl M. Shrader Scholarship  
 F. Ritter Shumway Scholarship  
 S. Richard Silverman International Scholarship  
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 Louis & Nellie Skalny Scholarship  
 Steven Skrynski Scholarship  
 Susan Smigel International Student Scholarship  
 Leo & Mary Smith Scholarship  
 Society for Mechanical Engineering Scholarship  
 Harry Speck Scholarship  
 Karl Sperber Scholarship  
 Sprint Company Scholarship  
 Statler Foundation Scholarship  
 Alfred L. Stern Fund  
 Stouffer Corporation Scholarship  
 Hattie M. Strong Scholarship  
 Pearl Hewlett Stutz Scholarship  
 William Swart Award  
 Michael Swartzman Memorial Scholarship  
 Southwest Printing Management Fund  
 Sullivan Communications Scholarship  
 George Tanzer Memorial Scholarship  
 Eloise Thornberry Scholarship  
 Tag and Label Scholarship  
 TAG and LABEL Manufacturers Scholarship  
 Time Inc. Scholarship  
 Hollis Todd Scholarship  
 Touche-Ross Scholarship  
 Clarence Tuites Scholarship  
 Turri & Brown Scholarship  
 Clifford & Ruth Ulp Memorial Scholarship  
 James Ventimiglia Scholarship  
 Frank Vereka Scholarship  
 Joseph Waldinsperger CCE Scholarship  
 Dewitt Wallace Scholarship  
 A. Stephen Walls Scholarship  
 Walls, Olsen Memorial Scholarship  
 Wall Street Journal Scholarship  
 Waste Management Scholarship  
 J. Watumul Indian Scholarship  
 Louis A. Wehle Scholarship  
 David Weinstein Scholarship  
 Harold J. Weisburg Scholarship  
 Mark & Beulah Welch Scholarship  
 Edwin Welter Fund  
 Weyerhaeuser Fellowship  
 Nelson Whitaker Scholarship  
 Ron & Joann White Scholarship  
 Eloise Wilkin Memorial Scholarship  
 Becky Wills Scholarship  
 Thomas B. Wilson Scholarship  
 Wallace & Paula Wilson Scholarship  
 John Wittman Scholarship  
 Joseph & Loretta F. Wolf Scholarship  
 Wurzer/NRS Scholarship  
 William D. Wright Scholarship  
 Xerox Scholarship  
 Young Printing Executives Club Scholarship  
 Donald Ziebreck Scholarship  
 Jeffrey W. Zielasko Scholarship

## Distinguished Professorships

College of Applied Science and Technology

### **Russell C. McCarthy Professorship in Engineering Technology**

Established: 1979

Held by: Thomas J. Dingman

College of Business

### **J. Warren McClure Research Professorship in Marketing**

Established: 1977

Donor: Mr. and Mrs. J. Warren McClure

Purpose: To perpetuate Mr. McClure's professional interest in the field of marketing

Held by: Dr. Eugene H. Fram

### **Benjamin Forman Professorship in International Business**

Established: 1986

Donor: Maurice Forman

Purpose: Perpetuate Mr. Forman's interest in international business

College of Continuing Education

### **Paul A. Miller Professorship in Continuing Education**

Established: 1981

Donor: RIT Board of Trustees

Purpose: Established in honor of former RIT President Paul A. Miller, recognizes RIT faculty making distinguished contributions to continuing education with record of matching Institute intellectual and educational resources with needs of students and the community

Held by: Dr. Jack Clarcq

### **Frederick H. Minett Professorship in Continuing Education**

Established: 1978

Purpose: Brings distinguished Rochester-area professionals to share professional knowledge and experience with RIT students and faculty

Held by: R. Carlos Carballada  
Liz Vega

College of Engineering

### **James E. Gleason Professorship in Mechanical Engineering**

Established: 1967

Donor: Estate of James E. Gleason

Purpose: To provide a permanent memorial for Mr. Gleason, who served as a trustee of RIT from 1930 until 1964, and to strengthen RIT in the field in which he received his education

Held by: Dr. Richard B. Hetnarski, P.E.

### **Gleason Professor**

Established: 1993

Donor: Gleason Memorial Fund

Purpose: To provide for a faculty member to lead a research and development program in electrical engineering.

Held by: Dr. Guifang Li

### **Motorola Professorship**

Established: 1994

Donor: Motorola, Inc.

Purpose: To support RIT's Microelectronic Engineering Department and to further develop the partnership that has developed between Motorola and the microelectronics program.

Held by: Dr. Lynn F. Fuller

College of Imaging Arts and Sciences

### **Artist-in-Residence Professorship**

Established: 1984

Purpose: To work with apprentice woodworkers and participate in conferences and lectures at RIT.

Held by: Wendell Castle

### **Charlotte Fredericks Mowris Professorship in Contemporary Crafts**

Established: 1973

Donor: Mrs. Charles F. Mowris

Purpose: To perpetuate interest in the School for American Crafts through the work of faculty and students as talented craftspeople

Held by: Albert Paley

### **Melbert B. Cary Jr.**

#### **Professorship in Graphic Arts**

Established: 1969

Donor: Mary Flagler Cary Charitable Trust

Purpose: To provide a permanent memorial for Mr. Cary as a former president of the American Institute of Graphic Arts and to perpetuate his interest in the field

Held by: Professor Frank J. Romano

### **James E. McGhee Professorship in Photographic Management**

Established: 1967

Donor: Master Photodealers and Finishers Association and friends of Mr. McGhee

Purpose: To provide a permanent memorial for Mr. McGhee, a former vice president of Eastman Kodak Company and lifelong friend of the photofinishing industry

Held by: Dr. Milton L. Cofield

### **Paul and Louise Miller Distinguished Professorship in Newspaper Operations Management**

Established: 1979

Donor: Frank E. Gannett Newspaper Foundation

Purpose: To honor the former chairman of the board of the Gannett Company and to perpetuate his interest in good management practices in the newspaper industry

Held by: Professor Owen Smith

## 350 Distinguished Professorships

### **Roger K. Fawcett Distinguished Professorship in Publications Color Management**

Established: 1991

Donor: World Color Press, Fawcett family and industry colleagues

Purpose: The endowed chair, the only one of its kind in the nation, was established to address color quality and productivity in both the magazine and newspaper publishing industries, as well as promotion of RIT color research activities

College of Liberal Arts

### **Caroline Werner Gannett Professorship in the Humanities**

Established: 1974

Donor: Mrs. Frank E. Gannett

Purpose: To perpetuate Mrs. Gannett's lifelong interest in education, especially in those fields of study that have a humanistic perspective

Held by: Dr. James Porter Buchanan

### **Arthur J. Gosnell Professorship in Economics**

Established: 1985

Donor: Family and friends of Arthur J. Gosnell

Purpose: To perpetuate the memory of Arthur J. Gosnell through recognition of the importance of good teaching in economics and by facilitating research into public policy questions

Held by: Dr. Thomas D. Hopkins

### **Ezra A. Hale Professorship in Applied Ethics**

Established: 1989

Donors: William B. and Patricia F. Hale and Lawyers Co-operative Publishing Company

Purpose: To establish a permanent memorial to a long-time and valued friend of RIT, Ezra A. Hale, and to provide instruction in applied ethics in keeping with his beliefs in sportsman-like conduct, fair play, and honesty.

Held by: Dr. Wade L. Robison

### **William A. Kern Professorship in Communication**

Established: 1971

Donor: Rochester Telephone Corporation

Purpose: To commemorate the 100th anniversary of that company and to provide a memorial for a former president of the company and a man who served as an RIT trustee from 1959 to 1964

Held by: Michael Prosser

College of Science

### **Richard S. Hunter Professorship in Color Science, Appearance, and Technology**

Established: 1983

Donors: Mr. and Mrs. Richard S. Hunter

Purpose: To enable RIT to increase its research and educational efforts in the areas of color science, technology, and appearance science in order to benefit the industry and science of color

Held by: Dr. Roy S. Berns

### **Frederick and Anna B. Wiedman Professorship**

Established: 1985

Donor: Frederick Wiedman Jr.

Purpose: To establish a permanent memorial to Frederick and Anna B. Wiedman, lifelong residents of Rochester and long-time friends of RIT

Division of Academic Affairs

### **Eastman Kodak Professorship of Industrial and Manufacturing Engineering**

Established: 1990

Purpose: To support RIT's Center for Integrated Manufacturing Studies (CIMS) initiative by bringing together interdisciplinary teams of faculty and industry experts to address issues that face small and medium-sized manufacturing companies seeking growth

Held by: Judith Gustinis

## Trustees

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Mary College; MS, Pittsburg State  
University; Ph.D., Kansas State  
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Edinburgh; MS, Rochester Institute of  
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Rochester—Professor

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College; MS, SUNY at Buffalo—  
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Monterrey Institute of Technology;  
Ph.D., University of Minnesota—  
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Vermont; MS, Syracuse University—  
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Wisconsin; BA, Nanzan University—  
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Technology; MA, Ph.D., University of  
Toronto—Associate Professor  
**Gordon Goodman**, BS, SUNY  
Binghamton; MS, Rochester Institute  
of Technology—Associate Professor

**Stephen Jacobs**, BA, MA, New  
School for Social Research—Assistant  
Professor

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College; MS, Rochester Institute of  
Technology—Assistant Professor  
**Stephen Kurtz**, BA, University of  
Miami; MS, Rochester Institute of  
Technology—Associate Professor  
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New York; MBA, City University of  
New York; MS, University of  
Minnesota—Professor

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Institute of Technology—Associate  
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**Evelyn Rozanski**, BS, SUNY College  
at Brockport; MS, Syracuse  
University—Coordinator, Graduate  
Programs; Professor

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MA, Hunter College; MS, Ph.D.,  
SUNY at Buffalo—Associate Professor

**Timothy Wells**, BS, Eastern  
Washington State University; MBA,  
California State, Bakersfield—  
Assistant Professor

**Michael A. Yacci**, BS, Ithaca College;  
MS, Rochester Institute of  
Technology; Ph.D., Syracuse  
University—Associate Professor

### Adjunct Faculty

**Robert Gayvert**, MS, Rochester  
Institute of Technology

**J. Doug Hanson**, MS, Rochester  
Institute of Technology

**Trudy Howles**, MS, Rochester  
Institute of Technology

**Bruce Lyon**, MS, Rochester Institute  
of Technology

**Govinda Kurup**, Ph.D., New Mexico  
State University

**Ralph Longobardi**, Ph.D. Syracuse  
University

**Patricia Mallory**, MS, SUNY Albany

**David Morabito**, MS, Rochester  
Institute of Technology

**Lois Rixner**, MS, Rochester Institute  
of Technology

**Fred Roberts**, MS, Rochester Institute  
of Technology

**Daniel Sorrentino**, MS, Rochester  
Institute of Technology

**David Tilley**, MS, Rochester Institute  
of Technology

**Donald Wilder**, MS, University of  
Rochester

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College; MSCE, University of  
California; P.E.—Associate Professor

**Robert H. Easton**, BS, U.S. Military  
Academy; MSCE, Iowa State  
University; P.E.—Chairman, Civil  
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**William C. Larsen**, BS, MSCE,  
Dartmouth College; P.E.—Associate  
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**Maureen S. Valentine**, BSCE, Tufts  
University; MCE, Virginia  
Polytechnic Institute; P.E.—Assistant  
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College; MS, Rochester Institute of  
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University; MS, University of  
Arizona—Professor

**Joel Hallas**, BSE, University of  
Connecticut; MSEE, Northeastern  
University—Assistant Professor

**Mark J. Indelicato**, BEEE, Manhattan  
College; MS, Polytechnic  
University—Assistant Professor

**William P. Johnson**, BA, Kings  
College; BSEE, MSEE, Syracuse  
University—Associate Professor

**David G. Krispinsky**, BE, MSE,  
Youngstown State University—  
Associate Professor

**Carol A. Richardson**, BSEE,  
University of Wyoming; MSEE,  
Union—Chair, Electrical Engineering  
Technology; Professor

**John D. Sherrick**, BEE, Clarkson  
College; MSEE, Worcester  
Polytechnic Institute; P.E.—  
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**John A. Stratton**, BS, Rochester  
Institute of Technology; MS,  
Rensselaer Polytechnic Institute;  
P.E.—Associate Dean, Engineering  
Technology; Professor

**Charles L. Swain**, BSEE,  
Pennsylvania State University; MS,  
Elmira College; MSEE, Pennsylvania  
State University—Associate Professor

**Thomas Young**, BA, Hunter  
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MSEE, Rochester Institute of  
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Institute of Technology—Associate  
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**Thomas A. Williams**, BS, Clarkson University; MS, Ph.D., Rensselaer Polytechnic Institute—Professor

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**Craig Hovey**, BA, Nazareth College; BS, SUNY Empire State College; MS, SUNY Albany; ABD, Union Institute; CPA, Delaware  
**Roberta Klein**, BS, SUNY College at Brockport; MBA, Rochester Institute of Technology; CPA, New York—Lecturer  
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**Franklin T. Russell**, BS, MBA, Cornell University; JD, Syracuse University; Federal Administrative Law Judge

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**Linda C. Gardner**, BA, University of Rochester; MBA, Rochester Institute of Technology  
**John W. Piccione**, BS, MBA, Rochester Institute of Technology

## Management

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**Milton L. Cofield**, BS, Southern Illinois University; MS, Ph.D., University of Illinois; MBA, Wharton School, University of Pennsylvania  
**Avan Jassawalla**, Ph.D., Syracuse University

**Robert F. Pearse**, BS, Olivet College; AM, Ph.D., University of Chicago

## Marketing

**Frances Penn Dearing**, BS, Northwestern University; MBA, JL Kellogg Graduate School of Management, Northwestern University  
**Carmen A. Powers**, BA, University of Illinois; MBA, Kellogg School at Northwestern University

## Decision Sciences

**Kathleen Fraser**, MBA, SUNY Albany; Ph.D., Syracuse University—Assistant Professor  
**Charles E. Koster Jr.**, BS, MBA, Rochester Institute of Technology  
**Elliot W. Lamb**, BS, Union College  
**Salvatore Lanzafame**, BS, LeMoynne College  
**Michael J. May**, BS, MBA, SUNY Buffalo  
**Edward A. O'Connor**, MBE, Clarkson University; MBA, Rochester Institute of Technology  
**Kathleen P. Oestreich**, BS, MA, University of Wisconsin; MBA, DePaul University  
**Thomas E. Traub**, BS, Clarkson University

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**Lynda Rummel**, BS, Oregon State; MA, SUNY College at Geneseo; Ph.D., SUNY Buffalo—Associate Dean; Director, Academic Division; Professor  
**Christine Hammer**, BS, M.Ed., SUNY College at Brockport—Assistant to the Dean  
**Alice McCrave**—Manager, Information Services  
**Bobette Warner**, BS, Rochester Institute of Technology—Manager, Academic Services  
**Bette Anne Winston**, BS, SUNY Buffalo; MS, Rochester Institute of Technology—Manager, Academic Advising

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**Linda A. Tolan**, BS, SUNY College at Geneseo, MS, Rochester Institute of Technology—Chairperson, Administrative Programs University Program; Assistant Professor  
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**Newton B. Green II**, Brown University; MBA, ME, Dartmouth College; P.E.—Visiting Assistant Professor

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**Gladys Winkworth**, BS, SUNY Albany; MS, SUNY College at Brockport—Visiting Assistant Professor

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**Jeanne Ferrara**, BS, Rochester Institute of Technology—Coordinator, Business Development  
**William Garno**, BS, Rochester Institute of Technology—Group Manager, Business Development  
**Linda Keeney**, BA, Loyola University—Coordinator, Marketing  
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**Sandra Richolson**, BA, University of Missouri—Coordinator, Marketing  
**David Sell**, BA, Newberry College; MS, Rochester Institute of Technology—Group Manager, Marketing  
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**Richard Thomas**, AAS, Rochester Institute of Technology; Graduate Management Certificate, University of Michigan—Coordinator, Business Development  
**Nancy Wixom**—Specialist, Business Development

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**David Cohn**, BS, Rochester Institute of Technology—Program Developer  
**Lisa Ford**, BS, Rochester Institute of Technology—Program Developer  
**David Tontarski**, BFA, Rochester Institute of Technology—Program Developer  
**Kitren VanStrander**, BA, SUNY College at Potsdam; MS, Rochester Institute of Technology—Program Developer

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**Betsy Saxe**, BS, Rochester Institute of Technology—Manager, Program Administration  
**Mary DeCiantis**, BA, SUNY Potsdam—Specialist, Facilities  
**Patricia Farrell**—Specialist, Seminars/Printing Applications Lab  
**Barbara Giordano**, BS, Rochester Institute of Technology—Coordinator, Printing Applications Lab  
**Val Johnson**, BS, Rochester Institute of Technology—Coordinator, Seminars  
**Cheryl McLean**—Coordinator, Custom Programs  
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**Terry Salerno-Kelly**—Coordinator, Facilities  
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**Daniel Clark**—Press Manager  
**Chester Daniels**, BS, MS, Rochester Institute of Technology—Analyst, Ink and Paper Lab  
**Richard Gillespie**—Press Specialist  
**Kristine Greenizen**, BFA, SUNY College at Potsdam—Prepress Specialist  
**James Monteleone**, BS, Rochester Institute of Technology—Analyst, Ink and Paper Lab  
**Neil Nowatchik**—Press Specialist  
**Ruben Soto**—Press Specialist

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**Roy Pierce**, Grad Certificate, Cornell University; BS, Regents College; MPA, SUNY College at Brockport—Manager, Finance  
**Tamara Gathers**—Finance Specialist  
**Margaret McEwen-Craven**, BS, SUNY College at Brockport; BS, MBA, Rochester Institute of Technology—Financial Analyst

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**Richard Reeve**, BS, MS, Ph.D., SUNY Buffalo—Associate Dean, Professor  
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**Donald D. Baker**, BA, Trinity College; M.Ed., MBA, Ed.D., University of Rochester—Director, Center for Quality and Applied Statistics; Professor  
**Roy S. Czernikowski**, BEE, ME, Ph.D., Rensselaer Polytech Institute—Department Head, Computer Engineering; Professor  
**Lynn F. Fuller**, BS, MS, Ph.D., SUNY Buffalo—Department Head, Microelectronic Engineering; Motorola Professor  
**Charles W. Haines**, AB, MS, Ph.D., Rensselaer Polytech Institute—Department Head, Mechanical Engineering; Professor  
**Jasper E. Shealy**, BS, MS, Ph.D., SUNY Buffalo—Department Head, Industrial and Manufacturing Engineering; Professor  
**Raman M. Unnikrishnan**, BS, MSEE, Ph.D., University of Missouri—Department Head, Electrical Engineering; Professor

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**Tony Chang**, BS, Jiao Tong University, Shanghai; Ph.D., Chinese Academy of Science, Peking—Professor  
**Kenneth W. Hsu**, BS, National Taiwan Normal University; MS, Ph.D., Marquette University; P.E.—Associate Professor  
**V. C. V. Pratapa Reddy**, B.E. M. Tech., Osmania University, India; Ph.D., Indian Institute of Technology, Madras—Professor

**Alan S. Wenban**, BS, M.Eng., Rensselaer Polytechnic Institute; Ph.D., Cornell University—Assistant Professor

### Electrical Engineering Department

**Edward Chung**, BS, MS, Ph.D., Ohio University—Assistant Professor  
**Soheil A. Dianat**, BS, Aria-Mehr University, Iran; MS, Ph.D., George Washington University—Professor  
**Roger E. Heintz**, BS, Michigan Technological University; MS, Ph.D., Syracuse University—Professor  
**Mark A. Hopkins**, BS, Southern Illinois University; MS, Ph.D., Virginia Polytechnic Institute and State University—Associate Professor  
**James P. LeBlanc**, BS, Rensselaer Polytechnic Institute; ME, Ph.D., Cornell University—Visiting Assistant Professor  
**Guifang Li**, BS, Tianjin University; MS, Ph.D., University of Wisconsin—Assistant Professor; Gleason Professor of Photonics  
**Swaminathan Madhu**, MA, University of Madras; MS, University of Tennessee; Ph.D., University of Washington—Professor  
**Athimootil V. Mathew**, BEE, Jadavpur University, India; M. Tech., Indian Institute of Technology; Ph.D., Queens University, Canada—Professor  
**Norman A. Miller**, BS, London University, England—Lecturer  
**P. R. Mukund**, BS, MS, Ph.D., University of Tennessee—Associate Professor  
**James E. Palmer**, BS, University of Western Ontario; MS, University of Pennsylvania; Ph.D., Case Institute of Technology—Professor  
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**Mysore R. Raghuvver**, BS, Mysore University, India; ME, Indian Institute of Science, Bangalore, India; Ph.D., University of Connecticut—Associate Professor  
**Sannasi Ramanan**, BS, BE, M.Tech, Ph.D., Indian Institute of Technology, India—Associate Professor  
**V. C. V. Pratapa Reddy**, B.E. M.Tech., Osmania University, India; Ph.D., Indian Institute of Technology, Madras—Professor  
**David A. Sumberg**, BA, Utica College of Syracuse University; MS, Ph.D., Michigan State University—Associate Professor  
**Fung-I Tseng**, BS, Taiwan University; MS Chiao-Tung University, Taiwan; Ph.D., Syracuse University—Professor  
**I. Renan Turkman**, Diplome D'Ingenieur (MS); Docteur-Ingenieur, Institut Nationale des Sciences Appliques, Toulouse, France—Associate Professor  
**Jayanti Venkataraman**, BS, MS, Bangalore University; Ph.D., Indian Institute of Science, Bangalore, India—Professor

### Industrial and Manufacturing Engineering Department

**Jacqueline Reynolds Mozrall**, BS, Rochester Institute of Technology; MS, North Carolina State; Ph.D., SUNY Buffalo—Assistant Professor  
**Madhu R. Nair**, BS, Rochester Institute of Technology; MS, Lehigh University—Visiting Instructor  
**Nabil Nasr**, BS, Helwan University, Egypt; MS, Rutgers University; M.Eng., Pennsylvania State University; Ph.D., Rutgers University—Associate Professor  
**Sudhakar R. Paidy**, BS, Osmania University, India; MS, Ph.D., Kansas State University—Professor  
**Paul H. Stiebitz**, BS, ME, Rochester Institute of Technology—Assistant Professor  
**Brian K. Thorn**, BS, Rochester Institute of Technology; MS, Ph.D., Georgia Institute of Technology—Associate Professor  
**Kathryn Woodcock**, BS, MASC., University of Waterloo, Canada—Visiting Assistant Professor

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**Richard G. Budynas**, BME, Union College; MS, University of Rochester; Ph.D., University of Massachusetts; P.E.—Professor  
**Robert A. Ellson**, BME, City College of New York; MS, Ph.D., University of Rochester, P.E.—Professor  
**Jon Freckleton**, BS, University of Rochester; MS, Nazareth College; P.E.—Associate Professor  
**Hany A. Ghoneim**, BS, MS, Cairo University, Egypt; Ph.D., Rutgers University—Associate Professor  
**Amitabha Ghosh**, B.Tech, M.Tech., Indian Institute of Technology, India; Ph.D., Mississippi State University—Associate Professor  
**Surendra K. Gupta**, B.Tech., Indian Institute of Technology, India; MS, University of Notre Dame; Ph.D., University of Rochester—Professor  
**Michael P. Hennessey**, BS, University of Minnesota; MS, Massachusetts Institute of Technology; Ph.D., University of Minnesota—Assistant Professor  
**Richard B. Hetnarski**, MS, Gdansk Technical University; MS, Warsaw University; Dr. Tech.Sci., Polish Academy of Sciences; P.E.—James E. Gleason Professor  
**Satish Kandlikar**, BE, Marathwada University, India; M.Tech., Ph.D., Indian Institute of Technology—Professor  
**Bhalchandra V. Karlekar**, BE, MS, University of Baroda, India; MS, Ph.D., University of Illinois; P.E.—Professor  
**Mark Kempfski**, BS, Purdue University; MS, Ph.D., SUNY Buffalo—Professor  
**Kevin Kochersberger**, BS, MS, Ph.D., Virginia Polytechnic Institute and State University—Visiting Assistant Professor  
**Chris Nilsen**, BS, Rochester Institute of Technology; MS, Worcester Polytechnic Institute; Ph.D., Michigan State; P.E.—Professor

**Alan H. Nye**, BS, MS, Clarkson College; Ph.D., University of Rochester—Professor  
**Ali Ogut**, B.Ch.E., Hacettepe University, Turkey; MS, Ph.D., University of Maryland—Associate Professor  
**Marietta R. Scanlon**, BS, Tufts University; SM, Massachusetts Institute of Technology; Ph.D., Johns Hopkins University—Assistant Professor  
**Frank Sciremammano Jr.**, BS, MS, Ph.D., University of Rochester—Professor  
**Robert L. Snyder**, BS, Rochester Institute of Technology; Ph.D., Iowa State; P.E.—Professor  
**David G. Tomer**, BS, ME, Pennsylvania State University—Senior Lecturer  
**Josef S. Torok**, BS, University of Akron; MS, Ph.D., Ohio State University—Associate Professor  
**Panchapakesan Venkataraman**, B.Tech., Indian Institute of Technology; MS, Ph.D., Rice University—Assistant Professor  
**Wayne W. Walter**, BE, State University of New York Maritime College; MS, Clarkson College; Ph.D., Rensselaer Polytechnic Institute; P.E.—Professor

### Microelectronic Engineering Department

**Karl D. Hirschmann**, BS, MS, Rochester Institute of Technology—Visiting Assistant Professor  
**Michael A. Jackson**, BS, MS, Ph.D., SUNY Buffalo—Associate Professor  
**Santosh K. Kurinec**, BS, MS, Ph.D., University of Delhi, India—Professor  
**Richard L. Lane**, BS, Ph.D., Alfred University—Professor  
**Robert E. Pearson**, BS, MS, Rochester Institute of Technology; Ph.D., SUNY Buffalo—Associate Professor  
**Bruce W. Smith**, BS, MS, Ph.D., Rochester Institute of Technology—Associate Professor  
**I. Renan Turkman**, Diplome d'Ingenieur (MS); Docteur-Ingenieur, Institut Nationale des Sciences Appliqués, Toulouse, France—Associate Professor

### The John D. Hromi Center for Quality and Applied Statistics

**Anne M. Barker**, BA, Nazareth College; MS, Rochester Institute of Technology—Assistant Professor  
**Thomas B. Barker**, BS, MS, Rochester Institute of Technology—Associate Professor  
**John T. Burr**, Ph.D., Purdue University—Assistant Professor  
**John D. Hromi**, BS, Carnegie-Mellon University; BEE, Clemson University; M. Litt., University of Pittsburgh; D. Engr., University of Detroit—Professor Emeritus  
**Daniel R. Lawrence**, BA, BS, University of Akron; MA, Ball State University; MS, Rochester Institute of Technology; Ph.D., University of Toronto—Assistant Professor

**Patrick J. S. McNenny**, BS, U.S. Naval Academy; MS, Rochester Institute of Technology—Manager, Academic Programs

**Edward G. Schilling**, BA, MBA, MS, Ph.D., Rutgers University—Professor

**Joseph G. Voelkel**, BS, Rensselaer Polytechnic Institute; MS,

Northwestern University; Ph.D., University of Wisconsin at Madison—Associate Professor

**Mason E. Wescott**, BS, Ph.D., Northwestern—Professor Emeritus, Statistics

**Hubert D. Wood**, BS, George Washington University; MS, University of Rochester—Assistant Professor

### Adjunct Faculty

#### Electrical Engineering

**James Moon**, Ph.D., University of California-Berkeley

#### Microelectronic Engineering

**Katherine Hesler**, BS, Clarkson University; MS, University of Vermont

#### Mechanical Engineering

**Risa Robinson**, BS, MS, Rochester Institute of Technology

### College of Imaging Arts and Sciences

**Margaret O. Lucas**, BS, Hampton University; MA, Virginia Commonwealth University; D.Ed., Pennsylvania State University—Dean

**Carole A. Sack**, BA, University of Michigan; Ph.D., Michigan State University—Associate Dean

**O. Terry Bruce**—Director of Operations

**Susan Chan**—Academic Coordinator

**Susan Clark**—Academic Coordinator

**Katherine Gorman**—Administrative Assistant

**Marie Hanes**—Academic Coordinator

**Vivian Vanderzell**—Student Relations Coordinator

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**Steve Loar**, BS, Murray State University; MA, Northern Illinois University—Director, Associate Professor

**Linda Hightower**, BA, Columbus College; MFA, Georgia State University—Associate Director, Associate Professor

**MaryAnn Begland**, BS, MFA—Chair, Graphic Design; Associate Professor

**Joyce Hertzson**, BFA, MFA—Chair, Foundation; Associate Professor

**Luvon Sheppard**, BFA, MST—Chair, Foundation; Professor

**Robert Schmitz**, BS, MS, MFA—Chair, School for American Crafts; Professor

### Industrial/Interior Design Faculty

**MaryAnn Begland**, BS, Ohio State University; MFA, Kent State University—Professor

**Roberley Ann Bell**, BFA, University of Massachusetts at Amherst; MFA, State University of New York at Alfred—Associate Professor

**Philip W. Bornarth**, BAE, MAE, Art Institute of Chicago—Professor

**Nancy A. Chwiecko**, BA, St. Lawrence University; MFA,

Rochester Institute of Technology—Assistant Professor

**Nancy A. Ciolek**, BFA, MFA, Indiana State University—Associate Professor

**Douglas Clemishaw**, BSME, Case Institute of Technology—Associate Professor

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**David Dickinson**, Chelsea School of Art, London, England; SKHS, Oslo, Norway; MFA, Rochester Institute of Technology—Professor

**Robert L. Dorsey**, BFA, Rochester Institute of Technology; MFA, Syracuse University—Assistant Professor

**Peter Giopulos**, BFA, Syracuse University; M.Ed., Ph.D.

Pennsylvania State University—Professor

**Robert Heischman**, BFA, Miami University; UCFA, Ruskin School of Art—Professor

**Joyce Hertzson**, BFA, Rhode Island School of Design; MFA, Indiana University—Associate Professor

**Glen Hintz**, BA, Lafayette College; MS, The Medical College of Georgia—Assistant Professor

**Barbara Hodik**, BS Ed., Benedictine College; MA, New York University; Ph.D., Pennsylvania State—Professor

**Robert M. Kahute**, BID, BFA, Syracuse University; MFA, Rochester Institute of Technology—Professor

**Robert P. Keough**, BFA, Rochester Institute of Technology; MFA, Rochester Institute of Technology—Professor

**Heinz Klinton**, BFA, MFA, Rochester Institute of Technology—Associate Professor

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**Charles F. Lewis**, B. Arch., Pratt Institute; M. Arch., University of Buffalo—Professor

**Thomas Lightfoot**, BA, BFA, University of Connecticut; MFA, Instituto Allende, San Miguel de Allende, Gto., Mexico; MA Ed. Art, Ed.D. Art, Columbia University Teachers College—Associate Professor

**Frederick Lipp**, BAE, School of the Art Institute of Chicago; MFA, Rochester Institute of Technology—Professor

**Bruce I. Meader**, BFA, MFA, Carnegie Mellon University—Assistant Professor

**Craig J. McArt**, BID, Syracuse University; MFA, Rochester Institute of Technology—Professor

**Edward C. Miller**, BFA, SUNY at Buffalo; MFA, Illinois State—Professor

**Robert C. Morgan**, BA, University of Redlands; Ed.M., Northeastern University; MFA, University of Massachusetts; Ph.D., New York University—Professor

**Marianne O'Loughlin**, BFA, MFA, Rochester Institute of Technology—Assistant Professor

**R. Roger Remington**, BFA, Rochester Institute of Technology; MS, University of Wisconsin—Professor

**Luvon Sheppard**, BFA, MST, Rochester Institute of Technology—Professor

**James H. Sias**, BFA, MA, Michigan State University—Professor, Industrial/Interior Design

**Alan Singer**, BFA, Cooper Union; MFA, Cornell University—Associate Professor

**Bruce Sodervick**, BS, Rhode Island School of Design; MFA, Indiana University—Professor

**Joanne Szabla**, BFA, Madonna College; MA, Catholic University of America; Ph.D., Walden University—Professor

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**James Ver Hague**, BS, Massachusetts Institute of Technology; MS,

Rensselaer Polytechnic Institute; BA, MFA, SUNY at Buffalo—Professor

**Robert Wabnitz**, Diploma, Rochester Institute of Technology; Certificate, University of Rochester—Professor

**Joseph A. Watson**, BFA, University of Georgia; MFA, Yale University—Professor

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Professor in Contemporary Craft; Ph.D. (honorary), University of Rochester

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**Richard Tannen**, BS, Cornell University; Certificate of Mastery in Woodworking and Furniture Design, Boston University—Associate Professor

**Michael Taylor**, BS, Middle Tennessee State University; MA, MFA, East Tennessee State

University—Professor

**Leonard A. Urso**, BFA, MFA, SUNY College at New Paltz—Associate Professor

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**Nancy Stuart**, BA, MS—Associate Director, Associate Professor

**Milton Cofield**, BS, MBA, Ph.D.—Chair, Imaging Systems Management; Professor

**Andrew Davidhazy**, BFA, MFA,—Chair, Imaging and Photographic Technology; Professor

**Howard Lester**, BA, MFA—Chair, Film/Video; Associate Professor

**Willie Osterman**, BFA, MFA—Chair, Applied Photography; Associate Professor

**Michael R. Peres**, BS, BA—Chair, Biomedical Photographic Communications; Associate Professor

**James Reilly**, BA, MA—Director, Image Permanence Institute; Professor

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**Patricia Ambrogio**, MFA, Visual Studies Workshop—Associate Professor

**Carl Battaglia**, BA, Boston College; MFA, Syracuse University—Associate Professor

**Owen Butler**, BFA, Rochester Institute of Technology—Associate Professor

**Adriane Carageorge**, BA, Florida State; MFA, Ohio University—Assistant Professor

**Guenther Cartwright**, BA, University of Oregon; MFA, Buffalo—Associate Professor

**John Ciampa**, BA, Boston University; MA, University of Michigan; Juris D., Cornell University—Professor

**Milton Cofield**, BS, Southern University; MBA, University of Pennsylvania; Ph.D., University of Illinois—James E. McGhee Professor

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**Andrew Davidhazy**, BFA, MFA, Rochester Institute of Technology—Professor

**Denis Defibaugh**, BS, Rochester Institute of Technology—Associate Professor

**Steve Diehl**, BS, University of Miami; BS, MS, Rochester Institute of Technology—Associate Professor

**William W. DuBois**, BFA, Ohio University; M.Ed., Bowling Green State University—Professor

**Mark Haven**, AB, Lebanon Valley College—Assistant Professor

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**Robert Kayser**, BS, City College of New York; MS, Rochester Institute of Technology—Associate Professor  
**Angela Kelly**, MA, Columbia College—Associate Professor  
**Weston D. Kemp**, MFA, Rochester Institute of Technology—Professor  
**Russell C. Kraus**, BA, William Paterson College; Ed.D., University of Massachusetts at Amherst—Professor  
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**Howard Lester**, BA, MFA, University of California at Los Angeles—Associate Professor  
**Howard LeVant**, BS, Institute of Design, Illinois Institute of Technology; MS, Rochester Institute of Technology—Professor  
**Susanne Loomis**, BS, Rochester Institute of Technology—Instructor  
**Stephanie Maxwell**, BA, University of California at Los Angeles; MFA, San Francisco Art Institute—Assistant Professor  
**Glenn Miller**, BS, Rochester Institute of Technology—Associate Professor  
**Elaine O'Neil**, BFA, Philadelphia College of Art; MS, Illinois Institute of Technology/Institute of Design—Professor  
**Willie Osterman**, BFA, Ohio University; MFA, University of Oregon—Chair, Applied Photography; Associate Professor  
**Michael R. Peres**, BS, Rochester Institute of Technology; BA, Bradley University—Associate Professor, Chair, Biomedical Photographic Communications  
**Doug Rea**, BS, Union College; MFA, Rochester Institute of Technology—Professor  
**James Reilly**, BA, Franklin and Marshall College; MA, SUNY Buffalo—Director, Image Permanence Institute; Professor  
**John Retallack**, BFA, Rochester Institute of Technology—Assistant Professor  
**Elliott Rubenstein**, BA, MS, St. John's University; MFA, SUNY at Buffalo—Professor  
**Nitin Sampat**, BS, University of Bombay, India; MS, Rochester Institute of Technology—Assistant Professor  
**Marla Schweppe**, BA, University of Kansas; MA, Ohio State University—Associate Professor  
**Malcolm Spaul**, BS, St. Lawrence University; MFA, Rochester Institute of Technology—Associate Professor  
**Loret Steinberg**, MFA, Indiana University—Associate Professor  
**Nancy Stuart**, BA, MS, Rochester Institute of Technology—Associate Professor  
**Erik Timmerman**, BS, University of Wisconsin; MFA, Southern California College—Associate Professor  
**Allen Vogel**, Philadelphia College of Art—Assistant Professor  
**Jeff Weiss**, BS, University of Michigan—Associate Professor  
**Ken White**, BA, Princeton University; MA, MFA, University of New Mexico—Associate Professor

**Scott Williams**, BS, Purdue University; Ph.D., Montana State University—Assistant Professor  
**Thomas Zigon**, BS, MS, Rochester Institute of Technology—Assistant Professor

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**William H. Birkett**, BS, MBA, CMA—Associate Director; Professor  
**Barbara Birkett**, BA, MBA, CPA—Graduate Coordinator, Graphic Arts Systems; Associate Professor  
**Frank Cost**, BS, MS—Undergraduate Coordinator, Printing and Applied Computer Science Printing Systems; Associate Professor  
**Marie Freckleton**, BFA, MST—Graduate Coordinator, Graphic Arts Publishing; Associate Professor  
**Joseph L. Noga**, BS, MS—Graduate Coordinator, Printing Technology; Professor

#### Faculty

**Barbara Birkett**, BA, Aquinas College; MBA, University of Michigan; MBA, Rochester Institute of Technology; CPA, Maryland—Associate Professor  
**William H. Birkett**, BS, University of Illinois; MBA, University of Michigan; CMA—Professor  
**Robert Y. Chung**, BA, Eastern Washington State University; MS, Rochester Institute of Technology—Professor  
**Frank J. Cost**, BS, Eisenhower College; MS, Rochester Institute of Technology—Associate Professor  
**Hugh R. Fox**, AB, Dartmouth; JD, Rutgers Law School—Professor  
**Marie Freckleton**, BFA, MST, Rochester Institute of Technology—Associate Professor  
**Robert G. Hacker**, BS, Illinois State; MS, South Dakota State; Ph.D., Iowa—Professor  
**Samuel B. Hoff**, BA, MA, California State University—Associate Professor  
**Herbert H. Johnson**, BS, Rochester Institute of Technology—Associate Professor  
**Barry Lee**, BS, Rochester Institute of Technology—Visiting Instructor  
**Len Leger**, BS, SUNY College at Potsdam; MS, University of Rochester—Assistant Professor  
**Joseph L. Noga**, BS, Central Connecticut State University; MS, University of Bridgeport—Professor  
**Archibald D. Provan**, BS, Rochester Institute of Technology; M.Ed., University of Rochester—Professor  
**Werner Rebsamen**, Diploma, Academy of Fine Arts, Zurich—Professor  
**Frank J. Romano**, BA, City University of New York—Professor  
**Emery E. Schneider**, BS, Southern Illinois University; M.Ed., University of Rochester—Professor  
**Owen Smith**, BS, Jackson State University; MS, Rochester Institute of Technology—Professor

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**William Daniels**, BA, MA, Ph.D.—Dean, Professor  
**Glenn Kist**, AB, MA, Ph.D.—Associate Dean, Professor  
**Anne Coon**, BA, MA, Ph.D.—Assistant Dean; Professor  
**Paul Ferber**, BA, MPH., Ph.D.—Division Chairperson, Social Science; Associate Professor  
**Joseph Nassar**, BA, MA, Ph.D.—Division Chairperson, Language, Literature and Communication; Associate Professor  
**Murli Sinha**, AB, MA, Ph.D.—Division Chairperson, Behavioral Science; Professor  
**Fred L. Wilson**, BA, Ph.D.—Division Chairperson, Humanities; Professor  
**Bruce A. Austin**, BA, MA, Ph.D.—Program Chairperson, Professional and Technical Communication; Professor  
**Virginia Costenbader**, BA, MS, Ph.D.—Program Chairperson, School Psychology; Assistant Professor  
**Richard B. Lewis**, BA, MA—Program Chairperson, Criminal Justice; Assistant Professor  
**Katherine Mayberry**, BA, Ph.D.—Program Chairperson, Technical and Liberal Studies Option; Associate Professor  
**Roy W. Rodenhiser**, BA, M.Ed.; MSW, Ed.D.—Program Chairperson, Social Work; Associate Professor  
**Michael J. Vernarelli**, AB, MA, Ph.D.—Program Chairperson, Economics; Associate Professor  
**Thomas D. Hopkins**, BA, MA, Ph.D.—Arthur J. Gosnell Professor in Economics  
**Wade L. Robison**, BA, Ph.D.—Ezra A. Hale Professor in Applied Ethics  
**Michael Prosser**, BA, MA, Ph.D.—William A. Kern Professor in Communication  
**James Porter Buchanan**, BA, MA, Ph.D.—Caroline Werner Gannett Professor in the Humanities

#### Behavioral Science Division

#### Department of Psychology

**Brian P. Barry**, BA, St. John Fisher College; MSSC, Ph.D., Syracuse—Associate Professor, Psychology  
**Kathleen C. Chen**, BA, Rangoon University, Burma; MA, Bryn Mawr College; Ph.D., Pennsylvania State—Professor, Psychology  
**Virginia K. Costenbader**, BA, Dickinson College; MS, Ph.D., Syracuse University—Assistant Professor, Psychology  
**Nicholas DiFonzo**, MA, Rider College; MA, Ph.D., Temple University—Assistant Professor, Psychology  
**Janet E. Farnum**, BA, SUNY College at Brockport; Ph.D., University of Rochester—Professor, Psychology  
**Gerald T. Guild**, BA, SUNY College at Geneseo; MS, Saint Bonaventure University; M.Ed., Ph.D., University of Cincinnati—Assistant Professor  
**James B. Hale**, BS, University of Wyoming; M.Ed., University of Illinois at Chicago; Ph.D., Loyola University Chicago—Assistant Professor, Psychology

**Roger W. Harnish**, BA, University of Rochester; MS, Ph.D., Oklahoma State University—Associate Professor, Psychology  
**Morton Isaacs**, BA, Chicago University; BS, MA, Columbia; Ph.D., Yeshiva University—Professor, Psychology

#### Department of Social Work

**Richard Morales**, BA, Michigan State University; MA, SUNY College at Brockport; MSW, Ph.D., Syracuse University—Associate Professor, Social Work  
**Roy W. Rodenhiser**, BA, Parson's College; M.Ed., Boston University; MSW, Our Lady of the Lake University; Ed.D., University of Southern California—Associate Professor, Social Work  
**Marshall L. Smith**, AB, MSW, University of Michigan; Ph.D., SUNY Buffalo—Professor, Social Work  
**Helen Wadsworth**, BS, Gordon College; MSW, Syracuse University—Assistant Professor, Social Work

#### Department of Sociology and Anthropology

**Kijana Crawford-Adeleye**, BA, Tougaloo College; MSW, Atlanta University—Associate Professor, Sociology  
**Paul F. Grebinger**, BS, Columbia University; Ph.D., University of Arizona—Professor, Anthropology  
**Joanne M. Jacobs**, BA, University of Rochester; MA, SUNY Buffalo—Associate Professor, Sociology  
**Murli M. Sinha**, AB, Bihar University, India; MA, Patna University, India; MA, City College of City University of New York; Ph.D., Cornell University—Professor, Sociology

#### Humanities Division

#### Department of Fine Arts

**Douglas R. Coffey**, Diploma, Cleveland Institute of Art; BFA, University of Denver; MA, Western Reserve University—Professor, Fine Arts  
**Charles D. Collins**, AB, Rutgers University; MA, Ph.D., University of Iowa—Professor, Fine Arts  
**Peter W. Ferran**, BA, College of the Holy Cross; MA, Ph.D., University of Michigan—Associate Professor, Fine Arts  
**Tina Lent**, BA, MA, University of California at Los Angeles—Associate Professor, Fine Arts  
**Edward Schell**, B.Mus. Ed., Westminster College; MM, Westminster Choir College—Associate Professor, Fine Arts  
**Charles W. Warren**, AB, State University of Iowa; MA, Ph.D., Ohio State University—Professor, Fine Arts  
**Houghton Wetherald**, BA, Brown University; MA, Oberlin College—Professor, Fine Arts

#### Department of History

**Frank Annunziata**, AB, Manhattan College; MA, City College of the City University of New York; Ph.D., Ohio State University—Professor, History

**Richard Chu**, BA, Taiwan University; MA, University of California at Berkeley; Ph.D., Columbia University—Professor, History  
**Norman R. Coombs**, BS, MS, Ph.D., University of Wisconsin—Professor, History  
**Thomas Cornell**, BA, Southwestern at Memphis; MS, Georgia Institute of Technology; Ph.D., Johns Hopkins University—Assistant Professor, History  
**Nabil M. Kaylani**, BA, American University of Beirut; MA, Ph.D., Clark University—Professor, History  
**Glenn J. Kist**, AB, MA, Xavier University; Ph.D., Loyola University of Chicago—Professor, History  
**Richard D. Lunt**, BA, Oberlin College; MA, Ph.D., University of New Mexico—Professor, History  
**Pellegrino Nazzaro**, BA, P. Giannone; Ph.D., University of Naples—Professor, History  
**Kenneth R. Nelson**, AB, University of Connecticut; MA, Georgetown University; Ph.D., University of Virginia—Professor, History

#### Department of Philosophy

**James L. Campbell**, AB, Mount St. Mary's College; MA, Marquette University; Ph.D., University of Notre Dame—Professor, Philosophy  
**Timothy H. Engstrom**, BA, MA, Ph.D., University of Edinburgh, Scotland—Associate Professor, Philosophy  
**Dane R. Gordon**, BA, MA, University of Cambridge; BD, University of London; MA, University of Rochester—Professor, Philosophy  
**Wade L. Robison**, BA, University of Maryland; Ph.D., University of Wisconsin—Professor, Philosophy  
**John T. Sanders**, BA, Purdue University; MA, Ph.D., Boston University—Professor, Philosophy  
**David B. Suits**, BA, Purdue University; MA, Ph.D., University of Waterloo—Associate Professor, Philosophy

#### Department of Science, Technology and Society

**M. Ann Howard**, BS, Cornell University; JD, Rutgers University—Assistant Professor, Science, Technology and Society  
**Robert J. Paradowski**, BS, Spring Hill College; MA, Brandeis University; Ph.D., University of Wisconsin—Professor, Science, Technology and Society  
**Richard Shearman**, BA, Western State College of Colorado; MS, Eastern New Mexico University—Assistant Professor, Science, Technology and Society  
**Fred L. Wilson**, BA, Murray State University; Ph.D., University of Kansas—Professor, Science, Technology and Society

Language, Literature and Communication Division

#### Department of Communication

**Bruce A. Austin**, BA, Rider College; MS, Illinois State University; Ph.D., Temple University—Professor, Communications  
**Diane Hope**, BS, SUNY College at Brockport; MA, Ph.D., SUNY at Buffalo—Professor, Communications  
**Keith Bernard Jenkins**, BA, University of Arkansas; MA, Ph.D., Florida State University—Assistant Professor, Communications  
**David R. Neumann**, BA, Ithaca College; MA, Ph.D., Bowling Green State University—Assistant Professor, Communications  
**Michael Prosser**, BA, MA, Ball State University; Ph.D., University of Illinois—William A. Kern Professor in Communications  
**Rudolph Pugliese**, BA, SUNY College at Oneonta; MA, SUNY College at Brockport; Ph.D., Temple University—Assistant Professor, Communications  
**Patrick M. Scanlon**, BA, SUNY Albany; Ph.D., University of Rochester—Assistant Professor, Communications

#### Department of Language and Literature

**Sam Abrams**, AB, Brooklyn College; MA, University of Illinois—Professor, Literature  
**Arnold J. Berman**, BA, Hofstra University; MA, Ph.D., New York University; MSW, Syracuse University—Professor, Literature  
**Anne Coon**, BA, MA, Ph.D., SUNY at Buffalo—Professor, Language  
**Diane J. Forbes**, BA, SUNY College at Geneseo; MA, Pennsylvania State University—Assistant Professor, Language  
**Katherine Mayberry**, BA, Smith College; MA, Ph.D., University of Rochester—Associate Professor, Literature  
**Stanley D. McKenzie**, BS, Massachusetts Institute of Technology; MA, Ph.D., University of Rochester—Professor, Literature  
**David Murdoch**, BA, Shurtleff College; MA, Redlands University; Ph.D., Occidental College—Professor, Literature  
**Joseph M. Nassar**, BA, MA, University of Toledo; Ph.D., SUNY Binghamton—Professor, Literature  
**Mark L. Price**, BA, MA, Miami University—Associate Professor, Literature  
**Sandra E. Saari**, AB, Carleton College; MA, Ph.D., Occidental College—Professor, Literature  
**Sister Mary Sullivan**, BA, Nazareth College; MA, Ph.D., University of Notre Dame—Professor, Literature  
**Elaine C. Thiesmeyer**, AB, Connecticut College; MA, Cornell University—Associate Professor, Literature  
**Andrea C. Walter**, BA, Duquesne University; MA, University of Pittsburgh; Ed.D., University of Rochester—Professor

**Wilma Wierenga**, AB, Calvin College; MA, Middlebury College, Johannes Gutenberg University—Assistant Professor, Language  
**Janet Zandy**, BA, Montclair State College; MA, University of Rochester—Assistant Professor, Language

#### Adjunct Faculty

**Andrew W. Boone**, BA, Stonehill College; MA, Middlebury College  
**Susan Donovan**, BA, Cornell College; MS, Nazareth College  
**Frank E. Fee**, MA, SUNY College at Brockport  
**Rhona Genzel**, BA, City College of New York  
**Peter Haggerty**, BA, Wesleyan University; MA, Rutgers University  
**Barbara MacCameron**, BS, Syracuse University; MA, University of Colorado  
**Michael A. McMahon**, AB, Rhode Island College; MS, University of Rhode Island  
**Samuel M. Nelson**, MA, JD, Syracuse University  
**Janet K. Patlow**, BA, Wells College; MS, SUNY College at Brockport; MA, University of Rochester  
**Sora R. Sachs**, BA, SUNY Buffalo; MA, University of Rochester  
**Katherine Schumacher**, BA, Indiana University; MA, Cornell University  
**Jane Smith**, BA, Lawrence University; MA, Northwestern University  
**Michael R. Stone**, MSW, West Virginia University

#### Social Science Division

#### Department of Criminal Justice

**John O. Ballard**, BA, MPA, Indiana University—Associate Professor, Criminal Justice  
**Paul Brule**, BA, Wittenberg University; MS, Xavier University—Assistant Professor, Criminal Justice  
**John M. Klofas**, BA, College of the Holy Cross; MA, Ph.D., SUNY Albany—Professor, Criminal Justice  
**Richard B. Lewis**, BA, SUNY Albany; MS, Southern Illinois—Assistant Professor, Criminal Justice  
**John A. Murley**, BA, University of Dallas; MA, Ph.D., Claremont Graduate School and University Center—Professor, Criminal Justice  
**John M. Violanti**, BA, MS, Ph.D., SUNY at Buffalo—Associate Professor, Criminal Justice

#### Department of Economics

**Constantino Dumangane Sr.**, BA, MPA, Syracuse University; Ph.D., SUNY at Buffalo—Associate Professor, Economics  
**Thomas D. Hopkins**, BA, Oberlin College; MA, Ph.D., Yale University—Professor, Economics  
**John Humphries**, BS, SUNY at Oswego; MS, Ph.D., Syracuse University—Professor, Economics  
**Hoyoung Lee**, BA, Seoul National University, Korea; MA, Ph.D., University of Maryland—Professor, Economics  
**Jeanette C. Mitchell**, BA, BA, Westminster College; Ph.D., Ph.D., University of Utah—Assistant Professor, Economics

**Michael J. Vernarelli**, AB, University of Michigan; MA, Ph.D., SUNY Binghamton—Professor, Economics

#### Department of Political Science

**Louis J. Andolino**, BS, Rochester Institute of Technology; MA, Kent State University—Associate Professor, Political Science  
**Robert J. Brown**, BS, SUNY College at Potsdam; Ph.D., Syracuse University—Associate Professor, Political Science  
**William J. Daniels**, BA, Upper Iowa University; MA, Ph.D., University of Iowa—Professor, Political Science  
**Paul H. Ferber**, BA, American University; M.Ph., Ph.D., George Washington University—Associate Professor, Political Science  
**James S. Fleming**, AB, Wake Forest University; MA, Ph.D., University of Arizona—Professor, Political Science  
**James L. Troisi**, AB, Lyscom College; MA, Ph.D., Syracuse University—Associate Professor, Political Science

#### College of Science

**Robert A. Clark**, BS, Massachusetts Institute of Technology; Ph.D., University of Maryland—Interim Dean; Director, Center for Materials Science and Engineering; Professor  
**Pasquale T. Saeva**, BA, Niagara University; MA, Bowling Green State University; MS, Rochester Institute of Technology—Associate Dean, Professor  
**Eileen D. Marron**, BS, St. Bonaventure University; MA, Colgate University—Student and Community Affairs Coordinator  
**G. Thomas Frederick**, BS, MS, Ph.D., Ohio State University—Department Head, Biology; Professor  
**Gerald A. Takacs**, BS, University of Alberta; Ph.D., University of Wisconsin—Department Head, Chemistry; Professor  
**John M. Waud**, BS, Lehigh University; MS, University of Pennsylvania; Ph.D., Lehigh University—Department Head, Allied Health Sciences; Professor  
**Rebecca E. Hill**, BS, Frostburg State College; MA, West Virginia University; MS, Rochester Institute of Technology—Department Head, Mathematics and Statistics; Professor  
**Arthur Z. Kovacs**, AB, Wabash College; Ph.D., Duke University—Department Head, Physics; Professor  
**Peter A. Cardegna**, BA, Loyola College; Ph.D., Clemson University—Program Director, Materials Science and Engineering; Associate Professor  
**David Lake**—Facilities Manager

#### Department of Biological Sciences

**Richard L. Doolittle**, BA, University of Bridgeport; MS, Ph.D., University of Rochester—Professor  
**Jean A. Douthwright**, BA, Skidmore College; MS, Pennsylvania State University; MS, Ph.D., University of Rochester—Associate Professor

**Irene M. Evans**, AB, University of Rochester; MS, Wesleyan University; Ph.D., University of Rochester—Associate Professor  
**G. Thomas Frederick**, BS, MS, Ph.D., Ohio State University—Professor  
**Paul A. Haefner**, BS, Franklin and Marshall College; MS, Ph.D., University of Delaware—Professor  
**Jeffrey S. Lodge**, BA, University of Delaware; Ph.D., University of Mississippi—Associate Professor  
**Douglas P. Merrill**, BS, Ph.D., SUNY College of Environmental Science and Forestry, Syracuse University—Professor  
**Robert H. Rothman**, BA, Ph.D., University of California at Berkeley; MA, California State, San Diego—Professor  
**Carole A. Sack**, BA, University of Michigan; Ph.D., Michigan State University—Professor  
**Franz K. Seischab**, BS, Cornell University; MS, SUNY College at Geneseo; Ph.D., SUNY College of Environmental Science and Forestry, Syracuse University—Professor  
**Martin A. Vaughan**, BS, MS, Ohio University; Ph.D., Indiana State University—Associate Professor  
**Nancy Wanek**, BS, University of Wisconsin; MS, Ph.D., University of California—Associate Professor

#### Department of Chemistry

**B. Edward Cain**, BA, Harpur College, SUNY Binghamton; Ph.D., Syracuse University—Professor  
**Robert A. Clark**, BS, Massachusetts Institute of Technology; Ph.D., University of Maryland—Professor  
**Paul Craig**, BS, Oral Roberts University; Ph.D., University of Michigan—Assistant Professor  
**Thomas Gennett**, BA, SUNY College at Potsdam; Ph.D., University of Vermont—Associate Professor  
**Joseph P. Hornak**, BS, Utica College of Syracuse University; MS, Purdue University; Ph.D., University of Notre Dame—Professor  
**Marvin L. Illingsworth**, BS, Lafayette College; Ph.D., University of Massachusetts—Professor  
**Andreas Langner**, BS, Ph.D., SUNY Buffalo—Associate Professor  
**Terence C. Morrill**, BS, Syracuse University; MS, San Jose State College; Ph.D., University of Colorado—Professor  
**John P. Neenan**, BS, Wayne State University; Ph.D., University of California at Santa Barbara—Professor  
**Christian G. Reinhardt**, BS, Lafayette College; Ph.D., University of Rochester—Professor  
**Gerald A. Takacs**, BS, University of Alberta; Ph.D., University of Wisconsin—Professor  
**Laura Ellen Tubbs**, BS, Hood College; Ph.D., University of Rochester—Professor  
**Kay G. Turner**, BS, Bucknell University; Ph.D., Ohio State University—Professor

#### Department of Mathematics and Statistics

**Maurino P. Bautista**, BS, Ateneo de Manila University; MS, Ph.D., Purdue University—Associate Professor  
**Marcia P. Birken**, AB, Mt. Holyoke College; MS, New York University—Professor  
**Patricia A. Clark**, SB, SM, Massachusetts Institute of Technology; Ph.D., University of Rochester—Professor  
**David M. Crystal**, BS, MS, SUNY Albany—Professor  
**Alejandro B. Engel**, BS, Universidad de Chile; Ph.D., SUNY at Buffalo—Professor  
**David L. Farnsworth**, BS, Union College; MA, Ph.D., University of Texas—Professor  
**Sally E. Fischbeck**, BA, University of Rochester; MS, Rochester Institute of Technology—Associate Professor  
**George T. Georgantas**, AB, University of Rochester; AM, Washington University; Ph.D., SUNY at Buffalo—Professor  
**James A. Glasenapp**, BS, University of Houston; MA, SUNY at Buffalo—Professor  
**Marvin H. Gruber**, BS, Brooklyn College; MA, Johns Hopkins University; MS, Rochester Institute of Technology; MA, Ph.D., University of Rochester—Professor  
**Laxmi N. Gupta**, BS, MS, Agra University, India; MS, Rochester Institute of Technology; Ph.D., SUNY at Buffalo—Professor  
**James J. Halavin**, BS, Clarkson University; MA, Ph.D., SUNY at Buffalo—Professor  
**David S. Hart**, BS, Syracuse University; MA, University of Rochester—Associate Professor  
**Rebecca E. Hill**, BS, Frostburg State College; MA, West Virginia University; MS, Rochester Institute of Technology—Professor  
**Edwin T. Hofer**, BA, Elmhurst College; AM, Washington University; Ph.D., SUNY at Buffalo—Professor  
**Seshavadhani Kumar**, BS, MS, University of Madras; Ph.D., University of Delaware—Associate Professor  
**Wanda S. Lojasiewicz**, MS, Ph.D., University of Cracow, Poland—Associate Professor  
**Sophia A. Maggelakis**, BS, MS, Ph.D., Old Dominion University—Associate Professor  
**James E. Marengo**, BA, MS, California State University; Ph.D., Colorado State University—Associate Professor  
**David J. Mathiason**, BA, St. Olaf College; MS, Syracuse University; MS, Ph.D., University of Rochester—Professor  
**Douglas S. Meadows**, BS, Stanford University; MS, New York University; Ph.D., Stanford University—Professor  
**Edward A. Newburg**, BS, MS, Purdue University; Ph.D., University of Illinois—Professor  
**Richard J. Orr**, BS, John Carroll University; MS, Case Institute of Technology; MS, SUNY at Buffalo—Professor

**John D. Paliouras**, BS, Alfred University; MA, Ph.D., University of Illinois—Professor  
**James C. Runyon**, BEE, Cornell University; MSEE, University of Rochester—Professor  
**Pasquale T. Saeva**, BA, Niagara University; MS, Bowling Green State University; MS, Rochester Institute of Technology—Professor  
**Harry M. Schey**, BS, Northwestern University; AM, Harvard University; Ph.D., University of Illinois—Professor  
**Jack Tishkoff**, BS, MS, MA, University of Rochester—Professor  
**Thomas C. Upson**, BS, Tufts University; MS, Rensselaer Polytechnic Institute—Professor  
**Theodore W. Wilcox**, BS, University of Michigan; MS, Ph.D., University of Washington—Professor  
**Paul R. Wilson**, BA, MA, University of Cincinnati; Ph.D., University of Illinois—Professor  
**Elmer L. Young**, BA, Amherst College; MS, Ph.D., Ohio State University—Associate Professor

#### Department of Physics

**John D. Andersen**, BS, SUNY at Buffalo; MA, Ph.D., University of Rochester—Associate Professor  
**Hrishikesh Banerjee**, BS, Presidency College; MS, University College of Science; Ph.D., Institute of Nuclear Physics, Calcutta—Professor  
**Peter A. Cardegna**, BS, Loyola College; Ph.D., Clemson University—Associate Professor  
**Tracy A. Davis**, BA, BS, Wofford College; Ph.D., Clemson University—Associate Professor  
**Alan B. Entenberg**, AB, Washington University; Ph.D., University of Rochester—Associate Professor  
**Charles A. Hewett**, BS, MS, Missouri School of Mines; Ph.D., University of Missouri—Professor  
**Ronald E. Jodoin**, BS, Worcester Polytechnic Institute; Ph.D., University of Rochester—Professor  
**James R. Kern**, BS, Indiana University of Pennsylvania; Ph.D., Clemson University—Professor  
**Michael Kotlarchyk**, BS, MS, Ph.D., Massachusetts Institute of Technology—Professor  
**Arthur Z. Kovacs**, AB, Wabash College; Ph.D., Duke University—Professor  
**Vern W. Lindberg**, BS, University of Alberta; MS, Ph.D., Case Western Reserve University—Associate Professor  
**Varadaraja V. Raman**, BS, St. Xavier College; MS, Calcutta University; Ph.D., University of Paris—Professor  
**Earl H. Sexton**, BS, Tufts University; MS, Massachusetts Institute of Technology; MST, Cornell University; Ph.D., SUNY Albany—Professor  
**John S. Shaw**, BS, MS, Indiana University; Ph.D., SUNY Albany—Professor  
**Jerome Wagner**, BS, Case Institute of Technology; MS, Ph.D., University of Wisconsin—Professor  
**Anne G. Young**, BA, Bryn Mawr; MS, Ph.D., Cornell University—Professor

#### Department of Allied Health Sciences

**John M. Waud**, BS, Lehigh University; MS, University of Pennsylvania; Ph.D., Lehigh University—Professor

#### Biomedical Computing

**Nicolas Threos**, BA, Wabash College; MS, Utah State University—Program Director; Associate Professor

#### Clinical Chemistry

**John M. Waud**, BS, Lehigh University; MS, University of Pennsylvania; Ph.D., Lehigh University—Program Director, Professor  
**James C. Aumer**, BS, MS, Michigan Technological University—Professor

#### Clinical Faculty

**Richard M. Bayer**, Ph.D., Rutgers University—Rochester General Hospital, Rochester  
**Michael R. Bogovich**, BS, MS, Rochester Institute of Technology—Calibration Engineer, Clinical Products Division, Eastman Kodak Company  
**David Brown**, BS, Lead Systems Analyst/Programmer, Information Services Department, Rochester General Hospital, Rochester  
**Howard N. Harrison**, BS, University of California; MS, Ph.D., Cornell University—Rochester General Hospital, Rochester  
**Fred D. Lasky**, BS, Ithaca College; Ph.D., SUNY at Buffalo—Senior Clinical Chemist, Clinical Products Division, Eastman Kodak Company  
**Daniel Montondo**, MS, Administrative Coordinator—Data Management, Rochester General Hospital, Rochester

#### Medical Technology

**James C. Aumer**, BS, MS, Michigan Technological University; (ASCP)—Program Director; Professor

#### Clinical Faculty

**Jean M Maatta**, MS, MT (ASCP), Program Director, School of Medical Technology, Albany Medical Center, Albany  
**Edward J. Hanchay**, MT (ASCP)—Program Director, School of Medical Technology; Boston Veterans Administration Medical Center, Boston  
**John Hayes**, M.D., Director, School of Medical Technology, Boston Veterans Administration Medical Center, Boston  
**Virginia Kotlarz**, MT (ASCP)—Program Director, School of Medical Technology, Daemen College, Buffalo  
**P. K. Carpenter**, M.D.—Director, School of Medical Technology, St. Mary's Hospital, Rochester  
**Nancy Mitchell**, MS, MT (ASCP)—Program Director, School of Medical Technology, Rochester General Hospital, Rochester  
**Arlene Nikiel**, MS, MT (ASCP) SM—Program Director, School of Medical Technology, St. Mary's Hospital, Rochester

**Marie Paserba**, MT (ASCP)—Microbiology Education and Training Coordinator, School of Medical Technology, Albany Medical Center, Albany  
**Jeffrey Ross**, M.D., Director, School of Medical Technology, Albany Medical Center, Albany  
**Mary Grace Seresia**, MT (ASCP)—Chemistry Education and Training Coordinator, School of Medical Technology, Albany Medical Center, Albany  
**Zygmunt M. Tomkiewicz**, M.D.—Director, School of Medical Technology, Rochester General Hospital, Rochester  
**Joanne Trovato**, MT (ASCP), Assistant Education Coordinator, School of Medical Technology, Boston Veterans Administration Medical Center

#### Physician Assistant

**Heidi Miller**, PA-C, BS, Alderson Broaddus College—Program Director; Assistant Professor  
**Nancy Valentage**, PA-C, BS, Gannon University—Clinical Coordinator; Assistant Professor  
**Betty Rabinowitz**, M.D.—Medical Director

#### Clinical Faculty

**Curtis Haas**, Pharm.D., Rochester General Hospital, Rochester  
**Howard Harrison**, BS, University of California, MS, Ph.D., Cornell University—Rochester General Hospital, Rochester

#### Nuclear Medicine Technology

**Kristen Waterstram-Rich**, BS, CNMT, Rochester Institute of Technology—Program Director, Assistant Professor  
**Nancy McKee**, BS, CNMT, Rochester Institute of Technology—Clinical Education Coordinator  
**Robert O'Mara**, M.D.—Medical Director

#### Clinical Faculty

**Brian Block**, M.D.—Director, Department of Nuclear Medicine, Mount St. Mary's Hospital, Lewiston  
**Steven Braff**, M.D.—Director, Department of Nuclear Medicine, Braff Associates, Clifton Springs Hospital, Clifton Springs; Geneva General Hospital, Geneva  
**Lawrence Cadkin**, M.D.—Director, Department of Nuclear Medicine, United Health Services—Wilson Site, Johnson City  
**Shirley Connors**, CNMT—Chief Technologist, Department of Nuclear Medicine, St. Joseph's Hospital, Cheektowaga  
**Cindy Cress**, CNMT—Chief Technologist, Department of Nuclear Medicine, Community General Hospital, Syracuse  
**Brenda DiCuffa**, CNMT—Chief Technologist, Department of Nuclear Medicine, Sisters of Charity Hospital, Buffalo  
**Chuck DiNolfo**—Administrative Director, Department of Nuclear Medicine, Rochester General Hospital, Rochester

**Dave Galleher**, CNMT—Chief Technologist, Geneva General Hospital, Geneva  
**Kim Gnann**, CNMT—Chief Technologist, Department of Nuclear Medicine, Mount St. Mary's Hospital, Lewiston  
**William Goldman**, M.D.—Director, Department of Nuclear Medicine, Community General Hospital, Syracuse  
**Debra Goodman**, CNMT—Chief Technologist, Department of Nuclear Medicine, The Genesee Hospital, Rochester  
**Kevin Hopkins**, CNMT—Chief Technologist, Department of Nuclear Medicine, Strong Memorial Hospital, Rochester  
**Mei-Ku Huang**, M.D.—Director, Department of Nuclear Medicine, St. Mary's Hospital, Rochester  
**Norman Jaffe**, M.D.—Director, Department of Nuclear Medicine, Onondaga Hill Cardiovascular Group, Syracuse  
**Francis Kelley**, M.D.—Chief of Radiology, Department of Nuclear Medicine, Highland Hospital, Rochester  
**Richard Kessler**, M.D.—Director, Department of Nuclear Medicine, Sisters of Charity Hospital, Buffalo  
**Robert Knack**, M.D.—Director, Department of Nuclear Medicine, Our Lady of Lourdes Hospital, Binghamton  
**Bernie Mahar**—Administrative Director of Nuclear Medicine and Ultrasound, Crouse Irving Memorial Hospital, Syracuse  
**Maria Mackin**, CNMT—Chief Technologist, Department of Nuclear Cardiology, Strong Memorial Hospital, Rochester  
**Robert O'Mara**, M.D.—Chief, Division of Nuclear Medicine, University of Rochester Medical Center, Rochester  
**Craig Osborn**, CNMT—Chief Technologist, Department of Nuclear Medicine, Robert Packer Hospital, Sayre, Pa.  
**David Paul**, M.D.—Director, Department of Nuclear Medicine, Genesee Memorial Hospital, Batavia  
**Christopher Pettine**, CNMT—Chief Technologist, Clifton Springs Hospital, Clifton Springs  
**Gail Redich**, CNMT—Chief Technologist, St. Mary's Hospital, Rochester  
**Gretchen Rehberg**, CNMT—Chief Technologist, Department of Nuclear Imaging, Rochester General Hospital, Rochester  
**Shirley Rheinheimer**, CNMT—Chief Technologist, Department of Nuclear Medicine, Crouse Irving Hospital, Syracuse  
**Judi Rizzo**, CNMT—Chief Technologist, Department of Nuclear Medicine, Highland Hospital, Rochester  
**Renato Rojas**, M.D.—Director, Department of Nuclear Medicine Technology, Arnot-Ogden Medical Center, Elmira  
**Bill Rupert**, CNMT—Chief Technologist, Department of Nuclear Medicine, United Health Services—Wilson Site, Johnson City

**Gerald Russ**, Ph.D., Department of Nuclear Medicine, Strong Memorial Hospital, Rochester  
**Joseph Saladzius**, CNMT—Chief Technologist, Department of Nuclear Medicine, Park Ridge Hospital, Rochester  
**Lynn Sauro**, CNMT—Chief Technologist, Department of Nuclear Medicine, Onondaga Hill Cardiovascular Group, Syracuse  
**W. Winslow Schrank**, M.D.—Chief Radiologist, Department of Diagnostic Imaging, Park Ridge Hospital, Rochester  
**Gerald Schwartz**, M.D.—Director, Department of Nuclear Medicine, St. Joseph's Hospital, Cheektowaga  
**Ronald Schwartz**, M.D.—Director, Department of Nuclear Cardiology, Strong Memorial Hospital, Rochester  
**Edward Smith**, Sc.D.—Department of Nuclear Medicine, Strong Memorial Hospital, Rochester  
**Marilyn Sullivan**, CNMT—Chief Technologist, Arnot-Ogden Medical Center, Elmira  
**Mark Tomko**, CNMT—Chief Technologist, Department of Nuclear Medicine, Our Lady of Lourdes Hospital, Binghamton  
**Herman Wallinga**, M.D.—Director, Division of Nuclear Medicine, Genesee Hospital, Rochester  
**Paul Weiss**, M.D.—Director, Division of Nuclear Imaging, Department of Diagnostic Radiology/Nuclear Imaging, Rochester General Hospital, Rochester  
**Ralph Zehr**, M.D.—Director, Department of Nuclear Medicine, Robert Packer Hospital, Sayre, Pa.  
**Albert Zens**, M.D.—Director, Department of Nuclear Medicine, Crouse Irving Memorial Hospital, Syracuse

#### Diagnostic Medical Sonography

**Hamad Ghazle**, BS (RDMS), Rochester Institute of Technology; MS, University of Rochester—Program Director, Assistant Professor  
**Peter Gleason**, M.D.—Medical Director  
**Roxanne Schon**, BA (CNMT, RDMS), SUNY Buffalo—Clinical Coordinator

#### Clinical Faculty

**Jacques Abramowicz**, M.D.—Medical Director, Perinatal Ultrasound Laboratory, Strong Memorial Hospital, Rochester  
**Spencer Annabel**, M.D.—Medical Director, Ultrasound Department, St. James Mercy Hospital, Hornell  
**Birgit B. Armstrong**, RDMS—Sonographer, Westside Imaging, Rochester  
**Maryanne Arseneau**, M.D.—Medical Director, Department of Ultrasound, Neward-Wayne Community Hospital, Newark  
**Mohammad Ayyub**, M.D.—Medical Director, Ultrasound Department, Jones Memorial Hospital, Wellsville  
**Farhad Azimi**, M.D.—Medical Director, Department of Radiology, St. Joseph's Hospital, Syracuse  
**Ted Barnett**, M.D.—Medical Director, Department of Ultrasound, F.F. Thompson Hospital, Canandaigua

**Kathy Belardi**, RDMS—Chief Sonographer, Department of Ultrasound, Sisters of Charity Hospital, Buffalo  
**Robert Benazzi**, M.D.—Medical Director, Department of Ultrasound, St. Mary's Hospital, Rochester  
**Laura Berg**, RDMS—Chief Sonographer, Department of Ultrasound, Ide Group, Rochester  
**Steven Braff**, M.D.—Medical Director, Department of Ultrasound, Clifton Springs Hospital/Braff Associates, Clifton Springs  
**Olga Christle**, RDMS—Chief Sonographer, Department of Ultrasound, St. Joseph's Imaging Associates, Liverpool  
**Tamara Conroy**, RDMS—Chief Sonographer, Department of Ultrasound, St. Joseph's Imaging Associates, Liverpool  
**Doreen Cook**, RDMS—Chief Sonographer, Antenatal Testing Unit, Rochester General Hospital, Rochester  
**Cynthia Ellis**, RDMS—Chief Sonographer, Radiology Department, Lockport Memorial Hospital, Lockport  
**Lieslie Filozof**, RT(M)RDMS—Chief Sonographer, Radiology Department, Genesee Memorial Hospital, Batavia  
**David Flannagan**, M.D.—Medical Director, Department of Radiology/Ultrasound, Community General Hospital, Syracuse  
**Rosemary Flint**, RT, RDMS—Chief Sonographer, Department of Ultrasound, St. Mary's Hospital, Rochester  
**Nancy Gadziala**, M.D.—Medical Director, Department of Ultrasound, Ide Group P.C., Rochester  
**Jeffrey Gibson**, RDMS—Chief Sonographer, Radiology Department/Ultrasound, Rochester General Hospital, Rochester  
**Mario Grosso**, M.D.—Medical Director, Westside Imaging, Rochester  
**Maria Gruttadauria**, RDMS—Chief Sonographer, Westside Imaging, Rochester  
**Richard Huff**, M.D.—Medical Director, Department of Ultrasound, Buffalo General Hospital, Buffalo  
**Karen Kedziarski**, RDMS—Chief Sonographer, Ultrasound Department, Jones Memorial Hospital, Wellsville  
**Francis Kelley**, M.D.—Medical Director, Medical Imaging/Ultrasound, Highland Hospital, Rochester  
**Kevin Kirch**, RDMS—Chief Sonographer, Department of Radiology, St. Joseph's Hospital, Syracuse  
**Susan Lazarus**, RDMS—Sonographer, Department of Radiology, St. Joseph's Hospital, Syracuse  
**Robert Lerner**, M.D.—Medical Director, Rochester Radiology Associates, Rochester  
**Jesse Makhija**, M.D.—Medical Director, Radiology Department, Lockport Memorial Hospital, Lockport  
**David Martin**, M.D.—Medical Director, Department of Ultrasound, Children's Hospital, Buffalo

**Phil Matteson**, RDMS—Chief Sonographer, Department of Ultrasound, Buffalo General Hospital, Buffalo  
**Michael McLaughlin**, RT, RDMS—Chief Sonographer, Department of Ultrasound, Geneva General Hospital, Geneva  
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**David Paul**, M.D.—Medical Director, Radiology Department, Genesee Memorial Hospital, Batavia  
**Lisa Phillips**, RT, RDMS—Chief Sonographer, Department of Ultrasound, F. F. Thompson Hospital, Canandaigua  
**Nina Ploetz**, RT, RDMS—Chief Sonographer, Medical Imaging/Ultrasound, Highland Hospital, Rochester  
**Marianne Raub**, RDMS—Chief Sonographer, Department of Ultrasound, Crouse Irving Memorial Hospital, Syracuse  
**Jay Riccardi**, M.D.—Medical Director, Department of Ultrasound, United Health Services/Wilson Hospital, Johnson City  
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**Deborah Rubens**, M.D.—Medical Director, Radiology Department, Strong Memorial Hospital, Rochester  
**Kevin Rutkowski**, RT, RDMS—Chief Sonographer, United Health Services/Wilson Hospital, Johnson City  
**Suzanne Scott**—Chief Sonographer, Department of Ultrasound, Newark-Wayne Community Hospital, Newark  
**Louise Sinesio**, RDMS—Chief Sonographer, Department of Ultrasound, Clifton Springs Hospital/Braff Associates, Clifton Springs  
**Majorie Smith**, RN, RDMS—Chief Sonographer, Ultrasound Department, St. James Mercy Hospital, Hornell  
**Bobbi Stebbins**, BS, RDMS—Chief Sonographer, Perinatal Ultrasound Laboratory, Strong Memorial Hospital, Rochester  
**Kelly Swagler**, RDMS—Chief Sonographer, Rochester Radiology Associates, Rochester  
**Paul Velt**, M.D.—Medical Director, Department of Ultrasound, Geneva General Hospital, Geneva  
**Maggie Vill**, M.D.—Medical Director, Antenatal Testing Unit, Rochester General Hospital, Rochester  
**Albert Zens**, M.D.—Medical Director, Department of Ultrasound, Crouse Irving Memorial Hospital, Syracuse

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# RIT Terminology

**Academic Probation**—A formal warning from your college dean that you are in danger of being suspended or dismissed from RIT because your grade point average (GPA) has fallen below 2.00 (C average). (See page 312 for a more complete description.)

**Accredited**—An academic program, school or university that has been reviewed by an appropriate educational association and meets its standards of quality in academics and services is accredited. RIT is accredited by the Middle States Association of Colleges and Schools, and several of its academic departments and programs have achieved additional accreditation by national associations within their discipline.

**Audit**—Attending a course without receiving an evaluation grade (such as A, B, etc.) or receiving credit. To audit a course, you must formally register for it and have the permission of the department. Audited courses may not be used to fulfill degree requirements, although the course and an audit grade of Z will appear on your official transcript.

**Cooperative education (co-op)**—The opportunity to work in a full-time, paid position related to your field of study. Co-op is a formal component of many RIT programs. Co-op experiences are divided into “blocks” of one quarter each and do not carry credit. They are usually scheduled during your final two years of study and should be carefully coordinated with the help of your adviser, the Office of Cooperative Education and Placement and your employer. Registration is required.

**Credit by exam or experience**—Academic credit awarded based on evaluation of a comprehensive examination, interview or record review.

**Credit hour**—The numerical value assigned to courses, internships and other educational experiences. RIT follows a quarterly academic calendar, so its base measure is the *quarter* credit hour, which generally equals two-thirds of a semester hour.

**Curriculum**—The set of courses that, when finished successfully, can qualify a student for an academic degree. The curricula for all of RIT’s degree programs have been registered with the New York State Education Department.

**Discipline**—A distinct academic area of study. At RIT, most programs are interdisciplinary, or include course work from a variety of areas of study.

**Distance learning**—A means of earning a certificate or degree off campus through methods such as cable TV broadcasts and videotapes of lectures; teleconferences; computer conferences; and on-line computer services such as electronic blackboards, picture phones and electronic mail. These technologies enable RIT’s distance-learning students to follow the same quarter system of study as on-campus students.

**Drop/add**—Formally changing the set of courses in which you are enrolled in any quarter by adding or removing yourself from an official class list for a course. You may add or drop a course until the end of the sixth class day of a quarter, as specified on the academic calendar. If you do not officially submit a drop/add form for a course, you may receive a failing grade for a course you have stopped attending or not receive credit for a course you have begun attending.

**Dual degree program**—A program combining the course curricula from a bachelor’s degree program and a master’s degree program. This produces a streamlined curriculum that allows selected students to earn both a bachelor’s and master’s degree at the same time.

**Evening program**—An academic program specifically designed for students who attend college part time. The RIT Budget Committee has approved specific evening programs as eligible for “evening division” tuition rates.

**Full-time student**—A student registered for at least 12 quarter credit hours of course work per quarter (excluding audits and credits by exam or experience) or registered for a cooperative education work block during the quarter.

**Good standing**—A student eligible to enroll in courses (not suspended) as verified by the Office of the Registrar. Certain financial aid programs have specific “standards of progress” by which students are determined to be in “good standing” and therefore eligible for aid. See page 338.

**Half-time student**—A student registered for 6 to 11 credit hours during a quarter.

**Internships/field instruction**—An experiential learning program in which students are placed into a public or private agency to work with professionals in their field of study. The student is eligible for academic credit for the work and is supervised and supported by a mentor while in the position.

**Lower-division course**—An undergraduate course typically taken during the first or second years of study (100- to 300- level).

**Matriculated**—A student who has been formally accepted into an academic program and begun a course of study. You must be matriculated in order to receive degrees or other formal awards from RIT.

**New York State Immunization Certification**—New York State Public Law 2165 (June 1989) requires RIT to either verify that students have been immunized according to state health law (see page 332 for specifics) or deny them access to RIT facilities. For more information, contact the RIT Student Health Center.

**Part-time student**—A student registered for at least one course during a quarter, excluding audits and credits by exam/experience.

**Residency**—Term for the minimum number of credit hours a student must earn at RIT to be eligible for academic certification and completion of degree requirements. The residency requirement ensures that RIT faculty have sufficient opportunity to evaluate your academic abilities.

**Summer orientation programs**—Two- to three-day events scheduled during the summer for students who will enter RIT during the upcoming academic year and their parents. Tours of campus; meetings with key staff, faculty advisers and fellow students; and opportunities to register for courses are some of the many activities offered.

**Summer Vestibule Program**—An orientation and evaluation program designed and offered especially for incoming NTID students with hearing impairments.

**Suspension**—Dismissal from RIT for either academic or disciplinary reasons, which bars a student from enrolling in any RIT courses while the suspension is in effect. If you are suspended for academic reasons, you must usually wait for at least a year before applying for readmission (see page 312). If you are suspended as a result of action by the judicial and appeals processes, you may not be readmitted until the dismissal is formally waived by the assistant to the vice president for Student Affairs/Judicial Affairs.

**Upper-division course**—An undergraduate course usually taken during the last two to three years of study (400- to 600-level courses).

**Withdrawal from a course**—Removal of a student from the official enrollment list of a class for a given quarter *after* the six-day drop/add deadline. You may withdraw from a course at any time through the eighth week of the quarter (time frames are adjusted for sessions of fewer than 10 weeks). After the end of the eighth week, you may withdraw only with written approval of the course instructor and chairperson of your department of study. In either case, the course remains on your record with a grade of “W” and you are still financially responsible for the course tuition.

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