Course Numbering

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

First letter College offering the course

Second and third letters: School or department of that college

Fourth letter Discipline

First number: Course level: 0 — Non-credit, 1 — Diploma; 2 or 3 — Lower level degree courses; 4, 5, or 6 — Upper level undergraduate degree courses; 7 or 8 — Courses for graduate credit.

Second and third numbers: Course differentiation and sequencing

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

Course prerequisites are shown in parentheses after course descriptions.

Courses of Study 1984-85

Produced by RIT Communications

Rochester Institute of Technology
Office of Admissions
One Lomb Memorial Drive
P.O. Box 9887
Rochester, NY 14623
(716) 475-6631
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This book represents the best academic planning at the time of publication. Course and curriculum changes sometimes occur after the book has been printed, and for this reason Rochester Institute of Technology does not assume a contractual obligation with its students for the contents of this publication.

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In this catalog you will find course descriptions for all course offerings given by the day colleges, schools and departments of the Institute for undergraduate or graduate credit. The listing does not include courses provided by the College of Continuing Education (except for graduate statistics courses) nor those courses specifically for students of the National Technical Institute for the Deaf. These are described in the separate Continuing Education and NTID catalogs.

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

Rochester Institute of Technology
Office of Admissions
One Lomb Memorial Drive
P.O. Box 9887
Rochester, New York 14623
or telephone (716) 475-6631.
College of Applied Science and Technology

Department of Instructional Technology

All courses in the Department of Instructional Technology are offered at least once every three years and/or upon sufficient demand:

Audiovisual Communications Service Courses

Service courses are offered by the Audiovisual Communications Department for other departments. These courses may not be taken by audiovisual communications majors.

ICIC-413 AV Production for Biomedical Communications
Registration #0612-413
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.

Class 2, Lab. 4, Credit 4

ICIC-421 Producing Audiovisual Presentations I
Registration #0612-421
Students develop slide/tape presentations in order to communicate an idea or to change the attitudes or behavior of the viewer. The development process includes: analyzing the needs of clients and audiences; preparing communications objectives; preparing treatment, storyboard, and script; producing audio track and visual materials; synchronization and presentation preparation. Project required. (Photographic skills required) For nonmajors.

Credit 4

ICIC-422 Producing Audiovisual Presentations II
Registration #0612-422
Basic slide/tape planning and production similar to ICIC-421 but with increased emphasis on scripting and production planning and the unique characteristics of slide/tape as a delivery medium. Increased emphasis on synchronization methods and more sophisticated presentation hardware. (ICIC-421) For nonmajors.

Credit 4

ICIC-423 Producing Audiovisual Presentations III
Registration #0612-423
Similar to ICIC-421 and 422 but with the production of presentations using media other than slide/tape and requiring a three projector show using memory programming as well as increased emphasis on script, planning, and budget. Characteristics of various media and uses appropriate to different situations are included. (ICIC-421, ICIC-422) For nonmajors.

Credit 4

ICIC-444 Technical Writing for Computer Scientists
Registration #0612-444
An intensive course in the preparation of technical documents in the field of computer science. Topics include analysis of purpose of a document, and writing effectively for the expertise and interests of the intended audience. Writing assignments will cover such topics as technical project proposals, progress reports, and documentation for the users of a system. This course is a prerequisite to the third quarter of cooperative education. For computer science majors only.

Credit 2

ICIC-489 Audio for Audiovisual Presentations
Registration #0612-489
Students record, transfer, edit, and mix sound tracks—with music, narration and sound effects—for audiovisual programs.Course stresses practical approach with hands-on experience. (Enrollment for 4 credits requires production of the audio portion of a presentation.) For nonmajors except by department permission.

Credit variable (3-4)

ICIC-519 Principles and Methods for Dietetics Education
Registration #0612-519
Principles of learning; behavioral objectives, motivation, perception, evaluation, guidance, teaching methods and audiovisual techniques; development of a teaching/learning unit for a specific group. For dietetics majors only.

Credit 4

Upper Division Major Courses

ICIC-401 Message Design
Registration #0612-401
Reviews media formats as they may be applied to the design of instructional communications. Examines social and psychological principles as they relate to attitude change and motivation in learners. Students use design principles and structure messages for different media forms. Required for graduation.

Credit 4

ICIC-405 Visual Production Techniques
Registration #0612-405
Permits students to discuss in a seminar setting a series of topics related to the field of audiovisual communications, including career choices, academic preparation, and professional growth opportunities. Required for graduation.

Credit 2

ICIC-424 Visual Production Techniques
Registration #0612-424
Students develop and refine the visual techniques in developing an audiovisual show, especially a multi-image show. Includes lighting, color balancing, format design and principles of continuity composition in audiovisual production. Required for graduation, but may be waived on demonstration of competency.

Credit 4

ICIC-430 Audiovisual Program Design I
Registration #0612-430
Students review basic production skills and develop slide/tape presentations to communicate ideas or to change the attitudes of the viewer. This development process includes an analysis of the client's needs and setting communications objectives; preparing the treatment, script, and storyboard; producing the audio track and visual materials and synchronization of the presentation. Stresses more design and planning than production. For audiovisual communications majors only. Required for graduation.

Credit 4

ICIC-440 Audiovisual Program Design II
Registration #0612-440
Students differentiate between audiovisual presentations and programs and then design programs which incorporate a number of presentations within a program. Emphasis is on analyzing the performance problem, setting appropriate communications objectives, and then developing a program to improve performance. Actual case studies are used to illustrate the design process in business and industrial settings. Required for graduation.

Credit 4

ICIC-450 Audiovisual Program Design II
Registration #0612-450
Students analyze the elements used in design of audiovisual programs and presentations. Emphasis is on the application of the key psychological principles—perception, memory, experience, attitudes—underlying successful communications. Students must design a series of presentations incorporating these principles. Required for graduation. (ICIC-440)

Credit 4

ICIC-490 Audio Techniques
Registration #0612-490
Students review principles of sound recording and produce audi-tapes in a variety of situations. Course includes both practical and theoretical aspects of studio and field recording, selection of equipment, acoustical considerations, and the electronics related to audio recording. (ICIC-489 or equivalent).

Credit 4

Permits students to discuss in a seminar setting a series of topics related to the field of audiovisual communications, including career choices, academic preparation, and professional growth opportunities. Required for graduation.

Credit 2

ICIC-424 Visual Production Techniques
Registration #0612-424
Students develop and refine the visual techniques in developing an audiovisual show, especially a multi-image show. Includes lighting, color balancing, format design and principles of continuity composition in audiovisual production. Required for graduation, but may be waived on demonstration of competency.

Credit 4

ICIC-430 Audiovisual Program Design I
Registration #0612-430
Students review basic production skills and develop slide/tape presentations to communicate ideas or to change the attitudes of the viewer. This development process includes an analysis of the client's needs and setting communications objectives; preparing the treatment, script, and storyboard; producing the audio track and visual materials and synchronization of the presentation. Stresses more design and planning than production. For audiovisual communications majors only. Required for graduation.

Credit 4

ICIC-440 Audiovisual Program Design II
Registration #0612-440
Students differentiate between audiovisual presentations and programs and then design programs which incorporate a number of presentations within a program. Emphasis is on analyzing the performance problem, setting appropriate communications objectives, and then developing a program to improve performance. Actual case studies are used to illustrate the design process in business and industrial settings. Required for graduation.

Credit 4

ICIC-450 Audiovisual Program Design II
Registration #0612-450
Students analyze the elements used in design of audiovisual programs and presentations. Emphasis is on the application of the key psychological principles—perception, memory, experience, attitudes—underlying successful communications. Students must design a series of presentations incorporating these principles. Required for graduation. (ICIC-440)

Credit 4

ICIC-490 Audio Techniques
Registration #0612-490
Students review principles of sound recording and produce audi-tapes in a variety of situations. Course includes both practical and theoretical aspects of studio and field recording, selection of equipment, acoustical considerations, and the electronics related to audio recording. (ICIC-489 or equivalent).

Credit 4

Permits students to discuss in a seminar setting a series of topics related to the field of audiovisual communications, including career choices, academic preparation, and professional growth opportunities. Required for graduation.

Credit 2

ICIC-424 Visual Production Techniques
Registration #0612-424
Students develop and refine the visual techniques in developing an audiovisual show, especially a multi-image show. Includes lighting, color balancing, format design and principles of continuity composition in audiovisual production. Required for graduation, but may be waived on demonstration of competency.

Credit 4

ICIC-430 Audiovisual Program Design I
Registration #0612-430
Students review basic production skills and develop slide/tape presentations to communicate ideas or to change the attitudes of the viewer. This development process includes an analysis of the client's needs and setting communications objectives; preparing the treatment, script, and storyboard; producing the audio track and visual materials and synchronization of the presentation. Stresses more design and planning than production. For audiovisual communications majors only. Required for graduation.

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Students differentiate between audiovisual presentations and programs and then design programs which incorporate a number of presentations within a program. Emphasis is on analyzing the performance problem, setting appropriate communications objectives, and then developing a program to improve performance. Actual case studies are used to illustrate the design process in business and industrial settings. Required for graduation.

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Permits students to discuss in a seminar setting a series of topics related to the field of audiovisual communications, including career choices, academic preparation, and professional growth opportunities. Required for graduation.

Credit 2

ICIC-424 Visual Production Techniques
Registration #0612-424
Students develop and refine the visual techniques in developing an audiovisual show, especially a multi-image show. Includes lighting, color balancing, format design and principles of continuity composition in audiovisual production. Required for graduation, but may be waived on demonstration of competency.

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ICIC-430 Audiovisual Program Design I
Registration #0612-430
Students review basic production skills and develop slide/tape presentations to communicate ideas or to change the attitudes of the viewer. This development process includes an analysis of the client's needs and setting communications objectives; preparing the treatment, script, and storyboard; producing the audio track and visual materials and synchronization of the presentation. Stresses more design and planning than production. For audiovisual communications majors only. Required for graduation.

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Students differentiate between audiovisual presentations and programs and then design programs which incorporate a number of presentations within a program. Emphasis is on analyzing the performance problem, setting appropriate communications objectives, and then developing a program to improve performance. Actual case studies are used to illustrate the design process in business and industrial settings. Required for graduation.

Credit 4

ICIC-450 Audiovisual Program Design II
Registration #0612-450
Students analyze the elements used in design of audiovisual programs and presentations. Emphasis is on the application of the key psychological principles—perception, memory, experience, attitudes—underlying successful communications. Students must design a series of presentations incorporating these principles. Required for graduation. (ICIC-440)

Credit 4

ICIC-490 Audio Techniques
Registration #0612-490
Students review principles of sound recording and produce audi-tapes in a variety of situations. Course includes both practical and theoretical aspects of studio and field recording, selection of equipment, acoustical considerations, and the electronics related to audio recording. (ICIC-489 or equivalent).

Credit 4
ICIC-501 Practicum in Audioserial Program Design
Registration #0612-501
Allows a student to explore or develop a special competence in audioserial program design and to work with "clients" in real or simulated work environments. A proposal (guidelines available from the department) must be submitted prior to registration. For audioserial communications majors only.
Credit variable (1-2)

ICIC-502 Practicum in Audioserial Management
Registration #0612-502
Allows a student to explore or develop a special competence in audioserial management and to work with "clients" in real or simulated work environments. A proposal (guidelines available from the department) must be submitted prior to registration. For audioserial communications majors only.
Credit variable (1-2)

ICIC-503 Practicum in Audioserial Production
Registration #0612-503
Allows a student to explore or develop a special competence in advanced production and work with "clients" in real or simulated work environments. A proposal (guidelines available from the department) must be submitted prior to registration. For audioserial communications majors only.
Credit variable (1-2)

ICIC-510 Writing for Audioserial Programs
Registration #0612-510
Emphasizes the principles of script writing for verbal and visual continuity, clarity, and impact. Considers the audience and purpose for which the script is being written, the intended medium and styles of writing. Required for graduation.
Credit 4

ICIC-550 Management of Audioserial Programs
Registration #0612-550
Covers organizational strategies, management practices, budgeting and fiscal control, personnel recruitment, selection, training and supervision, resource center operation and organization.
Credit 4

ICIC-560 Media Facilities Design
Registration #0612-560
Examines major variables influencing the design of such media facilities as media production areas, darkrooms, audio and television studios and control rooms, and training and instructional areas. Topics include acoustics, lighting, ventilation, electrical circuits, space requirements and layouts.
Credit 4

ICIC-570 Survey of Audioserial Equipment
Registration #0612-570
Permits the student to both survey the wide spectrum of AV equipment available and to do an in-depth analysis of one type of equipment. Different groups of students will then report to the class the results of their in-depth study, using demonstrations, media presentations, visits by dealers or manufacturers and other methods.
Credit 2

ICIC-571 Staging Audioserial Presentations
Registration #0612-571
The student learns to plan and set up equipment for audioserial presentations. Includes calculation of power requirements, analyzing facilities and developing plans, setting up, connecting and troubleshooting common audioserial equipment such as sound systems, projectors, multi-image equipment, screens. (ICIC-489, ICIC-580)
Credit 2

ICIC-580 Producing Multi-Image Presentations I
Registration #0612-580
Students design, produce, and present multi-image productions (3-6 projectors). Covers both theory and practice of aspects such as synchronization, presentation planning and equipment selection, and the presentation development process. Projects required. (Photography skills, and ICIC-489, and/or ICIC-421 or equivalent)
Credit 4

ICIC-581 Producing Multi-Image Presentations II
Registration #0612-581
Students design and produce multi-image presentations (6-15 projectors) controlled by microprocessor-based programmers using leisure time programming. Basic research and theory of multi-image covered. Projects required. (ICIC-489, and ICIC-580, and ICIC-401
or ICIC-421 or equivalent)
Credit 4

ICIC-583 Advanced Multi-Image Project
Registration #0612-583
A special project to develop an advanced, complex multi-image presentation using memory programming and multiple projectors. Projects may focus on a single special effect or a complete presentation. The number of credits allowed depends on the scope and complexity of the project undertaken. (ICIC-580, and 581, and approval of project prior to enrollment)
Credit variable (1-2)

ICIC-585 Producing Special Effects Slides
Registration #0612-585
Building on basic black and white and color photography, the student designs, produces and evaluates optically produced graphic and pictorial slides for use in audioserial presentations. Includes techniques to produce effects such as multiple exposures, streaks, zooms, neon, registration techniques to produce slide animation and seamless masking. Emphasis is on design and planning as well as production and use of slides in presentations. (Enrollment for 4 credits requires the prior approval of special effects sequence for multi-image.)
Credit 3-4

ICIC-587 Production Seminar Special Effects Slides
Registration #0612-587
For students with previous special effects slide experience who wish to explore new techniques with the optical camera stand. Students review special effects basics and camera operation, analyze existing special effects slides, and create new slides or slide sequences to meet presentation objectives. Exemplary slides or sequences will be duplicated for special effects library. Portfolio required for entry. (Approval of department; ICIC-585; slide+tape production course such as ICIC-413, 421, or 430; ICIC-580 recommended but not required)
Credit 2

ICIC-595, 596 Senior Project
Registration #0612-595, 596
Focus is on the design and production of an interview presentation package based on each senior's own job aspirations, professional skills, personal qualities and portfolio materials. These courses are to be taken in the senior year. Both are required for graduation. For audioserial communications majors only.
Credit 2/Qtr.

Graduate Courses

Instructional Technology

ICIT-700 Introduction to Instructional Technology
Registration #0613-700
An overview of the basic elements of instructional technology including: technology and its application to instruction; instructional development; past, present, and future trends in instructional technology; and, instructional objectives. The course is a mix of self-instructional modules and seminars. Completion of modules and seminars on topics above are required (2 cr.) Additional modules cover specialized areas of instructional technology such as health sciences and community college applications, television and instruction, training and development. Course credit varies with the number of modules completed. Course required for graduation.
Credit variable (2-4)

ICIT-701 Introduction to Instructional Technology II
Registration #0613-701
A continuation of ICIT-700 offering the student an opportunity to complete additional modules as described in ICIT-700 course description. (ICIT-700)
Credit variable (1-3)
ICIT-705 Sources of Information in Instructional Technology
Registration #0613-705
Students develop general search techniques and strategies for finding information, evaluating it, and establishing a reference file. Sources of print material include journals and periodicals related to instructional technology, books, research reports and conference proceedings, catalogues and commercial information, and automated information systems. Interpreting recent copyright changes is also covered. Actual search problems are given and an information search project is required.
Credit 3

ICIT-710 Programmed Instruction
Registration #0613-710
Students review principles and techniques of preparing programmed instruction; then design, produce and validate their own programmed instruction materials; includes research and development related to programmed instruction and sources of programmed materials.
Credit 4

ICIT-712 Computer Assisted Instruction
Registration #0613-712
Students review the use of the computer for instruction (computer-assisted instruction) and then produce their own teaching programs actually using a computer. Examines research about computer assisted instruction, various hardware and software configurations, programming languages and sources of already developed computer-assisted courses, also discusses various methods of course and lesson development. (ICIT-710 or permission of department.)
Credit 4

ICIT-715 Instructional Television
Registration #0613-715
Explores the various uses of television as an instructional medium, e.g., individualized instruction, instruction of mass audiences, stand-alone instruction, integrated instruction. Students must produce at least one television program. Surveys the hardware, technology and software of television.
Credit 4 (offered on demand)

ICIT-720 Research in Instructional Technology
Registration #0613-720
Examines the fundamentals of educational research; hypothesis stating, designing, statistical procedures, reporting techniques, and types of research. Specifically examines the research in instruction. Students learn to critique research articles and develop evaluation plans.
Credit 4

ICIT-721 Evaluation of Training and Instruction
Registration #0613-721
A course to train students in the development and application of testing methods used in measuring performance, principally cognitive and psychomotor skills, as well as methods to determine overall course effectiveness. Covers methods for both formative and summative evaluation, test construction, and means of validating instructional materials and instructional systems.
Credit 4

ICIT-722 Research Project
Registration #0613-722
A variable credit course which allows a student to conduct a research project based on the student's interests and with the advice and consent of a faculty member. A formal research proposal must be submitted before registering for this course (guidelines available from the department). (ICIT-750, 751, and 720 or 721)
Credit variable (1-3)

ICIT-735 Psychology of Learning and Teaching
Registration #0613-735
Relates various theories of learning to actual teaching and training. Students review learning principles and apply them to practical instructional situations. Emphasis is on behavioral approach to developing instruction and training. Course required for graduation.
Credit 4

ICIT-736 Applications of Behavioral Psychology to Training and Adult Learning
Registration #0613-736
The course distinguishes between counseling, coaching, and training, stressing task-related interpersonal and cognitive skills such as working with a subject matter expert or job counseling. Includes methods of interaction to maintain communications and to shape behavior. (ICIT-735, 770)
Credit 3

ICIT-745 Instructional Facility Design
Registration #0613-745
Designed to enable the instructional developer to assist and participate in the design of spaces and related facilities for effective learning. Specific topics include acoustics, lighting, ventilation, electric circuits, planning for electronic distribution systems, equipment specifications, spatial relationships, together with architectural engineering and contracting procedures.
Credit 4

ICIT-750 Instructional Development I
Registration #0613-750
Covers the concepts and principles underlying the development of instructional programs and materials. Instructional development is the systematic solution of instruction and learning problems involving needs assessment, task analysis, specification of objectives, analysis and synthesis of instructional strategies, and methods of evaluation. A limited instructional development project is part of the course. Required for graduation. (Note: ICIT-700 must be taken before or simultaneously with ICIT-750; must be taken before 18 hours of program are completed; ICIT-735 and ICIT-755 are prerequisites)
Credit 4

ICIT-751 Instructional Development II
Registration #0613-751
A continuation of Instructional Development (ICIT-750) in which instructional development principles are applied in an actual project selected by the student. More sophisticated means of development, evaluation, and revision are included along with strategies for media selection and development. Literature of the field is also covered. Required for graduation. (ICIT-750)
Credit 4

ICIT-752 Instructional Development III
Registration #0613-752
Stresses the difference between personnel/faculty development, instructional/program development, and curriculum/organizational development and how the instructional developer or trainer becomes an agent for change. Examines the methods of disseminating and promoting the adoption of innovative methods and materials. Students research special problems related to selected areas of instructional development. (ICIT-750, 751)
Credit 4

ICIT-755 Criterion Referenced Instruction and Technical Training I
Registration #0613-755
Required for graduation.
Credit 3

ICIT-756 Criterion Referenced Instruction and Technical Training II
Registration #0613-756
Credit 3

ICIT-757 Techniques of Work Analysis
Registration #0613-757
Students learn a variety of job analysis and task analysis techniques based on Functional Job Analysis. Data gathered from analyses is cast into various formats for job restructuring, writing job descriptions, establishing task and job hierarchies, and developing training programs. Students learn to develop job inventories and checklists for gathering task information for a number of interrelated purposes. Students must complete a total of three additional job analyses.
Credit 3

ICIT-758 Developing Instructional Modules
Registration #0613-758
The course is designed to follow ICIT-756 to give the student extended practice in the development, evaluation, and revision of self-instructional materials. The course, largely self-instructional and project oriented, emphasizes structuring the module, actual module writing, and tryout and revision procedures. Students must have already selected a content area and developed objectives, a course plan, and criterion tests. (ICIT-755, ICIT-756)
Credit 3
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<td>A study of the interrelationship of the world of formal education to the business, industrial, and labor communities.</td>
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<tr>
<td>IJCC-745</td>
<td>Career Concepts: Production</td>
<td>Credit 3</td>
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<td>IJCC-746</td>
<td>Career Concepts: Commerce</td>
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<td>IJCC-747</td>
<td>Career Concepts: Services</td>
<td>Credit 3</td>
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<tr>
<td>IJCC-702</td>
<td>Teaching, Learning, Content Management/Environment</td>
<td>An opportunity for a student to explore, with a faculty advisor, an area of interest to the student.</td>
<td>1-3</td>
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<tr>
<td>IJCC-740</td>
<td>Independent Study</td>
<td>Credit variable (1-3)</td>
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</table>
IJCC-748 Information Retrieval Systems Registration #0615-748
The primary goal is the ability to use several data based computer systems for the storage and retrieval of career information. This includes a sufficient understanding of the computer systems, languages and dictionaries for efficient utilization. Additional goals are awareness of the other systems based upon media and print materials, and the ability to evaluate various systems. (CTAM-712 or equivalent)
Credit 3

IJCC-749 Manpower Forecasting Fundamentals Registration #0615-749
Two different purposes that depend on a common base are goals for this course. The common base is an understanding of the techniques, theories and limitations of manpower forecasting as it applies to numbers in current occupations and to the probabilities of emerging careers.
The two purposes are: (1) the ability to provide, as a generalist having a broad knowledge of different careers, assistance to discipline specialists in feasibility studies for new educational programs, and (2) assisting people in making decisions in those careers for which insufficient information exists. The ability to assist people in making decisions about the pursuit of a career that is projected to be available several years later will be studied in order to develop a uniform and responsible judgement in those areas where probability statements are extremely important. (CTAM-712 or equivalent)
Credit 4

IJCC-750 Seminar Registration #0615-750
This is a series of interdisciplinary discussions led by course participants from different teaching disciplines and outside resource persons. The topics concern the challenges involved in teaching, and in educational planning, leading to a better understanding of the total learning by the two-year college students.
Credit 2

IJCC-751 Occupational/Industrial Environments Registration #0615-751
This course offers educators first-hand exposure to industrial and/or occupational work environments with focus on the various components of the work force such as research, skilled trades, computer-related areas, production supervision, finance and retailing. Students will have presentations from executives, training directors, employment personnel and workers about skills required for entry-level jobs, application and interview procedures, scope of work, economic benefits, salary and wage scales, employment outlook, and worker and employer expectations.
Credit 3

IJCC-752 Career Education in Colleges & Special Settings Registration #0615-752
The course goals are to develop the abilities and knowledge necessary to function effectively in college career education and information centers and other organizations helping adults develop career plans. Topics include career education components in community/junior and four year colleges and universities: multiple, middle, and late careers; advocacy; spouse and family concerns; and special settings for career assistance.
Credit 3

IJCC-753 Group Dynamics for Career Development Registration #0615-753
This course concentrates on the abilities needed to plan, conduct and evaluate various group counseling and peer assistance processes as used in assisting individuals to formulate career plans. Each participant will understand the appropriate functions, advantages and disadvantages of different group dynamic procedures; and will demonstrate the required skills of attending, listening, guidance, problem solving, and decision making needed to plan and moderate such sessions.
Credit 3

IJCC-754 Human Resources Topics Registration #0615-754
This course provides classroom studies, research, and experiential learnings that relate general knowledge about occupations and careers to information about individual and personal characteristics needed for success in the careers. The specific topics and objectives will vary each time the course is offered in order to meet differing needs. They will, however, relate to career development, planning, advising and counseling. Applications to human resource planning, personnel administration, career education, and career assistance will be stressed. Interested persons should understand the particular objectives for a scheduled offering of the course prior to registration. Because of the differences in selected concentrations within the general goal, the course may be repeated for credit if the topic is changed.
Credit variable (1-4 credits)

IJCC-760 Career Counseling Skills Registration #0615-760
Students are introduced through demonstration and role playing to selected interviewing and counseling skills including attending, listening, questioning, paraphrasing, reflection of feelings, giving directions, and interpreting. The primary tenets of related counseling theories are presented and discussed.
Credit 4

IJCC-762 Career Education Seminar—Women Registration #0615-762
An elective course for students in Career and Human Resource Development concentrating on the ability to provide effective counseling for women who wish to enter non-traditional career fields. Case studies, first person presentations, readings, media and discussions focused on knowledge and skills needed. A project related to the elimination of bias and stereotyping in career counseling materials will be required.
Credit 3

IJCC-763 Career Education Seminar—Handicapped Registration #0615-763
An elective course for students in Career and Human Resource Development concentrating on the ability to provide effective counseling for handicapped persons who wish to plan and succeed in desired careers.
Credit 3

IJCC-777 Career Development Project Registration #0615-777
This is a variable (1-3) credit course that is required of all students unless they have had sufficient approvable experience. It is an opportunity to practice one or more of the defined functions in career education or human resource development. Proposals approved by director required prior to enrollment. (IJCC-742, IJCC-760, 20 additional hours of coursework)
Credit variable (1-3 credits)

IJCC-840 Teaching Internship Registration #0615-840
An individual arrangement with an appropriate community or junior college will be made for those persons not having sufficient experience. This will provide definite teaching assignments and responsibilities, together with participation in other faculty functions, including advising, committee work, planning, and student evaluation on a full semester or term basis at a two year college. Supervision, assistance, and evaluation will be provided by a mentor in the participating college and by the CHRD. Proposals approved by director required prior to enrollment. (IJCC-742, IJCC-760, 20 additional hours of coursework)
Credit variable (1-3 credits)

IJCC-850 Special Projects Registration #0615-850
This course provides for independent study, investigation, or research activity in subject matter areas not formalized by the Center program, but having specialized value. Proposals approved by director required prior to enrollment. (IJCC-742, IJCC-760, 20 additional hours of coursework)
Credit variable (1-3 credits)
School of Computer Science and Technology
School of Computer Science and Technology courses are offered at least once annually, except as noted.

Undergraduate Courses

Service Courses

Service courses are offered by the School of Computer Science and Technology for students in other departments. These courses may not be taken by Computer Science and Technology majors.

ICSP-205 Computer Techniques
Registration #0601-205
Class 3, Credit 3
A study of elementary COBOL programming, using structured design and programming concepts developed in ICSP-210. The course will emphasize the use of COBOL in solving common business, commercial, and managerial problems. Topics include COBOL program organization, sequential file I/O, COBOL control structures, arithmetic operations and report editing, control break processing, and table handling. Students will write programs which adhere to specific programming and documentation standards. (ICSP-210)
Class 4, Credit 4

ICSP-303 Advanced Business Applications
Registration #0601-303
An advanced course developing more expertise in the application of COBOL to business and industrial problems. Topics include advanced COBOL constructs, direct and indexed sequential access methods, sorting and searching, and database system access using commands embedded in the COBOL source. Students will write programs which adhere to specific programming and documentation standards. (ICSP-300)
Class 4, Credit 4

ICSS-200 Survey of Computer Science
Registration #0603-200
An introduction to the field of computer science and technology for non-majors, serving as a basic literacy course and as a first course in the computer science minor sequence. Topics include an introduction to Pascal, the use of Pascal as a vehicle for the design and implementation of simple programs, basic computer organization concepts, and the impact of computers on society. Programming projects will be required.
Class 4, Credit 4

ICSS-410 Computer Concepts and Software Systems
Registration #0603-410
An introduction to the overall organization of digital computers and operating systems for non-majors. Topics include basic machine organization, a 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. (ICSP-210)
Class 4, Credit 4 (Not offered in 1984-85)

ICSS-411 Data Communications and Computer Networks
Registration #0603-411
An introduction to data communications hardware and software, and the 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 (ICSP-210)
Class 4, Credit 4 (Not offered in 1984-85)

ICSS-483 Applied Database Management
Registration #0603-483
An introduction to issues in data management in organizations, and the role of database management systems in addressing these issues. Topics include the uses and needs for data in organizations, review of simple data structures, the influence of computer architecture and I/O devices on the management of data, basic file organizations supporting data management (sequential, direct access, indexed sequential), logical data models and their physical implementation, database administration, and DBMS selection (ICSP-300 or permission of instructor)
Class 4, Credit 4 (Not offered in 1984-85)

Computer Science Courses

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

ICSP-241 Programming I
Registration #0601-241
An introduction to programming emphasizing the development and documentation of modular computer-based algorithms. A structured procedural programming language (e.g., Pascal) is used to demonstrate modern programming principles. Topics include variables, expressions and assignment, control structures (sequencing, selection and repetition), modularity via procedures and functions, parameter mechanisms, and identifier scope in block structured languages. Programming assignments are an integral part of the course.
Class 4, Credit 4

ICSP-242 Programming II
Registration #0601-242
An introduction to the basic data structures used in computer applications. Both abstract concepts and implementation details will be discussed, including comparisons of alternative implementations. Topics include arrays, records, pointers, dynamic storage allocation, linked lists, stacks, queues, trees. Programming projects are required. (ICSP-241)
Class 4, Credit 4
ICSP-243 Programming III
Registration #0601-243 Design and Implementation
A first course on the design and implementation of moderately large single-programmer systems. Modern principles of design and testing will be presented in class and reinforced by programming assignments. The importance of both internal and external program documentation will be stressed. Topics include top-down design, testing, debugging, and program documentation. (ICSP-242)
Class 4, Credit 4

ICSP-305 Assembly Language Programming
Registration #0601-305
A study of assembly language concepts and programming methods, including computer organization, assembly process, addressing, binary arithmetic, repeatability, storage allocation, subroutine linkage, loop and program modification, character manipulation, bit manipulation, floating point arithmetic, decimal instructions, some system I/O macros and debug programming techniques. Programming projects will be required. (ICSP-243 or equivalent)
Class 4, Credit 4

ICSP-306 Systems Programming Fundamentals
A study of systems programming concepts and techniques. Topics include the roles of assembly language and systems implementation languages, systems macros and supervisor calls, program linkage, reentrant and recursive subroutines, I/O programming at the device level, macros and conditional assembly. Programming projects will be required. (ICSS-315, ICSS-325)
Class 4, Credit 4

ICSP-307 Business Applications Programming
Registration #0601-307
An introduction to the concepts and techniques relevant to the business programming environment. Structured COBOL is used to solve common business application problems, including report generation, sorting and table processing, and complex I/O processing. Project management, programming teams, and the module system for prototype development are used in the course. Programming projects will be required. (ICSS-325)
Class 4, Credit 4

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

ICSP-330 PL/I Programming
Registration #0601-330
A study of PL/I and its applications in business, industry, and science. Topics include elementary data types and control structures, data structuring capabilities (arrays and records), run time error handling, standard built-in functions, and subroutines. Emphasis is placed on developing well structured, modular programs. Programming projects will be required. (ICSP-243)
Class 4, Credit 4
(Not offered in 1984-85)

ICSP-450 Programming Language Concepts
Registration #0601-450
A study of the syntax and semantics of a diverse set of high-level programming languages. The languages chosen are compared and contrasted in order to demonstrate general principles of programming language design. The course emphasizes the concepts underpinning modern languages, rather than the mastery of particular language details. Programming projects will be required. (ICSP-325)
Class 4, Credit 4

ICSP-488 Programming Systems Workshop
Registration #0601-488
A workshop for the application of programming systems specification, design and implementation techniques. Topics include data modeling, (with and without a database management system), system specification and design charting techniques, and project scheduling and management. Students will work in teams to solve specific problems. Programming projects will be required. (ICSS-307, ICSS-435, ICSS-485)
Class 4, Credit 4

ICSG-499 Cooperative Education
Registration #0602-499
One quarter of appropriate work experience in industry.
Credit 0

ICSS-202 Introduction to Computer Science
Registration #0603-202
An introduction to the field of computer science. Topics include computer representation of information, integer (binary and decimal) and floating point arithmetic, logical operations, character codes, and a introduction to machine language and assembly language. The role of operating systems, compilers, and other software components will be surveyed.
Class 4, Credit 4

ICSS-315 Digital Computer Organization
Registration #0603-315
An introduction to computer design and implementation. Topics include a review of arithmetic and Boolean algebra, combinatorial and sequential circuit design, flip-flops and adders, storage mechanisms and their organization, instruction set and execution in a simple CPU, input/output subsystems, interrupts, and variations in memory addressing (ICSP-305)
Class 4, Credit 4

ICSS-320 Data Structure Analysis
Registration #0603-320
An introduction to classic information structures and associated algorithms. Topics include sequential lists, stacks, queues, linked lists (circular, doubly linked allocation), trees and tree traversal, dynamic storage allocation, and garbage collection. Programming projects will be required. (Either ICSP-210 or ICSP-216, and ICSP-305)
Class 4, Credit 4

ICSS-325 Data Organization and Management
Registration #0603-325
A course on the considerations associated with the external storage of data. Topics include file organization (sequential, indexed and direct access), space optimization and directory organization, an introduction to external sorting and searching, and the basics of data modeling, database organization, and management. Programming projects will be required. (ICSP-305, either ICSP-243 or ICSS-320)
Class 4, Credit 4

ICSS-355 The Human Side of Computers
Registration #0603-355
The impact of computer systems on society is studied via class discussion, lectures and films. Current topics such as the following are covered: the impact of computers on employment, automation and the labor force; overview of computer applications in government; innovative medical applications; computers in education and computers assisted instruction issues, privacy and the Freedom of Information Act; computer abuses and crime — the impact on law enforcement; the future — a cashless society; universal identifiers, computers in the home. Participants will develop several short discussion papers and a major study in one of the course topics. (ICSS-200 or ICSS-202)
Class 4, Credit 4

ICSS-360 Fundamentals of Computer Science
Registration #0603-360
for Transfer Students
Selected topics from ICSP-241, ICSP-242, ICSP-243, and ICSP-305 are presented. This course is required for students transferring into the School of Computer Science and Technology with previous programming experience. Open only to transfer students; not to be taken as a Computer Science Elective.
Class 4, Credit 4
ICSS-400 Logical Design
Registration #0603-400
Topics include an introduction to switching theory, sequential circuit analysis and synthesis, error detection, error correction networks, speed-up techniques, serial and parallel approaches, interface techniques, and comparative studies of digital computer architecture. (ICSP-315)
Class 4, Credit 4

ICSS-420 Data Communications Systems
Registration #0603-420
Data communication and telecommunication systems, including communication techniques, communication interfaces; common carrier implications and tariffs, exchanges; concentrators, multiplexers, front-end computers; buffering, response time and human factors; network cost and design analysis, software considerations. (SMAM-309 or SMAM-352, and third year standing in Computer Science and Technology)
Class 4, Credit 4

ICSS-430 Numerical Methods
Registration #0603-430
Topics include introductory error analysis, roots of an equation, solutions of systems of linear and non-linear equations, interpolation, power series calculation of functions, numerical integration and first-order ordinary differential equations. The computational aspects rather than mathematical development will be emphasized. Programming projects will be required. (Either SMAM-252 or SMAM-215, and a high-level scientific programming language)
Class 4, Credit 4 (not offered in 1984-85)

ICSS-435 Systems Specification, Design and Implementation
Registration #0603-435
Students are introduced to basic concepts of system specification, design, system implementation and project management. Tools used include PERT/CPM (scheduling tools), structured English, structured flowcharts, and decision trees (description tools), dataflow diagramming (description and design tool), and hierarchical design of programming system (design tool). A study of Yourdon's structured design methods is included. (ICSS-325)
Class 4, Credit 4

ICSS-440 Operating Systems
Registration #0603-440
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlocks, 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. (ICSS-315, ICSS-325)
Class 4, Credit 4

ICSS-470 Finite State Machines and Automata
Registration #0603-470
Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis and synthesis, sequential iterative systems, and space-time transformations. (ICSS-315)
Class 4, Credit 4

ICSS-480 Formal Languages
Registration #0603-480
Formal language theory and principles. Topics include context free and context sensitive grammars, regular expressions. Turing machines, and an introduction to unsolvability and computability. (ICSS-470)
Class 4, Credit 4

ICSS-485 Data Base Concepts
Registration #0603-485
A course on the formal aspects of database management. Topics include data organization and structure, relational, hierarchical, and network approach, database security and recovery, comparisons of the data base approach with traditional file organization and data control methods, and performance and management issues. Example data base systems will be studied. (ICSS-325)
Class 4, Credit 4

ICSS-515 Analysis of Algorithms
Registration #0603-515
A course covering the mathematics and techniques needed to analyze the computational complexity of algorithms. Several classic algorithms will be studied, to determine their space and time efficiency. (Third-year standing in Computer Science and Technology)
Class 4 Credit 4

ICSS-520 Computer Architecture I
Registration #0603-520
An introduction to computer architecture. Includes a survey of computer architecture fundamentals exemplified in commercially available computer systems, to include classical CPU and control unit design, register allocation, 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 then compared. Parallel processors are also presented, along with an analysis of their performance relative to non-parallel machines. Programming projects will be required. (ICSS-440)
Class 4, Credit 4

ICSS-521 Introduction to Microprocessor Systems
Registration #0603-521
An examination of microcomputers and microcomputer applications, including the study of microprocessors and their use in the construction of microcomputers. Several commercially available microcomputer systems are used in laboratory projects to explore hardware and software design issues, as well as memory design and I/O interface techniques. Programming projects may be required (ICSS-315)
Class 4, Credit 4

ICSS-525 Assemblers, Interpreters, and Compilers
Registration #0603-525
A survey of the three basic programming language processors. Topics include design and construction of language processors, formal syntax and syntax generation techniques. Laboratory work includes actual construction of language processors. (ICSS-325)
Class 4, Credit 4 (not offered in 1984-85)

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

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

ICSS-541 Introduction to Computer Networks
Registration #0603-541
An introduction to computer communication network design and implementation. Network terminology is discussed, and a variety of configurations are studied. Both hardware and software components are examined. The state of current technology is presented, along with possible trends for future evolution. Measurement and evaluation of network utilization and performance are also discussed. Programming projects will be required. (ICSS-420, SMAM-309 or SMAM-352, and third-year standing in Computer Science and Technology)
Class 4, Credit 4
Graduate Courses

Undergraduate Computer Science and Technology students may take 700 and 800 level courses only by consent of the Chairman of Graduate Studies and the consent of the instructor.

Graduate students must obtain the consent of a graduate advisor in order to enroll in graduate courses not listed in their own program of study.

Computer Science

ICSS-701 Programming I
Registration #0603-701
Fundamentals of computer programming and problem-solving using a structured programming language (Pascal or Ada). Introductions to and use of an interactive editor and file system. Techniques will be introduced for data representation and structuring, sorting, and searching. (The material of ICSS 703 will be covered in this course.) Applications in business, science, mathematics, engineering, education, systems programming, and graphics will be covered. (Computer literacy)
Credit 8

ICSS-702 Programming II
Registration #0603-702
Computer programming in macro assembly language. Combining program segments written in assembly language with segments in a high-level language. Modern programming practices, tools, and techniques from the point of view of the software life-cycle: specification, design and prototyping, coding and verification, integration, and maintenance. (ICSS-701 or equivalent: programming proficiency in a high-level language; algorithms and data structures.)
Credit 8

ICSS-703 Algorithm* and Data Structures
Registration #0603-703
Topics include data representation, data structures such as: linked lists, trees, stacks, queues, hash tables, sparse matrix techniques. Searching and sorting techniques, file structure and maintenance. Programming projects will be required. (Programming proficiency in some high level structured programming language.)
Credit 4

ICSS-706 Foundations of Computing
Registration #0603-706
Review of discrete mathematics with emphasis on graph theory and proof techniques. A study of computer programs in the abstract, including program flow graphs, program transformations, the structuring theorem, abstract automata, and formal languages. An overview of computability and algorithmic complexity. (SMAM-265 or equivalent: Data Structures)
Credit 4

ICSS-707 Computer Organization and Programming
Registration #0603-707
An introduction to the basic concepts and terminology of hardware and software systems including such topics as elementary circuit design, interrupt programming, and virtual memory. The intent is to prepare the student for future study in computer architecture and operating systems. Programming projects will be required. (Assembly Language: Data Structures)
Credit 4

ICSS-709 Programming Language Theory
Registration #0603-709
A survey of several important modern programming languages, their methods of specifying data and control structures, and their approach to functionality; syntax and semantics specification systems. Programming projects will be required. (Assembly Language: Data Structures)
Credit 4

ICSS-720 Computer Architecture
Registration #0603-720
Review of classical computer architectures, the design of operation codes and addressing modes, data formats, and their implementa- tions. Analysis of internal and external bus structures. Architectural features to support virtual storage and page-replacement policies, high-level language features, and operating systems. Speed-up techniques. Future directions. (ICSS-708)
Credit 4
ICSS-721 Microprocessors and Registration #0603-721 Microcomputers
A study of microprocessors, microcomputers, and their applications. Topics include microprocessor hardware, microcomputer organization, software, microcomputer programming, interface techniques and development trends. Case studies will be provided. Programming projects will be required. (ICSS-720)
Credit 4

ICSS-730 Modeling and Simulation I
Registration #0603-730
Computer simulation techniques are examined. Topics include abstract properties of simulations modeling, analysis of a simulation run, and statistics. One or more general purpose simulation languages will be taught. Programming projects will be required. (Data Structures; Statistics)
Credit 4

ICSS-731 Modeling and Simulation II
Registration #0603-731
Design and validation of systems models using advanced statistical methods and queuing theory. Programming languages that support simulation and procedural applications (e.g., Simscript, Simula, SLAM), Continuous system simulation and programming packages. Applications to world population models, computer operating systems, etc. Programming projects will be required. (ICSS-530 or ICSS-730)
Credit 4

ICSS-735 On-Line Information Systems Design
Registration #0603-735
Topics include basic on-line system characteristics, design guidelines, hardware requirements, comparison of systems and languages, file organization concepts, the simultaneous access problem, file security and recovery, error recovery, system evaluation, and case studies. (Data Structures; Assembly Language; a background in systems analysis is recommended)
Credit 4

ICSS-736 Data Base System Implementation
Registration #0603-736
Requirements and characterization of generalized data base systems, the role of the data base administrator, creation of a general data base, elements of data base management systems, data base management in a multi-access environment, survey of data base management systems, selecting a data base management system. Projects in data base systems implementation will be emphasized. (ICSS-836)
Credit 4

ICSS-744 Data Communications & Networks I
Registration #0603-744
An introduction to Computer Communication. This course will cover the fundamentals of data communication, including terminal communication and computer to computer communication. Emphasis in the first course will include the theoretical basis for data communication, terminal handling, data transmission and multiplexing, error detection and correction, as well as an introduction to the hierarchical model for computer networks. Also included will be an introduction to graph theory and the topological design of networks, queuing theory and delay analysis. Additional emphasis will be on the fundamental protocols for computer communication. (Statistics, ICSS-708)
Credit 4

ICSS-745 Data Communications & Networks II
Registration #0603-745
A second course in computer communication and networks. Emphasis will be on higher level protocols and local networks. Included in this course will be design and analysis of communication protocols, routing algorithms, satellite and local networks. (ICSS-744, ICSS-720)
Credit 4

ICSS-770 Fundamentals of Computer Graphics
Registration #0603-770
Topics include basic concepts, 2-D transformations, windowing, clipping, interactive and raster graphics, 3-D transformations and perspective, hidden line and hidden surface techniques, graphical software packages and graphics systems. Programming projects will be required. (Data Structures)
Credit 4

ICSS-771 Advanced Topics In Computer Graphics
Registration #0603-771
Animation techniques and packages. Modeling of solids, including shading, perspective, hidden line and surface removal. Three-dimensional graphics software packages; algorithms and heuristics. Some computer hardware for graphics. Programming projects will be required. (ICSS-570 or ICSS-770)
Credit 4

ICSS-809 Operating Systems I
Registration #0603-809
An introduction to solving problems using cooperating parallel processes and to the concepts of operating systems design. Emphasis will be on the use of operating systems from the programmer's point of view and on the design of operating systems from a conceptual rather than an implementation oriented point of view. The student will be required to construct software systems of parallel processes and study how an operating system supports such parallelism. Also, the student will become conversant in the issues facing the operating system designer and will be able to evaluate tradeoffs inherent in the design process. (ICSS-708)
Credit 4

ICSS-810 Operating Systems II
Registration #0603-810
This course will elaborate on topics covered in the introductory course, such as virtual memory, I/O systems and file systems, as well as introduce new topics, like security, multiprocessing and networking. Also, an introduction to operating systems theory will be provided, including topics such as queuing theory, the working set model and performance analysis. In addition, the student will be required to design and code a portion of an actual operating system. (ICSS-809)
Credit 4

ICSS-811 Topics In Operating Systems
Registration #0603-811
This is an advanced course in operating systems design and theory. The topics may be expected to vary from time to time as the direction of operating systems research and the interests of the faculty change. Examples of topics that might be covered are: distributed processing, operating systems theory, secure operating systems (e.g., the security kernel approach), etc. (ICSS-809 or ICSS-810)
Credit 4

ICSS-836 / Data Base Systems
Registration #0603-836
Topics include data organization and structure; relational, hierarchical, and network approach; data security and recovery. Comparison of the data base approach with traditional file organization and access methods, performance and management issues. Existing data base systems will be studied. (Data Structures)
Credit 4

ICSS-846 Information Storage and Retrieval
Registration #0603-846
Topics include an overview of history, development and traditional approaches of information storage and retrieval, automatic text analysis, automatic classification, file structures, search strategies, probabilistic retrieval, system evaluation. (Data Structures)
Credit 4

ICSS-850 Computability
Registration #0603-850
The theory of computation as it relates to computable functions is examined. Topics include finite state machines, Turing machines, recursive function theory, Post's symbol manipulation systems, the limitations of the concept of effective computability. (ICSS-706)
Credit 4

ICSS-851 Computational Complexity
Registration #0603-851
This course is concerned with the mathematical analysis of computer algorithms. Topics include matrix operations, combinatorial algorithms, integer and polynomial arithmetic, NP-complete problems, and lower bounds on algorithms involving arithmetic operations. (ICSS-706)
Credit 4
School of Engineering Technology

Upper Division Civil Engineering Technology

ITEC-099 Introduction to CET
Registration #0608-099
This course will introduce CET transfer students to RIT, showing them the difference in types and methods of instruction and what is expected in the way of student ethics. Guest lectures and field trips will be used to show the many aspects of the industry.

Class 1, Credit 1

ITEC-404 Applied Mechanics of Materials
Registration #0608-404
Basic strength of material and statics are reviewed. Advanced topics are covered to include stress and strain, Mohr's circle, transversely loaded members, statically indeterminate problems. Euler's equations, and parabolic column equations.

Class 4, Credit 4

ITEC-420 Hydraulics
Registration #0608-420
Study of principal physical and mechanical properties of liquids, hydrostatic pressure and forces; pressure measuring devices; buoyancy and fluctuation, 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) ITEC-421 Hydraulics Lab must be taken concurrently.

Class 3, Credit 3

ITEC-421 Hydraulics Laboratory
Registration #0608-421
Laboratory to be taken concurrently with ITEC-420. Seven laboratory exercises are introduced to support lecture material.

Lab. 3, Credit 1

ITEC-422 Elements of Building Construction
Registration #0608-422
Elements and details of building construction; study of building codes from a design concept; foundations; wood, steel and concrete construction and wall systems; and introduction to construction specifications for materials and methods.

Class 4, Credit 4

ITEC-428 Technical Communications
Registration #0608-428
The principles of organizing data and information into clear and concise engineering memos, letters, reports, and presentations. The techniques of library research and oral presentations, including audiovisual, are also stressed. (Basic college writing)

Class 4, Credit 4

ITEC-432 Water and Wastewater Transport Systems
Registration #0608-432
Discussion of surface and groundwater sources. The hydraulic design of sanitary and storm sewer systems, and water distribution systems. (ITEC-420)

Class 2, Recitation 3, Credit 3 (Effective 1985-86, Class 2, Credit 2)

ITEC-434 Environmental Pollution
Registration #0608-434
The study of various forms of pollution including air, thermal, noise, erosion, pesticides, radiation, and visual pollution, with the investigation of the sources, measurement, methods of control, legislation, codes, and enforcing agencies, water pollution and land pollution.

Class 3, Credit 3 (not offered after 1985-86)
ITEC-438 Principles of the Treatment of Water and Sewage
Registration #0608-438
An introduction to water and wastewater treatment, interpretation of analyzed physical, chemical, and biological parameters of water quality with regard to the design and operation of treatment processes and to the control of the quality of natural water; fundamental principles and applications of physical, chemical and biological processes employed in water and wastewater treatment; analysis of waste assimilative capacity of streams.
Class 3, Lab. 2, Credit 4

ITEC-444 Mechanical Equipment for Buildings
Registration #0608-444
Presentation of mechanical and electrical equipment used in building construction. The codes applicable to plumbing, heating, air-conditioning, and ventilation and control will be studied.
Class 3, Credit 3 (Effective 1986-87, Class 2, Credit 2)

ITEC-450 Construction Management
Registration #0608-450
Construction company organization; time and resource scheduling for construction with computer assisted CPM; role of the construction manager; project finance; cash flow; construction projects will be emphasized. (ITEC-500, .508, .460)
Class 4, Credit 4 (not offered after 1985-86)

ITEC-460 Construction Equipment
Registration #0608-460
Fundamentals of equipment selection; determining equipment requirements based upon the design and capabilities of currently available construction equipment. Emphasis is given to economic aspects of equipment ownership, principles of equipment management, and earthmoving project analysis.
Class 3, Credit 3, (Effective 1985-86, Class 4, Credit 4)

ITEC-470 Timber Design and Construction
Registration #0608-470
Application of structural design methods to timber. Topics covered include: the structure and properties of wood; grade sizes, and design properties of structural lumber; design of wood structures; plywood; nailed joints; and trusses (ITEC-404)
Class 3, Credit 3 (Effective 1985-86, Class 4, Credit 4)

ITEC-480 Groundwater Hydraulics
Registration #0608-480
Groundwater movement, flow-net concept, graded filter design and construction, flow to wells and trenches, dewatering system analysis and design, water-flow cut-off methods and their use for construction. (ITEC-420 and ITEC-527 or permission of instructor)
Class 3, Credit 3 (Effective 1985-86, Class 4, Credit 4)

ITEC-482 Hydrology
Registration #0608-482
Course presents major theoretical and practical considerations of hydrology in application to study Groundwater Hydraulics, Hydraulic Structures, Water Transportation Systems, and Transportation.
Class 4, Credit 4 (Effective 1985-86)

ITEC-485 Hydraulic Structures
Registration #0608-485
This course will study analysis and design of dams, spillways, storage reservoirs, canals, tunnels and river diversion systems for the effective utilization of water resources, energy, soil conservation, and flood control. Principles of maintenance and operation of hydraulic structure will also be studied. (ITEC-432).
Class 4, Credit 4 (Effective 1986-87)

ITEC-490 Structural Analysis
Registration #0608-490
Introduction to the analysis of statically determinate and indeterminate structures by classical and modern techniques. The types of structures covered include beams, trusses, and frames which are loaded in the plane of the structure. Topics include influence lines and approximate methods. The course is intended to bridge the gap between the previous course in Applied Mechanics of Materials and the subsequent course in Structural Design. (ITEC-404)
Class 4, Credit 4, (Effective 1985-86)

ITEC-495 Structural Design
Registration #0608-495
Structural design in reinforced concrete and structural steel. In the reinforced concrete portion of the course, the working stress method is briefly covered, but emphasis is on the strength method; members and frames are primarily of the indeterminate type. In the structural steel portion, the working stress method is emphasized; members and frames are primarily of the determinate type. In both portions the accent is on building structures. Provisions of the ACI code and AISC specification will be followed. (ITEC-404, ITEC-490)
Class 4, Credit 4 (Effective 1985-86)

ITEC-499 Co-operative Education
Registration #0608-499
One quarter of appropriate work experience in industry.
Credit 0

ITEC-500 Labor Relations
Registration #0608-500
Introduction to the fundamentals of labor law and its applications to the construction industry. Topical areas include the Fair Labor Standards Act, Davis-Bacon Act, Title VII of the Civil Rights Act, National Labor Relations Act, hiring halls, pre-hire agreements, strikes and Open Shop construction. Several guest speakers representing government, private industry and organized labor also lecture.
Class 4, Credit 4 (Effective 1985-86, Class 2, Credit 2)

ITEC-505 Construction Safety
Registration #0608-505
General safe practices in construction operations. Safety standards, both voluntary and mandatory; Employers’ responsibilities under the provisions of OSHA and state labor law. A portion of this course is audiovisual.
Class 3, Credit 3 (Effective 1986-87, Class 2, Credit 2)

ITEC-508 Cost Estimates
Registration #0608-508
A study of construction cost determination and bidding procedure; including construction business practices; overhead cost, break-even analysis, profit determination and statistical cost forecasting. (ITEC-436, ITEC-509 or may be taken concurrently)
Class 2, Credit 2 (not offered after 1986-87)

ITEC-509 Cost Estimating
Registration #0608-509
An introduction to direct cost estimating of a construction project. The estimating techniques reviewed include productivity analysis, material pricing, and quantity take-offs. (ITEC-422 may be taken concurrently)
Class 2, Credit 1 (Effective 1986-87, Class 3, Credit 2)

ITEC-510 Design of Water Treatment Facilities
Registration #0608-510
Principles of water treatment plant design, conceptual and hydraulic design of water purification and conditioning facility. Includes: settling, filtration, softening, disinfection, organics, removal, and plant design construction elements.
Class 3, Lab. 2, Credit 3 (Effective 1986-87, Class 2, Credit 2)

ITEC-513 Computer Techniques in Civil Engineering
Registration #0608-513
Introduction to the engineering computing environment, the topics of computer modeling and simulation, and program documentation. Techniques are developed in the lecture and laboratory through the application of software in examining typical engineering problems. (ICSP-206 or ICSP-220)
Class 2, Credit variable 1-2

ITEC-514 Land Planning
Registration #0608-514
The environmental and social aspects of land planning are covered as well as the engineering and cost considerations. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wetlands, other planning and control tools, and as solar access planning. Students are involved in an independent project consisting of a concept design for a subdivision or other land use project. Extensive use is made of field trips and attendance at appropriate meetings or work sessions. (Drafting, surveying, and ITEC-432)
Class 2, Credit 2 (Effective 1985-86, Class 3, Credit 4)
ITEC-516 Analysis and Design of Reinforced Concrete Structures
Introduction to the analysis of indeterminate flexural members and frames, emphasizing the method of moment distribution. Design of continuous reinforced concrete elements and frames. The accent is on building structures and the use of the ACI Code. The working stress method is briefly covered, but primary emphasis is given to the strength method (ITEC-404)
Class 5, Credit 4

ITEC-518 Masonry Design
An introduction to masonry design and construction. Both brick and concrete masonry will be covered, with emphasis on concrete masonry. Topics covered include terminology, non-reinforced masonry, reinforced masonry, joint reinforcement, types of mortar, design of bearing walls and partitions. Use will be made of the publications of the Brick Institute of America, the National Concrete Masonry Association, and the Portland Cement Association.
(ITEC-404)
Class 2, Credit 2 (Effective 1986-87)

ITEC-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 phosphorus removal will be discussed. Processes, plant design, and construction elements are stressed.
Class 3, Lab. 2, Credit 4

ITEC-522 Principles of Treatment of Water and Sewage II
Principles of microbiology and their application to water and wastewater treatment processes with emphasis on chemical precipitation, adsorption, disinfection, granular medium filtration, aerobic suspended and attached growth, and anaerobic suspended growth.
Class 3, Lab. 3, Credit 4 (Effective 1986-87)

ITEC-525 Hazardous Waste
Identification, classification and legal aspects of hazardous waste. Generator, transport, storage and disposal of hazardous waste with emphasis on chemical landfill and incineration of hazardous and toxic wastes. The possibility of using genetic engineering in treating toxic wastes will be discussed. Processes, plant design, and construction elements are stressed.
Class 4, Credit 4 (Effective 1986-87)

ITEC-526 Industrial Wastewater
Industrial wastewater characterization and waste flow survey. Case studies of selected industrial wastewater. (ITEC-438)
Credit: 2 or 4 Class 2, Lab. 6 (For students taking 4 cr.) (Effective 1986-87)

ITEC-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 footings analysis and design; lateral earth pressure and retaining walls analysis and design, pile foundation analysis and design principles; slope stability, study of modern and traditional soil improvement technology. (ITEC-404)
ITEC-528 Soil Mechanics Laboratory must be taken concurrently.
Class 3, Credit 3

ITEC-528 Soil Mechanics Laboratory
Laboratory to be taken concurrently with ITEC-527. Exercises will include tests in internal friction by direct shear, unconfined compression, triaxial compression, consolidation and compaction.
Laboratory 2, Credit 1

ITEC-530 Transportation Engineering
The course exposes the student to the fields of highway, airport, and rail engineering. The areas of administration, planning, design, construction, maintenance, and operation are covered; however, 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. (ITEC-422 may be taken concurrently)
Class 4, Credit 4 (Effective 1986-87)

ITEC-535 Pavement Design
This course expands upon the background of the Transportation Engineering core-course, providing additional detailed engineering knowledge on pavement design. Included with the theoretical knowledge will be the development of, and practice in, the necessary design skills. The course includes not only the design of new pavements, but 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.
Class 3, Lab. 1, Credit 4 (Effective 1986-87)

ITEC-544 Contracts & Specifications
This course includes a fundamental overview of contract law, followed by the application of this material into the contracts of construction. Subsequently, the student is exposed to construction specification. 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 (Effective 1986-87, Class 2, Credit 2)

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

ITEC-549 Environmental Engineering Project
Fundamental concepts, principles and advanced techniques in the treatment of industrial and domestic wastewater. Laboratory study of certain aspects of water pollution control treatment processes. Field trips to water pollution control plants. Students are required to prepare a technical report based on laboratory study or actual treatment plant data. (ITEC-438, -520 and permission of instructor)
Class 2, Lab. 3, Credit 4 (not offered after 1985-86)

ITEC-550 Construction Practices
An introduction to basic construction management and organization with CPM scheduling, estimating, bidding, heavy construction techniques, methods, and equipment applications.
Class 3, Recitation 2, Credit 4 (Effective 1986-87, Class 2, Credit 2)

ITEC-552 Analysis and Design of Steel Structures
An introduction to the analysis and design of steel structures. Emphasis is on low-rise buildings of the determinate type which are braced vs. lateral loads. The background of the AISC Code is covered, as well as practice in the use of the AISC Manual, such as selection of beam and column sections, and the analysis and design of welded and bolted connections. Current practice in foundation and erection is discussed in addition to a brief study of contract and shop drawings.
(ITEC-404)
Class 4, Credit 4
ITEE-556,557 Wastewater Treatment Plants
Registration #0608-556, -557
A self-paced audio-visual course. Emphasis on the functional aspects of waste water treatment plants' operation. Discussion of the significance of the results of laboratory analysis and their interpretation and application to the control of treatment processes. (ITEC-438 and consent of Instructor)
Credit 1-4

ITEC-560 Construction Project Management
Registration #0608-560
An introduction to basic construction management and organization. Topics include company and project organization, contracts, specifications, bonds, insurance, bidding, cost and financial accounting, labor relations, and project planning and scheduling. (ITEC-509 and ITEE-422 may be taken concurrently.)
Class 4, Credit 4 (Effective 1986-87)

ITEE-561 Construction Project Management II
Registration #0608-561
An introduction to advanced applications in construction management through precedence modeling. Both CPM and PERT precedence models will be used for scheduling, resource leveling and cost control. (ITEC-560)
Class 4, Credit 4 (Effective 1986-87)

ITEC-580 Senior Construction Seminar
Registration #0608-580
Construction finance, cost engineering, quality and production control, special engineering subjects, and value engineering. (Seniors only and permission of the instructor).
Class 3, Credit 3

ITEC-599 Independent Study
Registration #0608-599
A supervised investigation within a civil technology area of student interest. Consent of the instructor is required and departmental approval.
Credit 1-8

Electrical Engineering Technology
Lower Division
"DC Circuits
ITEE-201 Registration #0609-201
An introduction to electrical technology, with emphasis on DC circuit analysis techniques. Topics include resistance, inductance, capacitance, and diodes with circuit techniques of Ohm's Law, Kirchoff's Laws, Thevenin's Theorem, Mesh analysis, and superposition. (Co-requisite SMAM-204)
Class 3, Lab. 3, Credit 4

ITEE-202 AC Circuits
Registration #0609-202
Continuation of ITEE-201, AC circuits and devices with topics of phasor algebra, reactance, impedance, ac power and power factor, power factor correction, resonance, maximum power transfer, bandwidth, and three phase circuits. (ITEE-201)
Class 3, Lab. 3, Credit 4

ITEE-203 Electronic Devices
Registration #0609-203
A continuing course in electronic devices and systems. Emphasis on semiconductor devices (including zener and other two-terminal devices) and transistors (BJTs and FETs), basic operation, biasing and cascading. SCRs, triacs and other npn-pn devices will be discussed. (ITEE-202)
Class 3, Lab. 3, Credit 4

ITEE-301 Digital Fundamentals
Registration #0609-301
A first course in digital computer fundamentals. Topics include binary arithmetic, Boolean algebra, logic gates, Karnaugh mapping, 2's compliment and hexadecimal arithmetic. (ITEE-203)
Lecture 3, Lab. 2, Credit 4

ITEE-302 Linear Integrated Circuits
Registration #0609-302
A course in the modern application of linear integrated circuits. The operational amplifier will be studied emphasizing the operating characteristics and applications such as comparators, amplifiers, signal generators, differential amplifiers and active filters. The basics of switching circuits will also be studied. (ITEE-301)
Lecture 3, Lab. 2, Credit 4

ITEE-303 Microprocessors
Registration #0609-303
A first course in microprocessors. Emphasis on the programming and hardware aspects of 8 bit microcomputers, with emphasis on one of the Motorola 6800 or Intel 8085 machines. (ITEE-301 and ICSP-305)
Lecture 3, Lab. 3, Credit 4

ITEE-305 Drafting and Fabrication
Registration #0609-305
An introductory course involving the development of skills in electrical circuit layout, circuit board fabrication and assembly. Drafting and computer aided design will be included. (ITEE-203)
Lecture 2, Lab. 4, Credit 4

ITEE-310 Electricity
Registration #0609-310
Circuits using d.c. sources are analyzed. Components stressed are the inductor, capacitor, diode, transistor, relays, and photo devices.
Class 3, Lab. 3, Credit 4

ITEE-311 Electronics I
Registration #0609-311
Circuits using a.c. sources are analyzed. Components stressed are the transformer, SCR and triac. Circuits used in the 2610 printer are analyzed. (ITEE-310)
Class 3, Lab. 3, Credit 4

ITEE-312 Electronics II
Registration #0609-312
Continuation of ITEE-311. Circuits of other photographic equipment are analyzed. Digital devices are introduced. The 8085 microprocessor assembler language is covered (ITEE-311)
Class 3, Lab. 2, Credit 4

Upper Division Electrical Engineering Technology
ITEE-401 Circuit Theory I
Registration #0609-401
An introductory course in the use of LaPlace transforms to determine the complete response of circuits containing independent and dependent sources, resistance, inductance, and capacitance. Application of basic circuit theorems to the solution of transformed networks. (SMAT-420 concurrently)
Class 3, Rec. 2, Credit 4

ITEE-402 Circuit Theory II
Registration #0609-402
Frequency response of network functions as solved by use of pole-zero diagrams and Bode diagrams. Mutual inductance. The Fourier series solution of circuits with non-sinusoidal inputs. (ITEE-401)
Class 2, Rec. 2, Credit 3

ITEE-403 Advanced Circuit Theory
Registration #0609-403
Transistor and steady-state response of linear circuits to d.c., a.c. and nonsinusoidal inputs. Laplace transform application to circuits, Bode and Fourier series analysis. (ITEE-202)
Lecture 4, Recitation 2, Credit 5

ITEE-404 Control Systems I
Registration #0609-404
Analysis and application of closed-loop control systems for stability, accuracy, transient response; block diagram algebra and transfer functions, Routh's and Nyquist's stability criteria; gain and phase margin, Bode plots, steady-state error, lead and lag compensating networks, microprocessor-based control systems. (ITEE-402, SMAT-422)
Class 3, Lab. 2, Credit 4
ITEE-405 Power Controls
Registration #0609-405
A course in the fundamentals of control systems, as used from the stand-point of the digital computer. Emphasis on feedback control theory, control system components, digital control systems and solid state control. (ITEE-403)
Lecture 3, Lab. 2, Credit 4

ITEE-409 Technical Reporting
Registration #0609-409
A course for those enrolled in Computer Technology to meet the minimum requirements in written and oral communications in their major area. Topics include effective sentence, paragraph, and report organization; documentation makeup for user-friendly relationships; and oral presentation of ideas.
Lecture 2, Recitation 3, Credit 4

ITEE-411 Electrical Principles for Design I
Registration #0609-411
A service course offered to non-electrical majors studying in the technical disciplines; covers basic electrical circuits, network theorems, power and energy concepts, P.F. correction, and basics of transformers and motors.
Class 3, Lab. 2, Credit 4

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

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

ITEE-424 Logic and Digital Devices
Registration #0609-424
The analysis and simplification of logic equations using Boolean algebra, with applications to semiconductor integrated circuits. Truth tables and Karnaugh map reduction techniques, multiple output circuits, multi-level gate networks, multiplexers and demultiplexers, synchronous sequential circuits, state diagrams and counter circuits are also studied.
Class 3, Lab. 2, Credit 4

ITEE-425 Power Concepts
Registration #0609-425
Steady-state ac circuits both single and three phase, transformers, dynamometer theory, motor characteristics, dc and stepper motors, solid-state power electronic devices and application to control of motors.
Class 2, Recitation 2, Credit 3

ITEE-428 Linear Amplifier Design
Registration #0609-428
Biasing of bipolar and field effect transistors is reviewed. Design and analysis of Class A amplifiers using small signal h-parameters is presented. Included are the topics of feedback and frequency response in multistage amplifiers. (Co-requisite ITEE-402)
Class 3, Lab. 3, Credit 4

ITEE-429 Advanced Electronics
Registration #0609-429
Analysis of small and large signal transistor amplifiers is covered, including elements of power supply design. (ITEE-403)
Class 3, Lab. 3, Credit 4

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

ITEE-471 Topics in Computer Engineering Technology
Registration #0609-471
A course designed to broaden the knowledge of computer technologists. Topics covered include FORTRAN, Advanced 8-bit microprocessors (the 6809), 16-bit microprocessors (the 68086 and 68000), and microprocessor development systems. (ITEE-303)
Lecture 3, Lab. 3, Credit 4

ITEE-472 Electronic Instrumentation
Registration #0609-472
An introduction to the devices necessary to supply input to digital computers. A/D and D/A converters, impedance bridge circuits and sensing devices are emphasized. (ITEE-405)
Lecture 3, Lab. 2, Credit 4

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

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

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

ITEE-527 Semi-Conductor Devices
Registration #0609-527
A course to provide an understanding of current semiconductor devices. Emphasis will be placed on the manufacture and usage of integrated circuits, field-effect devices, and small scale computer devices. The course will give the student an understanding of the physical bases of device characteristics. (ITEE-429)
Class 4, Credit 4

ITEE-528 Introduction to Minicomputers
Registration #0609-528
A continuation of the study of small computers with an emphasis on the characteristics which make minicomputers a part of the computer spectrum. Topics include minicomputer machine description, memory referencing techniques, microprogramming, assemblers, editors, linkers, number systems and macros. (ICSP-205)
Class 3, Lab. 3, Credit 4

ITEE-530 Application of Discrete and Integrated Circuit Elements
Registration #0609-530
Selected topics in the application of discrete circuit components to linear and non-linear circuit design. Theory and application of integrated circuit op-amps in the design of active filters, analog computers, feedback control systems and function generators. (ITEE-428)
Class 3, Lab. 2, Credit 4

ITEE-532 Power Amplifier Design
Registration #0609-532
The design of Class A and B low-frequency power amplifiers is studied including the use of feedback and heat sinking requirements. Principles of design for Class C RF amplifiers and Class D voltage regulators are also covered. (ITEE-429)
Class 3, Lab. 2, Credit 4

ITEE-534 Communications Systems I
Registration #0609-534
This course provides an introduction to AM, DSB, SSB, VSB, and FM modulation systems. Fourier transforms are utilized to demonstrate relationships between the time and frequency domain. Circuits for modulators and demodulators are discussed. (ITEE-428)
Class 3, Lab. 2, Credit 4
ITEE-535 Communication System II
Reg istration #0609-535
Topics include sampling theorem, time division multiplexing, pulse modulation systems, pulse code modulation and quantization, phase-shift keying, noise, noise effects in analog and digital communication systems, analog and digital system performance, and an introduction to statistical methods. (ITEE-534)
Class 4, Credit 4
ITEE-536 Control Systems II
Reg istration #0609-536
A review of ITEE-404, Control Systems I: Root locus and Nichols charts will also be discussed. Design of control systems for specific application and performance criteria; a study of control motors and components for DC/AC control systems; application of control theory to the solution of practical system problems. Time domain analysis including state variables, matrices and numerical solutions to state equations will be studied. Digital computer control utilizing real-time controllers and z-transforms will also be included. (ITEE-404)
Class 3, Lab. 2, Credit 4
ITEE-538 Digital Computer Design I
Reg istration #0609-538
Design of logic circuits using 7400 series TTL gates: a study of TTL flip-flops, one shots and oscillator circuits; design of timing circuits, shift registers and counters. (ITEE-424)
Class 3, Lab. 2, Credit 4
ITEE-539 Digital Computer Design II
Reg istration #0609-539
A continuation of ITEE-538 with application of logic circuits to computer design. Multiplexers, semiconductor memories, ALUs and their applications to computers and microprocessors are considered. The basic operation of computers, and computer systems are examined. Machine language programming, indexing and interrupt programming are introduced. The student will build a small prototype minicomputer for use in this course. (ITEE-538)
Class 3, Lab. 2, Credit 4
ITEE-542 Microprocessors
Reg istration #0609-542
An introductory course in Microprocessors emphasizing the Motorola 6800 and Intel 8085. The topics covered include the CPU, ROMS, RAMS, programming and interface ICs. Practical applications of microprocessors are also considered. (ITEE-424)
Class 3, Lab. 3, Credit 4
ITEE-543 Minicomputers, Controllers and Peripherals
Reg istration #0609-543
A study of the most common peripherals used with microprocessors and minicomputers. Peripherals include UARTs, IC Timers, TTYs, MODEMS, CRT drivers, disc drives, cassettes, card readers, line printers, and D/A and A/D converters. Methods of interfacing these peripherals to minicomputers and microprocessors are emphasized. (ITEE-539)
Class 3, Lab. 3, Credit 4
ITEE-546 Industrial Electronics
Reg istration #0609-546
Design of SCR/Traic control circuits for D.C. and A.C. motors; control of lights and heating elements with D.C. power supplies and polyphase rectifier circuits; speed control of D.C. and A.C. motors; process control systems utilizing solid state electronic circuits. (ITEE-532)
Class 3, Lab. 2, Credit 4
ITEE-547 Digital Processing of Signals
Reg istration #0609-547
Basic concepts of linear systems are covered, followed by an introduction to digital signal processing from a hardware and software approach. Emphasis is placed on digital filter design and the FFT. Applications are considered. Programming projects will be assigned. (SMAT-422, ITEE-530)
Class 3, Recitation 2, Credit 4
ITEE-550 Power Systems I
Reg istration #0609-550
Basic elements of a power system, energy sources, substation configuration, load cycles, balanced and unbalanced three phase circuits, power factor correction, transmission line configurations and impedances, voltage regulation of transformers, and the per unit system are studied. The symmetrical component method of analysis is introduced. (ITEE-426 or ITEE-412)
Class 3, Lab. 2, Credit 4
ITEE-551 Protective Relaying
Reg istration #0609-551
The physical construction and characteristics of electromechanical relays, short circuit calculation and line, bus, transformer and motor-generator protection are studied. Solid state relays, instrument transformers, and telecommunications and supervisory control are included. (ITEE-402 or equivalent)
Class 3, Lab. 2, Credit 4
ITEE-552 Power Systems II
Reg istration #0609-552
The symmetrical component method of three phase circuit analysis is used for fault analysis. Various methods of circuit reduction are developed. Lightning and surge protection, load flow, economic operation, and system stability are covered. System protection is introduced. (ITEE-550 or permission of instructor)
Class 4, Credit 4
ITEE-554 Electronic Optic Devices
Reg istration #0609-554
Basic photometry is discussed. Light emitting and light receiving devices are covered with circuits and applications. Optics is introduced with laser theory and fiber-optics.
Class 3, Lab. 2, Credit 4
ITEE-555 Transmission Lines and Antennas
Reg istration #0609-555
Analysis of voltage, current, and power along transmission lines. Design of matching stubs. Use of Smith chart. Solution of Maxwell's equations and their interpretation relevant to antenna theory. Characteristics of various antennas and arrays (ITEE-402)
Lecture 3, Lab. 2, Credit 4
ITEE-560 Microelectronic I
Reg istration #0609-560
The fabrication process of integrated circuits is covered, beginning with crystal growth up to the first predeposition and drive-in. Topics include: doping, deposition, oxide and epitaxial growth and masking.
Lecture 3, Recitation 2, Credit 4
ITEE-561 Microelectronics II
Reg istration #0609-561
This is a continuation of Microelectronics I. Topics covered are isolation drive-in, device formation, metallization, mounting and packaging. Device characteristics based upon their fabrication are discussed. (ITEE-560)
Lecture 3, Recitation 2, Credit 4
ITEE-562 Construction and Failure Analysis
Reg istration #0609-562
Techniques for analyzing an integrated circuit to determine its construction and/or failure mode. Topics include photography, microscopes, and scanning electron microscopes. (ITEE-560, ITEE-561)
Lecture 3, Recitation 2, Credit 4
ITEE-580 Senior Project
Reg istration #0609-580
Selected independent study of design project by electrical technology students with the approval of the department. Approval must be granted first week of fall or winter quarter for spring quarter registration.
Class/Lab. as required. Credit 4
ITEF-403 Machine Elements
This course covers the basic principles that apply to the design and selection of such frequently used machine elements as bearings, shafts, fasteners, variable speed drives, gears, cams, and springs. Emphasis will be given to applications for manufacturing equipment.
Credit 4

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

ITEF-425 Statistical Quality Control II
Registration #0617-425
The course will deal with the application of statistical theory to forecasting, process control, sampling, reliability, quality control and quality assurance. The planning, organizing and implementation of quality controls in the industrial setting will be studied. Inspection techniques dealing with destructive and non-destructive testing and computer-aided measurement will be introduced. (ITEF-424)
Class 3, Recitation 2, Credit 4

ITEF-434 Operations Management
Registration #0617-434
A study of modern manufacturing organization and how it is managed. The course will cover manufacturing systems design, analysis and control. Techniques of decision making process, design of manufacturing process, materials handling, design of physical facilities and control of manufacturing operations will be discussed.
Credit 4

ITEF-436 Engineering Economics
Registration #0617-436
This course covers some of the factors involved in the engineering economy. Capital financing and budgeting, depreciation and valuation, risk and uncertainty, break-even studies, replacement costs and selections between alternatives are typical of the topics covered.
Class 4, Credit 4

ITEF-437 Value Analysis
Registration #0617-437
This course presents a fundamental coverage of cost systems, cost optimization and cost estimation for engineering projects and processes. Value analysis is presented as a problem solving methodology. The relationship among value, function, quality, reliability, and cost is explored.
Class 4, Credit 4

ITEF-460 Computer-Aided Design
Registration #0617-460
The course will deal with CAD concepts, 2-D and 3-D interactive graphics, hardware and software systems, programming, and CAD applications. CAD and its role in group technology, process planning and numerical control part programming will also be included.
Class 3, Lab. 2, Credit 4

ITEF-471 Computer Numerical Control
Registration #0617-471
An advanced course in applications of numerical control. Emphasis will be placed on computer-assisted part programming for contouring in two and three axes. Application of advanced technologies such as CNC and DNC.
Class 3, Lab. 2, Credit 4

ITEF-472 Tool Engineering
Registration #0617-472
Machining and machine tools will be reviewed: the selection of tools for production; the specification of tools, jigs, and fixtures; production gauges; selection of tooling for automatic machines; determination of assembly tooling. Emphasis is placed on the design and application of dies.
Class 3, Recitation 2, Credit 4

ITEF-473 Compact II
Registration #0617-473
This is a second advanced level course in Computer Numerical Control. Compact II is one of the most commonly used NC part programming languages in the industry. The students will learn to write Compact II programming language and work in the Manufacturing Data Systems, Inc., time-sharing terminals to produce NC tapes.
Class 3, Credit 4

ITEF-475 Computer-Aided Manufacturing
Registration #0617-475
The basic elements, principles, and terminology of the hardware and software for computer-aided manufacturing systems are outlined. Group technology (GT), workpiece classification and coding, cellular production, design retrieval. Computer Aided Process Planning and FMS are dealt with as they apply to CAM. Lab sessions will be devoted to system building.
Class 3, Lab. 2, Credit 4

ITEF-481 Work Simplification and Measurement
Registration #0617-481
Principles and applications of basic methods and techniques to improvement of the worker-job time relationship. Job standards, predetermined time, time and motion study, human engineering in relation to work-space designed for efficient use of laboratory.
Class 3, Recitation 2, Credit 4

ITEF-485 Robot* in Manufacturing
Registration #0617-485
The course will deal with the technology and applications of industrial robots. Included are the study of engineering technology underlying the hardware and software systems. The hardware aspect will include physical configurations, degrees of freedom, precision, speed, load capabilities and gripper technology. Software aspect will deal with the manual methods of programming the robot and computer programming. The emphasis will be on the industrial applications of robots. Applications will include die casting, welding, painting, plastic molding, assembly operations, material handling and special applications such as glass manufacturing. Laboratory sessions will be used to provide the students “hands-on” experience with robots.
Class 3, Lab. 2, Credit 4

ITEF-491 Production Control
Registration #0617-491
The fundamental principles in the control of industrial production in relation to forecasting purchasing, inventory, production planning and scheduling with special emphasis on MRP.
Class 4, Recitation 1, Credit 4

ITEF-499 Manufacturing Technology Co-op
Registration #0617-499
Class 0, Credit 0

ITEF-502 Advanced Manufacturing Processes
Registration #0617-502
This is an advanced course in Manufacturing Processes, dealing with the state-of-the-art in this area. A study of precision machining processes such as Chemical Machining, Electrochemical Machining, Electrical Discharge Machining, Ultrasonic Machining, Electron Beam Machining, Laser Machining will be made. Also included in the course are Surface Finishing, Microfinishing. Manufacture of Thin Films, and Printed Circuits. Lab sessions will include hands-on experience with EDM and Lasers.
Class 3, Lab. 2, Credit 4

ITEF-510, 511 Process Design I, II
Registration #0617-510, 511
The student is placed in a realistic manufacturing situation in which he or she selects, creates, or is assigned a product to manufacture. Use of his or her total program in the solution of the problem and its presentation. Oral and written report presentations.
Class 3, Lab. 2, Credit 4

ITEF-526 Quality Systems
Registration #0617-526
The study of the total quality control engineering field from new product testing and evaluation through manufacturing quality systems to analysis of returned defective products is presented.
Class 4, Recitation 1, Credit 4
ITEM-404  Applied Mechanics of Materials
Registration #0610-404
The basic concepts of strength of materials as applied to mechanical design are reviewed in depth. The course includes the study of the concepts of stress and strain, the stress-strain relationship and combined stress. Fatigue and properties of materials and analysis of mechanical fatigue, theories of failure. Applications of these concepts to the analysis of machine members.
Class 4, Credit 4

ITEM-405  Applied Dynamics
Registration #0610-405
Examines the principles of kinematics and the basic laws of motion as applied to the design and analysis of mechanical components and systems. (ITEM-404, SMAT-421 or concurrent)
Class 3, Recitation 2, Credit 4

ITEM-406  Dynamics of Machinery
Registration #0610-406
A study of the kinematics of machine elements such as gears, cams and linkages with emphasis on graphical methods. (ITEM-405)
Class 3, Recitation 2, Credit 4

ITEM-407  Mechanical Engineering Laboratory II
Registration #0610-407
A course in mechanical laboratory techniques and the preparation of laboratory reports; experimental work in materials testing, strength of materials, experimental stress analysis, metallurgy, and metallography; instruction in the preparation of laboratory reports. (It is intended that students enroll concurrently in ITEM-404 and ITEM-414.)
Class 2, Lab. 3, Credit 3

ITEM-408  Introduction to Strength of Materials
Registration #0610-406
Elements of statics and strength of materials. Topics include plane equilibrium, friction, stress, strain, torsion, and the bending of beams.
Class 3, Recitation 2, Credit 4

ITEM-409  Mechanical Engineering Technology Laboratory II
Registration #0610-409
A course in mechanical laboratory techniques, the analysis of experimental results and the preparation of laboratory reports. Experimental work in mechanics of materials, materials science and plastics technology will be conducted. Instruction will be provided in several forms of technical communication. (ITEM-404, ITEM-407; ITEM-415 concurrently)
Class 1, Lab. 3, Credit 2

ITEM-411  Engineering Materials
Registration #0610-411
A study of the physical properties of materials; survey of manufacturing processes including casting, molding, metal removal, metal forming, welding; field trips to local manufacturing installations; material testing inspection labs, and selected heat treating experiments are available. For non-mechanical majors.
Class 3, Recitation 2, Credit 4

ITEM-414  Material Science Technology I
Registration #0610-414
A course involving a study of materials, their structure and their characteristics. Topics covered include metallic structures, unit cell, phases and phase diagrams, physical properties, diffusion in metals, recovery, recrystallization and growth grain, ferrous and some non-ferrous metals, heat treatment and age hardening of metals.
Class 3, Credit 3
ITEM-522 HAVC Control Systems
Registration #0610-522
An introduction to controls used in association with HVAC systems. The course integrates controls with HVAC processes to arrive at appropriate control and instrumentation systems. The course examines individual instruments, instrument and control systems, monitoring systems and computer control. (ITEM-542)
Class 4, Credit 4

ITEM-530 Instrumentation
Registration #0610-530
The basic approach to calibration and use of pressure, temperature, flow, humidity and liquid level measurement instruments. Techniques of test, calibration and proper use of instruments will be demonstrated. Principles of experimentation and computerized data reduction are examined. (ITEE-411, ITEM-460, SMAT-422)
Class 3, Lab. 2, Credit 4

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

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

ITEM-542 HVAC System Engineering
Registration #0610-542
Principles and applications of refrigeration, air conditioning, comfort heating, and ventilating. Thermodynamics of vapor compression refrigeration cycles, air conditioning, psychrometrics; also related heat transfer topics. (ITEM-540)
Class 3, Recitation 2, Credit 4

ITEM-543, 544 Energy Management I, II
Registration #0610-543, 544
Technical, management, and cost aspects of energy conservation. Technical aspects of reducing energy consumption in utilities, processes, buildings, heating, air conditioning, and ventilation systems. Special topics such as furnace efficiency, heat recovery, heat pumps, pumping and piping, and architectural considerations. (ITEM-540)
Class 4, Credit 4

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

ITEM-560 Pipe and Duct Design
Registration #0610-560
Theory and application methods for designing hydronic, refrigerant, steam, and compressed air piping and air handling ducts. The use of computer-aided methods is emphasized. (ITEM-460, ITEM-542)
Credit 4

ITEM-575 Computer Aided HVAC Systems Design
Registration #0610-575
Use of computer programs for evaluating system sizing, annual operating cost analysis, and system optimization will be emphasized while studying the impact of various architectural and HVAC designs on energy utilization. Current professionally used design programs will be used including the Carrier Corporation E-20 Series of programs and the McClintock Corp. MC2 series, main frame programs accessible through Trane Corp. and APEC. (ITEM-542)
Class 3, Lab. 3, Credit 4

ITEM-580 Power Plant Design
Registration #0610-580
Description of power plants and their components; boilers, turbine, pumps, condenser, heat exchangers, nuclear reactors. Relevant analytical tools; cycle calculations, heat balances, gas analysis, fuel analysis. Also, internal combustion power plants and cogeneration plants are covered. (ITEM-440)
Class 4, Credit 4

ITEM-599 Independent Study
Registration #0610-599
A supervised investigation within a mechanical technology area of student interest. Student must submit written proposal and have it approved prior to registering.
Credit variable (1-4)

Packaging Science
All Department of Packaging Science courses are offered at least once annually.

Undergraduate Courses

IPKG-201 Principles of Packaging
Registration #0607-201
An overview of packaging: the historical development of packaging, the functions of packaging, and the materials, processes, and technology employed to protect goods during handling, shipment and storage. A brief review of container types, package design and development, and research and testing will be presented, along with information about economic importance, social implications, and packaging as a profession.
Class 4, Credit 4

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

IPKG-310 Methods of Evaluation
Registration #0607-310
Information about recognized standard testing procedures will be presented, and students will gain practical experience in the operation of various commonly used testing instruments which are used to determine physical properties of fibre, metal, plastic, and glass packaging materials. (IPKG-201)
Lab. 4, Credit 2

IPKG-311 Packaging Materials I
Registration #0607-311
The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on metals and plastics used in packaging, and adhesives, propellants, and other component materials. (IPKG-201)
Class 3, Credit 3

IPKG-312 Packaging Materials II
Registration #0607-312
The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on paper, paperboard, wood, and glass used in packaging applications. (IPKG-201)
Class 3, Credit 3
IPKG-321 Registration #0607-321
A detailed study of primary packages. History, manufacturing processes, characteristics, and applications for containers in direct contact with the product. Structural design, chemical compatibility and suitability of container for intended use will be analyzed for basic container types. Students will practice structural design and testing of prototype containers. Primary emphasis will be on rigid paperboard, glass, plastic and metal containers. (IPKG-301, 311, 312)
Class 2, Recitation 1, Lab. 2, Credit 4

IPKG-322 Registration #0607-322
Corollary course for 321. Primary emphasis will be on flexible paper, foil, plastic, and laminated materials, and selected processing techniques. (IPKG-301, 311, 312)
Class 2, Recitation 1, Lab. 2, Credit 4

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

IPKG-420 Technical Communication Registration #0607-420
Introduction to the principles of effective written technical communication for the packaging professional. Topics include: memos, business letters, summary activity reports, technical proposals, and research papers. This course is open only to packaging majors, and is required as part of the writing skills certification process under the RIT policy.
Class 3, Credit 3

IPKG-431 Packaging Production Systems Registration #0607-431
A study of package forming and filling, closing, product/package identification, inspection, and other machinery commonly used in packaging, plus consideration of handling and storage/retrieval systems. The characteristics of such equipment and maintenance programs will be considered. Students will gain practice in setting up complete production lines for packaging various products. (IPKG-315)
Class 2, Lab. 4, Credit 4

IPKG-432 Packaging for Distribution Registration #0607-432
An exploration of different shipping, storage, and use environments common to various products and packages. Structural design of packages for product physical protection, chemical compatibility as a factor in shelf life, and methods for testing and predicting these factors will be studied. (IPKG-315)
Class 2, Lab. 4, Credit 4

IPKG-433 Packaging for Marketing Registration #0607-433
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a scientific marketing tool. The course concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market. Advertising, marketing demographics, and the impact of color upon packaging will be considered. Students will gain practice in the development of a complete package system.
Class 2, Lab. 4, Credit 4

IPKG-499 Packaging Co-op Registration #0607-499
One quarter of appropriate work experience in industry.
Credit 0

IPKG-520 Packaging Management Registration #0607-520
A study of packaging organization in the contemporary corporation and project management techniques available to the packaging manager. Organization theory will be discussed, and compared with typical industry practice. Other topics will include PERT, value analysis, and the impact of regulatory agencies upon packaging from a management standpoint. (Professional elective)
Class 3, Recitation 1, Credit 4

IPKG-524 Packaging Economics Registration #0607-524
A study of firm behavior with concentration on production costs and revenues. Market structures will be analyzed in order to develop an understanding of how packaging fits into the general economy. Students will be instructed in the use of basic economic reference materials for research purposes. A paper is required. (Professional elective)
Class 4, Credit 4

IPKG-530 Packaging and the Environment Registration #0607-530
Consideration of packaging in a social context. Factors which enhance secondary use, recycling, recovery of resources, and proper disposal will be discussed. Package design in relation to solid waste disposal and materials and energy shortages will be considered. Other topics of current social interest will be discussed. Primarily a discussion class for senior students. Open to non-majors. (Professional elective)
Class 2, Recitation 1, Lab. 2, Credit 4

IPKG-555 Military and Export Packaging Registration #0607-555
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 (IPKG-432; Professional elective)
Class 3, Lab. 2, Credit 4

IPKG-562 Packaging Regulations Registration #0607-562
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, hazardous materials packaging regulations administered by the Department of Transportation; freight classifications, freight claims, hazardous materials packaging, and safety regulations. (IPKG-432, Professional elective)
Class 3, Credit 3

IPKG-568 Food Preservation and Packaging Registration #0607-568
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. (IPKG-432; Professional elective)
Class 3, Credit 3

IPKG-570 Point of Purchase Displays Registration #0607-570
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. (Course is intended to be an interdisciplinary, senior elective for students in packaging, packaging design, audio-visual technology, retailing, and printing. (IPKG-433, FADK-403, BRER-410, ICIC-450, PPRM-403 or department approval, depending on major.)
Class 2, Lab. 4, Credit 4

IPKG-585 Principles of Shock and Vibration Registration #0607-585
A study of the factors involved in analyzing potential damage to packaged items resulting from impact or vibration forces. Students will be expected to master basic mathematical and physical concepts in addition to the use of the various pieces of testing equipment.
Credit variable 3-4

IPKG-590 Senior Thesis Registration #0607-590
An in-depth study of some phase of packaging which will enable the student to make use of the knowledge and skills acquired during the course of the program.
Arranged, Credit 4
IPKG-598, 599 Independent Study
Registration #0607-598, -599
Independent study, in consultation with the instructor, on any packaging-related topic. (Independent study total credit allowed is limited to a maximum of 8 credits.) Arranged, Credit variable 1-4

Graduate Courses

IPKG-701 Research Methods in Packaging
Registration #0607-701
Discussion of procedures, methods, and requirements for carrying out the research project. Students pursue advanced study and research in the following areas: distribution packaging, package systems development, product and/or packaging damage in the physical distribution environment, materials, quality preservation, production and mechanical properties of packaging materials and systems.
Credit 4

IPKG-721 Packaging Administration
Registration #0607-721
Study of the role of packaging operations in the corporate enterprise. Positioning of the packaging function in the corporation, managerial practice, interpersonal relationships, and control techniques are considered. Individualized instruction, case analysis, and/or research papers supplement classroom instruction.
Credit 4

IPKG-731 Advanced Packaging Economics
Registration #0607-731
An advanced study of the firm's economic behavior in relationship to activities within the packaging function. Included are packaging costs, production theory, and case studies demonstrating general trends in the packaging industry. Individual instruction, case study, and/or research paper required, as appropriate to the student's level of interest.
Credit 4

IPKG-742 Distribution Systems
Registration #0607-742
Study of the shipping and handling environment encountered by goods in packages during distribution to the product user. Materials handling, warehousing, and the impact of the distribution environment on shipping container design and development is considered. Case study or individual research appropriate to student's interests.
Credit 4

IPKG-750 Graduate Seminar
Registration #0607-750
Course concentrates on topic of current interest, depending on instructor, quarter offered, and mix of students. Content to be announced prior to registration dates.
Credit 4

IPKG-752 The Legal Environment
Registration #0607-752
An intensive study of federal, state, and local regulation that affects packaging. Individualized study and research on an interest basis.
Credit 4

IPKG-763 Packaging for End Use
Registration #0607-763
An intensive study of package design requirements specific to use of a product at specified end points. Individual design and development of a package system and its specifications, appropriate to the needs of the product and the consumer/user.
Credit 4

IPKG-770 Computer Applications
Registration #0607-770
Study of the application of computer techniques and data processing for packaging applications: specification development, test simulation, optimum sizing of packaging systems, process control, and similar applications will be presented. Computer program development and individual research on an interest basis.
Credit 4

IPKG-783 Packaging Dynamics
Registration #0607-783
The study of instrumentation systems for, analysis, evaluation, and application of shock and vibration test methods and data to package system design and development for specific products. Individualized instruction appropriate to student's interests.
Credit 4

IPKG-798 Independent Study
Registration #0607-798
Student-initiated study in an area of specialized interest, not leading to a thesis. A comprehensive written report of the investigation is required. Cannot be used to fulfill core requirements.
Credit variable (may be taken for a maximum of 8 credits)

IPKG-799 Advanced Package Design
Registration #0607-799
Advanced package design projects selected in consultation with the instructor. Individual study appropriate to area of interest and background of student. (Consent of department)
Credit variable 1-4

IPKG-890 Graduate Thesis
Registration #0607-890
An independent research project to be completed by the student in consultation with the major professor. A written thesis and an oral defense of the thesis is required. (Consent of department)
Credit variable (maximum of 12)

School of Food, Hotel and Tourism Management

Dietetics and Nutritional Care

ISMD-213 Nutrition Science
Registration #0620-213
The study of specific nutrients and their functions; physiological, psychological and sociological needs of humans for food; development of dietary standards and guides; application of nutritional principles in planning and analyzing menus for individuals of all ages; survey of current health nutrition problems and food misinformation.
Class 4, Credit 4

ISMD-402 Dietetics Environment
Registration #0620-402
Introductory dietetics course for students to interact and communicate with a representative sampling of the various categories of personnel in the general field of dietetics to study all major components of a total system in which a registered dietitian might function. (ISMF-215, ISMD-213)
Class 1, Credit 4 Clinical hours by arrangement.

ISMD-525, 526 Advanced Nutrition and Diet Therapy I & II
Registration #0620-525, -526
Biological metabolism and interrelationships of nutrients, enzymes, and other biochemical substances in humans. Etiology, symptoms, treatment, and prevention of nutritional diseases; evaluation of nutritional status, role of the diet and dietetics in metabolic gastrointestinal, renal, musculoskeletal, cardiac, endocrine, febrile, and other diseases. (ISMD-213, SCHG-203, SBIG-212)
ISMID-525 Class 5, Credit 5 ISMD-526 Class 4, Credit 4

ISMD-550 Community Nutrition
Registration #0620-550
Study of current nutrition problems in the community. Survey of agencies involved in giving nutrition information to the public and/or nutritional care to groups. An independent study project involving nutrition care in a clinical facility in the community is required. Assignments are arranged by the instructor. (ISMD-213, ISMD-526 or ISMD-562)
Class 2, Credit 4 Clinical hours by arrangement.
### ISMD-551 Food Systems Management II Registration #0620-551
Principles of management in organizational structure, supervision and evaluation of employee performance, and use of computers in food management; the functions of an administrative dietitian in planning, organizing, directing, coordinating, and controlling dietetic activities. (ISMF-215)

Class 1, Credit 8 Practicum in hospital by arrangement.

### ISMD-554 Nutrition In Life Cycle Registration #0620-554
This is an applied course in nutritional needs throughout the life cycle. Emphasis will be given to nutrition during pregnancy, infancy, early childhood, adolescence, and in later years. (ISM-213)

Class 4, Credit 4

### ISMD-560, 561 Clinical Dietetics I & II Registration #0620-560, -561
An intensive integrated study and application of advanced nutrition and diet therapy theories and principles. The course is structured to integrate class lectures (ISM-560) with clinical experience (ISM-561) in a hospital setting. Designed for senior students in the Coordinated Dietetics Program. (ISM-213, SCHG-203, SBIG-212)

ISM-560 Class 4, Credit 4
ISM-561 Clinical Hours by Arrangement, Credit 4

### ISMD-562, 563 Clinical Dietetics III & IV Registration #0620-562, -563
A continuation of ISMD-560,561 in the succeeding quarter with the clinical experience being conducted in the hospital. (ISM-560,561)

ISM-562 Class 4, Credit 4
ISM-563 Clinical Hours by Arrangement, Credit 6

### Food and Beverage Management

#### ISMF-210 Introduction to Food, Hotel and Tourism Management Registration #0621-210
An orientation course designed to trace the history, organizational structure, problems, opportunities and the place of the industry in the national and world economy. Trends and developments in the industry today are stressed.

Class 4, Credit 4

#### ISMF-215 Principles of Food Production Registration #0621-215
Introduction of foods and basic preparation of high quality food products. Topics include history, kinds, varieties, seasonal availability, sources, and composition of foods and ingredients; essential vocabulary; organization and management of work areas; techniques and methods used for menu planning. Uniform required.

Class 3, Lab. 6, Credit 5

#### ISMF-220 Career Seminar Registration #0621-220
Seminar designed to define career opportunities in the food, hotel and tourist industries. Students will be aided in developing career objectives. Leading industry executives will participate.

Class 1, Credit 1

#### ISMF-311 Design & Equipment Engineering Registration #0621-311
Recognizing, analyzing and solving equipment and space problems in layouts of existing institutions and in designing new food service plans. Consideration of food service equipment; determination of needs; development of specifications; procedures of maintenance, sanitation, and safety. (ISMF-215)

Class 3, Lab. 2, Credit 4

#### ISMF-314 Fundamentals of Food Sanitation Registration #0621-314
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. (ISMF-215)

Class 2, Credit 2 (For all ISMD, ISMF, and ISMH majors)

#### ISMF-321 Menu Planning and Merchandising Registration #0621-321
Recognizing, analyzing, research and solving fundamental merchandising techniques including menus for food and beverages found in the food service industry. (ISMF-215)

Class 4, Credit 4

#### ISMF-331 Food Systems Management I Registration #0621-331
Application of standards, preparation, and service of high quality food. Recognizing, analyzing, planning, scheduling, solving and evaluating problems related to all aspects of food production and management based on scientific, technological, economic, and social factors. Students will assume various operational positions found in commercial feeding facilities by operating the department's 80-seat restaurant. Students will be instructed in utilizing the Remanco Computer System. Students in the Coordinated Dietetics program will have hospital practicum arranged. (ISMF-215,321)

Class 1. Lab. 12, Credit variable, 4-5

#### ISMF-340 Beverage Operations Registration #0621-340
Practical course dealing with the management of a commercial beverage operation. Class and laboratory includes objectives, procedures, characteristics, regulations, controls and mixology of alcoholic beverages. Students will utilize computerized dispensing equipment. (Open to sophomores and juniors only, age 19 or older)

Class 3, Credit 3

#### ISMF-341 Beverage Operations Lab Registration #0621-341
Course will allow experience in the actual operation of Henry's beverage center. Students will become familiar with Remanco and Sweda electronic liquor control system. Open to sophomores and juniors only, age 19 or older. (ISMF-340)

Lab. 4, Credit 2

#### ISMF-416 Product Development Registration #0621-416
This course is designed to develop new food products and to evaluate their market acceptance within major food companies for either consumer or institutional production. Group projects will be assigned in order to create a team approach to simulate product research. (ISMF-314, ISMF-331, ISMD-213)

Class 2, Lab. 6, Credit 4

#### ISMF-424 Food and Labor Cost Control Registration #0621-424
A fundamental course to assist the student in costing of food and labor needed to operate a food service system. Included is analysis of standardized recipes, scheduling, application of internal controls, and computations of operating statements. Analysis of sales activity and current inventory data will be done on the Remanco System. (BBUA-302, ISMF-425, ISMF-331)

Class 4, Credit 4

#### ISMF-425 Purchasing and Inventory Control Registration #0621-425
Course covers controls of purchasing systems, including selection, ordering, receiving, storage, issuing, evaluation of food, non-food supplies and services. (ISMF-210, 215)

Class 3, Credit 3

#### ISMF-426 Personnel and Training Registration #0621-426
Course includes employee relations: recruitment, selection, hiring, orienting, training and supervising. Emphasis on development of employee training manuals, employee productivity using techniques of work analysis, job description formulation, and production and labor schedule development. (ISMF-210, 331)

Class 4, Credit 4

#### ISMF-430 Restaurant Management Registration #0621-430
Application of theories and techniques dealing with total restaurant operation including: menu planning, marketing strategies, supervision of purchasing, equipment, production and service operations. Creation and calculation of management reports to evaluate efficiency and effectiveness of restaurant operations. (ISMF-311, 314, 341, 416, 424, 425, 426, 435)

Class 1, Lab. 12, Credit 5
The development, marketing and management of campgrounds will be studied with micro-computer applications. (ISMH-405)

Class 1, Credit 1

ISMH-405 Theme Park Management
Registration #0622-405
The development, marketing and management of theme parks will be studied with micro-computer applications. (ISMH-405)

Class 1, Credit 1

ISMH-406 Resorts and Condominium Management
Registration #0622-406
The development, marketing and management of resorts and condominiums will be studied with micro-computer applications. (ISMH-400)

Class 1, Credit 1

ISMH-410 Tourist Consumption Analysis
Registration #0622-410
A course designed to analyze the consumption of tourist goods and services. The analysis will include economic, recreation and personality theory in order to fully understand tourism consumption. Computer research applications are utilized.

Class 4, Credit 4

ISMH-411 Problem Analysis & Decision-Making
Registration #0622-411 for Tourist Industries
The course is designed to assist the student in constructing a problem-solving framework for the analysis of tourism industry management problems. Computer research applications are utilized.

Class 4, Credit 4

ISMH-412 Maintenance and Engineering Systems
Registration #0622-412 of Hotel/Resort Properties
A course designed to expose the student to various problems of maintaining a resort property. Maintenance practices, equipment, record keeping, and specific needs of recreational surfaces will be discussed as to proper maintenance for quality resort development. Computer energy monitoring systems are evaluated.

Class 4, Credit 4

ISMH-420 Hotel and Travel Law
Registration #0622-420
Policies, laws, and liabilities are examined as they pertain to the traveling public. The focus will be on current management problems and responsibilities as they entail the legal aspects of the hospitality industry. (ISMH-423)

Class 4, Credit 4

ISMH-423 Hotel Operations
Registration #0622-423
Analysis and evaluation of systems and operations, franchising, feasibility planning, development, financing and organization of facilities; rate structure determination, front office procedures, guest room salesmanship and analysis of demand; computerized reservation systems, ethics, security and on-the-job application of operational problems. (ISMH-210, BBUA-301, Junior standing)

Class 5, Credit 4

ISMH-450 Hotel Marketing and Convention Sales
Registration #0622-450
A study of tourism development, marketing and the interaction between the broad areas of the travel industry and its relationship to hotels, motels, restaurants, community economy, trade associations, competitive and non-competitive markets. Students will utilize the department's American Airlines' Sabre System which will emphasize its applicability in planning convention sales for various market segments, and in providing convention services at the meeting site. (ISMH-423, BBUA-463)

Class 4, Credit 4

Travel Management

ISMT-201 Travel Lab. I
Registration #0623-201
The basics of the domestic air transportation system are examined with the focus on the student achieving proficiency in reservations, itinerary construction, fare calculation, and ticketing procedures. The labs make use of the various air carrier and accommodation tariffs and guides. This course provides the basic understanding needed for the subsequent travel labs.

Class 3, Credit 3
the development of the present passenger system and to their possible future implications. (ISMT-220 or Permission of Instructor)

Class 4, Credit 4

ISMT-210 Introduction to A.A. SABRE Reservations
Registration #0623-210

An operational proficiency of American Airlines' SABRE reservation system is acquired by the student. Utilizing Sabre's Training mode, course topics include: PNR retrieval, availability, name and phone fields, ticketing field, remarks field, fare quotes, itinerary pricing, PNR queues, flight information AAVOA. This course is equally divided between lecture and Travel Lab simulations.

Class 4, Credit 4

ISMT-220 Travel Intermediaries
Registration #0623-220

A functional approach is utilized to aid in the understanding of the travel industry through the analysis of the marketing channels of distribution. The channel functions performed by the retail travel agent and the wholesale tour operator are examined in relation to suppliers’ (air carriers, hotel, etc.) marketing strategies and operations. Emphasis is placed on channel problems associated with group sales and packaged promotions.

Class 4, Credit 4

ISMT-303 Travel Lab. III
Registration #0623-303

Cruise travel and rail travel are examined in considerable detail. Motor coach and auto rentals are also discussed. (ISMT-201)

Class 2, Credit 2

ISMT-310 Intermediate SABRE Applications
Registration #0623-310

Utilization of Phase IV faring, pre-paid ticket advice, queue printing, currency conversion/rates, STARS, segments and accounting data entries, invoicing/itineraries.

Class 4, Credit 4

ISMT-320 Passenger Transportation Systems
Registration #0623-320

A detailed examination of the economic forces which help determine product configurations and pricing structure of the various modes of passenger transportation. The market structure of the passenger transportation system is surveyed with the emphasis placed upon the analysis of the pricing system's multiple interactions created in part because of the nature of the various demand components and supply consequences. (ISMT-220, or Permission of Instructor)

Class 4, Credit 4

ISMT-350 SABRE Applications to Non-Airline Information Systems
Registration #0623-350

Utilization of SABRE's non-airline information system. Topics include: car sale option fields, hotel index-descriptions, hotel availability, selling from hotel availability, immigration-customs guide.

Class 4, Credit 4

ISMT-370 Passenger Transportation
Policy Registration #0623-370

An examination of the development of transportation policy as it relates to the various modes of passenger transportation. The role of regulatory policy is discussed with emphasis on how it effects the economic and social policies and the physical aspects of passenger transportation. The various passenger transportation regulatory agencies are surveyed with the primary focus being their effect on the development of the present passenger system and to their possible future implications. (ISMT-220 or Permission of Instructor)

Class 4, Credit 4

ISMT-420 Corporate Travel Planning
Registration #0623-420

This course focuses upon the specific travel goals, accounting policies, and informational requirements of corporate (business) travel. Three major orientations of corporate travel are examined: corporate travel utilizing the retail travel agent, corporate travel operated through the firm's transportation manager, and incentive travel. One of these orientations is emphasized during the quarter, corresponding to the interests of the students enrolled. (ISMT-220 or Permission of Instructor)

Credit 4, Credit 4

ISMT-421 Tour Operations
Registration #0623-421

The operation of a typical tour wholesaler's program is examined. Emphasis is given to escorted and hosted tours, since they usually require direct involvement by representatives of the tour wholesaler. Financial and documentation flows are emphasized. The role of the tour guide/escort is highlighted. (ISMT-220 or Permission of Instructor)

Class 4, Credit 4

ISMT-422 Travel Product Development
Registration #0623-422

This course examines the planning function associated with the tour operator's development of new service offerings and/or the selection of new travel destination. Initially, a marketing research orientation is utilized with emphasis on tour specifications (packaging), negotiations and pricing of the final package. The methods of marketing to various market segments are subsequently examined. (ISMT-220 or Permission of Instructor)

Class 4, Credit 4

ISMT-423 Computer Reservation and Accounting Systems
Registration #0623-423

A survey of American Airlines SABRE computer reservation system used in passenger transportation is conducted. Application of the ASTA manual and several computer accounting systems, such as Holiday and ADS Nova IV, are examined. (Permission of Instructor)

Class 4, Credit 4

ISMT-550 Seminar in Travel Management
Registration #0623-550

A survey of the current issues faced by the travel industry. The course is designed as a capstone course for travel management majors, and only to seniors who have completed all of their co-op requirements. Various topics are discussed and different orientations are taken corresponding to the interests of the students and issues of current relevance in the travel industry.

Class 4, Credit 4
College of Business

School of Business Administration

Accounting

BBUA-301 Financial Accounting
Registration #0101-301
Basic accounting principles and techniques within a framework of sound modern theory. Methods of accounting for revenues, costs, property and debt. Typical records for various types of business enterprise. Preparation and use of classified financial statements. (SMAM-225)
Credit 4

BBUA-302 Managerial Accounting
Registration #0101-302
The accounting function as a source of data for managerial decision making. Control of the operations of the firm is emphasized through the use of reports for internal and external consumption. Major emphasis is on the analysis of accounting data rather than on its collection. (BBUA-301)
Credit 4

BBUA-408,409 Intermediate Accounting I, II
Registration #0101-408, 409
A study of the concepts, theories and practices used to prepare comprehensive financial statements in accordance with generally accepted accounting principles. The course will explore alternative accounting methods and valuation bases and the impact these have on financial statements. Current pronouncements of the Financial Accounting Standards Board will be studied if they are appropriate to the subjects of the course outline. (BBUA-302)
Credit 4

BBUA-431 Cost Accounting
Registration #0101-431
This course emphasizes the uses of cost data and cost reports for managerial decisions. Included are problems and procedures relating to job-order, process, standard cost systems and the techniques of overhead distribution. The role of the controller's organization in the furnishing of accounting data and reports for managerial planning and control is emphasized. (BBUA-302)
Credit 4

BBUA-522 Tax Accounting I
Registration #0101-522
A basic course in Federal taxation relating to concepts of income, deductions and credits. The tax structure of business forms including sole proprietorship, partnership, S corporation, and C corporation will be compared. Tax research will be introduced as a component of the decision process. (BBUA-302)
Credit 4

BBUA-523 Tax Accounting II
Registration #0101-523
A course in Federal taxation emphasizing specialized topics in individual and business taxation. Advanced topics will include acquisitions, mergers, liquidations and tax planning. (BBUA-522, Junior Status)
Credit 4

BBUA-530 Auditing
Registration #0101-530
A study of the legal, ethical, and technical environment in which the auditor works. Current auditing standards, procedures and techniques are studied. Audit programs are developed and problems connected with fraud and internal control are examined. The course includes a case study which simulates the conduct of an audit and which requires the preparation of working papers, an audit report, and an internal control memorandum. (BBUA-409)
Credit 4

BBUA-540 Advanced Accounting
Registration #0101-540
The application of modern accounting theory to problems of advanced complexity. The student is made aware of the media for expression of current accounting thought. Topical coverage includes consolidated financial statements, partnerships, estates and trusts, government and not-for-profit entities and an introduction to alternate accounting theories. (BBUA-409)
Credit 4

BBUA-550 Accounting Theory
Registration #0101-550
A comprehensive study of the official pronouncements of the Accounting Principles Board and the Financial Accounting Standards Board. The course will examine alternative theories of Accounting. (BBUA-409)
Credit 4

BBUA-554 Seminar in Accounting
Registration #0101-554
A seminar series covering selected topics in accounting, including management accounting, taxation, international accounting and accounting for non-profit organizations. Specific course topics to be announced when seminar is offered. (Junior status)
Credit 4

Management

BBUB-201 Management Concepts
Registration #0102-201
A basic course in management theory and practice. The student is introduced to organizational structure and to the application of the behavioral sciences. Particular attention is paid to management's roles in its relations with employees, ownership, government and community.
Credit 4

BBUB-210 Career Seminar I
Registration #0102-210
A basic introduction to the concept of career planning. The course emphasizes acquiring information about yourself such as understanding your own preferences and talents. In addition, the student will learn techniques for acquiring valid career information in order to select a field, or narrow occupational choices within a field. Self-assessment is an important feature of the course.
Credit 1

BBUB-301, 302 Business Law I & II
Registration #0102-301, 302
An introduction to legal principles and their relationships to business practices. Topical cases and examples are used as a guide to the observation of legal requirements, the avoidance of infractions, the utilization of professional services, and for familiarity with legal nomenclature. Representative topics include contracts, bankruptcies, and product liability.
Credit 4

BBUB-310 Career Seminar II
Registration #0102-310
A more advanced course in career development and planning. Students enrolled in this course are involved in a number of experiential exercises designed to provide self-insight for purposes of career planning. Information is provided about techniques for advancing one's career including career pathing and obtaining visibility. Exposure to career information is also included. (BBUB-210)
Credit 1

BBUB-315 Legal Environment of Business
Registration #0102-315
An introduction to the relationship between the business organization and laws that govern its operation. This includes the background and origins of law, law enforcement agencies, and government procedures for dealing with organizations that violate the law. Cases and examples are used as a guide to the observation of the legal requirements and forces which influence decision making about products and services, personnel, finances, and accounting practices.
Credit 4
BBUB-402 Credit 4  CPA Business Law
Registration #0102-402
A preparatory course in law for those planning careers as CPA’s. Topics include contracts, agency, Uniform Commercial Code, sales, letters of credit, bulk transfers, investment securities, estates, trusts, suretyship and guaranty, creditor’s rights, corporation and partnership law. (CBCB-302 or BBUB-302)
Credit 4

BBUB-403 Credit 4  Transportation Law
Registration #0102-403
Legal problems of transportation and traffic including evolution, construction, interpretation, and applications of the Interstate Commerce Commission Act. The Organization of the Interstate Commerce Commission and a review of its decisions are presented. (CBCB-302 or BBUB-302)
Credit 4

BBUB-420 Credit 4  Principles of Management
Registration #0102-420
A comprehensive course in the theory and practice of management for upperclass students. Emphasis is placed on the functional (or classical) and decision science schools of management. Among the major topics included are planning, controlling, organizing, budgeting, delegation, organization structures, organization design, and productivity improvement. Information in this course applies to different types of organizations and different levels of management. Cases and student activities are part of the instructional process. (Junior Status)
Credit 4

BBUB-427, 428 Credit 4  Health Institutions
Registration #0102-427, 0102-428  Management I, II
Introductory survey of administration in health care facilities including roles, functions, and responsibilities; organization structure; health care focusing on patient care, education and research; supervisory management for hospitals and related care facilities, emphasizing managerial planning, span of supervision, financing and coordination of public and private efforts. (Junior Status)
Credit 4

BBUB-429 Credit 4  Legal Aspects of Health Care Administration
Registration #0102-429
An overview of legislation as it applies to health facilities. All levels of law — federal, state and local discussed. Social Security, National Labor Relations, New York State Disability and Workmen’s Compensation, minimum wage, and Code of the New York State Health Department are examples of regulatory procedures to be analyzed. The role of the state and local governments in licensing and accrediting, and the standard of accreditation by major professional bodies will be reviewed. (Junior Status)
Credit 4

BBUB-430 Credit 4  Organizational Behavior
Registration #0102-430
An introduction to understanding human behavior in organizations with a particular emphasis upon organizational psychology and organizational behavior. Major topics include motivation, communication, stress and burnout, organizational power and politics, leadership, and research methods in organizational behavior. Students are required to analyze cases and participate in experiential activities. (BBUB-420)
Credit 4

BBUB-435, 436 Credit 4  Health Administrative Functions I, II
Registration #0102-435, 0102-436  Course examines contemporary issues in health care management. Emphasis is placed on the daily operational situations and decisions encountered in managing a health care unit, including personnel administration, financial management, and organization planning and administration. (Junior Status)
Credit 4

BBUB-455 Credit 4  Personnel and Human Resource Management
Registration #0102-455
An overview of the personnel and human resource (personnel) function in both large and small organizations. The major topics studied include: employee selection, training and development, compensation, safety and health, performance evaluation, compensation systems, the management of ineffective performance, and equal employment opportunity. Emphasis is placed on the legal aspects of managing human resources. (BBUB-420)
Credit 4

BBUB-470 Credit 4  Compensation and Performance Appraisal
Registration #0102-470
An intensive study of two key aspects of personnel and human resource management, employee compensation and performance evaluation. Specific topics studied include the effective management of salary, bonuses, pensions, tuition refund programs, medical insurance, and a variety of other employee benefits. Modern approaches to performance evaluation are studied including management-by-objectives and behaviorally anchored rating scales. Experiential exercises are used to facilitate acquiring skills in performance appraisal. (BBUB-455)
Credit 4

BBUB-475 Credit 4  Human Resources Planning and Selection
Registration #0102-475
Course is designed to provide information, insight, and skills about forecasting the demand for managers and individual contributors within a firm and recruiting and selecting employees to meet that demand. The role of computer-generated information in forecasting will be studied. Emphasis is given to matching the demands of individuals and the organization as a byproduct of forecasting. Among the selection methods studied are personnel tests, employment interviews, biographical data, reference checks, and the assessment center method. (BBUB-465)
Credit 4

BBUB-480 Credit 4  Training and Development
Registration #0102-480
Course provides intensive description and analysis of techniques for the training and development of individual contributors and managers, along with a study of formal methods of evaluating training and development. Among the techniques and methods studied are on-the-job training and coaching, simulation, leadership training, team building, transactional analysis, assertiveness training, computer-assisted instruction, skill-building, and career development programs. (BBUB-455)
Credit 4

BBUB-485 Credit 4  Employee and Labor Relations
Registration #0102-485
Overview of the functioning of labor unions and employee associations in both the public and private sectors. The course includes information about labor law, the collective bargaining process, union certification and decertification, the grievance process, the factors precipitating strikes, the current developments in labor-management relations. Emphasis is placed upon achieving a better understanding of both the management and labor points of view. (BBUB-455)
Credit 4

BBUB-490 Credit 4  Entrepreneurship
Registration #0102-490
An exploration of the basics of small business management with an emphasis on understanding the role of the small business owner. Major topics studied include starting and operating a small business, small business marketing, managing small business operations, managing human resources, financial and administrative controls, and governmental interaction with the small business. (Junior Status)
Credit 4

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

BBUB-534 Credit 4  Purchasing
Registration #0102-534
An exploration of the purchasing and material handling function of industrial firms. Major topics include the organization of the sources of supply, computerized information systems, and legal ramifications of purchasing. Also explored are the unique problems of purchasing in public sector and third sector (not-for-profit) organizations. (BBUB-420)
Credit 4
BBUB-536 Organization Theory
Registration #0102-536
An analysis of organizations as entities from the perspective of the total organization rather than from the small-group or individual point of view. Among the topics included are the various forms of organization structure, the design of organizations, matrix structures, centralization and decentralization, organizational effectiveness, and the interaction of organizations with their external environments. The student may be asked to prepare an analysis of the strengths and weaknesses of an existing organization. (BBUB-420)
Credit 4

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

BBUB-551 Integrated Business Analysis
Registration #0102-551
An integrated viewpoint on business operations achieved through analysis and evaluation of actual cases. Also referred to as business strategy and policy, this course provides experience in combining theory and practice gained in other management courses. The content of the course is from the viewpoint of top management in its role as a developer and implementer of strategy and policy. As a capstone course, the workload is considerably above average. (Senior status, BBUB-420, BUUM-463, BUUG-460)
Credit 4

BBUB-554 Management Seminar
Registration #0102-554
A variety of special interest topics in the field of management, ordinarily treated in more depth than would be possible in a survey course. The topic and instructor for each seminar will be announced in advance, along with any prerequisites or other special requirements. Seminar topics in recent years have included career development, the management of stress, real estate investment, and managerial control systems.
Credit 4

Economics

BBUE-381 Money and Banking
Registration #0103-381
Analysis of money, credit, and financial system. Banking operations and the money supply process. The business of commercial banking and the act of central banking. Central bank activities in relation to national and international monetary policies. (BBUA-301, GSSE-302)
Credit 4

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

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

Finance

BBUE-407 Managerial Economics
Registration #0103-407
Analysis of the firm. Problems facing management: economizing in the use of resources, optimal combinations of products, pricing, competitive forces in markets affecting the firm. (BBUE-405)
Credit 4 (offered upon demand)

BBUE-408 Business Cycles and Forecasting
Registration #0103-408
Analysis of economic conditions affecting the firm. Theory of business fluctuations. Forecasting techniques and services available to the firm. (BBUE-405 or BBUE-406)
Credit 4 (offered upon demand)

BBUE-443 Recent Economic Policies
Registration #0103-443
A seminar type course on recent monetary and fiscal policies in the United States. Topics will cover the economic background, nature and effects of the policies during the most recent 10-year period. (GSSE-301 and GSSE-302)
Credit 4

BBUE-509 Advanced Money and Banking
Registration #0103-509
Development of monetary theory. Money and income: theories of interest, liquidity preference and loanable funds; theories of income and employment. Keynesian and neo-Keynesian approach. Money and prices; quantity theory, velocity and cash—balance approach; inflationary process; and money wage rates and prices. (BBUE-381)
Credit 4

BBUE-530 Labor Economics
Registration #0103-530
A course in applied economics, using economic theory and analysis for the study of labor institutions and their relation to the economy as a whole. Topics include wage theory, supply and demand, forces of labor, wages and unions, unemployment, inflation and public policy. (BBUE-405 or BBUE-406)
Credit 4 (offered upon demand)

BBUE-554 Seminar in Economics
Registration #0103-554
Investigation of advanced problems and policies in economics. Emphasis is on student reports and papers. (Junior status)
Credit 4

BBUF-441 Corporate Finance
Registration #0104-441
An introduction to the functions of Financial Management and Financial Markets and Institutions. Asset Valuation as it applies to working capital management and long term financing. (BBUF-352, BBUA-302, GSSE-301)
Credit 4

BBUF-445 Advanced Corporate Finance
Registration #0104-445
A broad coverage of business finance with emphasis on the analytical techniques of resource allocation and asset management. Covers securities and securities’ markets, capital structures, analysis of financial statements, financing business operations, cost of capital, theories of leverage and dividend policy, and capital budgeting. (BBUF-441)
Credit 4

BBUF-450 Mathematics of Finance and Economics
Registration #0104-450
The introduction of calculus and matrix algebra as a language for expressing models and solving problems in finance and economics. Students will be exposed to the use of mathematics in finance and economic journal articles. (BBUE-405)
Credit 4 (offered upon demand)
BBUF-503 Financial Problems
Registration #0104-503
An examination of problems encountered in many areas of corporate finance. The emphasis is on analytical and decision making techniques used to develop acceptable solutions. The case approach is used extensively. (BBUF-445) Credit 4

BBUF-504 International Finance
Registration #0104-504
This course is concerned with the monetary aspects of international economic relations. It deals with the following topics: the balance of payments, foreign exchange rates and markets, gold standard, flexible exchange rates system, international capital movements, exchange restrictions, and international monetary experience. (BBUF-445) Credit 4 (offered upon demand)

BBUF-507 Security Analysis
Registration #0104-507
The course is introductory and provides background in the field of securities investment. It is both descriptive and analytical in nature. The course coverage emphasizes the securities markets, type of issues, the historical investment perspective, and the valuation of different types of securities. (BBUF-441) Credit 4

BBUF-508 Portfolio Management
Registration #0104-508
This course deals with the considerations involved in the construction and management of securities portfolios. The emphasis is on the requirements of the institutional investor, the examination of the efficient market hypothesis, modern portfolio theory, and the valuation of investment results. (BBUF-507) Credit 4

BBUF-510 Financial Institutions and Markets
Registration #0104-510
Analysis of the different kinds of financial institutions such as commercial banks, savings institutions, insurance companies, pension funds, and others. It will cover their operations and relationships with the economic system. (BBUF-441) Credit 4

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

BBUF-530 Public & Non-Profit Sector Finance
Registration #0104-530
An exposure to the financial management practices of public sector institutions with an emphasis on state and local governmental agencies. This course will also expose the students to the financial management practices of private non-profit institutions such as cultural, educational and health related institutions. (BBUF-445) Credit 4

BBUF-554 Seminar in Finance
Registration #0104-554
Course will be designed by individual instructor. (Varies by seminar content) Credit 4

BBUM-428 Traffic and Transportation Management
Registration #0105-428
An overview of the practical aspects of the day-to-day administration of a typical traffic organization. Selected field trips and outside speakers are included. (Junior status) Credit 4

BBUM-463 Principles of Marketing
Registration #0105-463
A basic course in which the student is introduced to the marketing system and specific marketing functions of the business firm. An analytical approach is used to develop an understanding of marketing strategy. (BBUA-301, GSSE-302) Credit 4

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

BBUM-510 Consumer Services Analysis
Registration #0105-510
A course designed to examine the common attributes and problems of consumer service institutions. Topics to be covered: factors of market segmentation, customer needs, models of present and future service organizations, organizational concerns, and external environmental variables affecting consumer service industries. (BBUM-463) Credit 4

BBUM-530 Marketing Management
Registration #0105-530
Marketing Management
A course designed to provide the student with an in-depth knowledge of middle and upper management level marketing problems. In addition, the student should become familiar with tools used by marketing managers at these levels. (BBUM-553, BBUF-560) Credit 4

BBUM-554 Seminar in Marketing
Registration #0105-554
The objective of this course is to enable the student to bring together interests, learnings and experiences obtained in previous marketing courses. Specific course content will vary. (Permission of instructor) Normal Credit 4 (maximum 12 hours credit)

BBUM-555 International Marketing
Registration #0105-555
Management problems of marketing in foreign countries. Topics to be considered include the economic, cultural, and political roots of marketing systems. (BBUM-463) Credit 4

BBUM-556 Marketing Logistics
Registration #0105-556
A study of physical supply and physical distribution activities. Topics include transportation, inventory control, materials handling, warehousing, order processing, protective packaging, product scheduling, facility location and customer service. (BBUM-463, BBUF-352) Credit 4

Marketing

BBUM-426 Distribution Management
Registration #0105-426
Provides students with knowledge of all "Distribution Management" areas, e.g. finished goods inventory control, warehousing, packaging, materials handling, transportation, plus the critical interface/ trade-offs between these functions and the sales department. Impacts on the market place and distribution cost savings methods are also covered. (BBUM-463) Credit 4
**Decision Sciences**

**BBUQ-334 Management Science**
Registration #0106-334
Introduces the student to quantitative approaches to decision-making. Topics include linear programming, computer simulation, and calculus-based solution techniques. (SMAM-226, ICSS-200, BBUQ-351)
Credit 4

**BBUQ-351, 352 Applied Statistics I, II**
Registration #0106-351, 352
Interpretation and application of statistical techniques in business. Topics include descriptive statistics, probability, sampling distributions, one and two sample tests of means, proportions, and variances, chi-square tests, and simple and multiple regression analysis. Extensive use of a statistical software package. (SMAM-225, ICSS-200)
Credit 4

**BBUQ-363 Programming Systems Design**
Registration #0106-363
This course is designed to be the capstone course for previous programming courses. Topics include: project design and project development, review of top-down design, structured programming, and program documentation. A team programming project will be assigned that requires the student to apply these topics in the design and implementation of the solution to the assigned problem. (ICSP-303) (Not offered in 1984—85)
Credit 4

**BBUQ-406 Quality and Productivity Management**
Registration #0106-406
Examines the concepts of quality and productivity and the relationship between them. Distinguishes between the objectives of control and improvement and studies the managerial and technical tools needed to pursue each. (BBUQ-460)
Credit 4

**BBUQ-407 Inventory Management and Control**
Registration #0106-407
Principles of inventory management and material control, emphasizing the independent demand environment. Allocation of planning and control effort. Types of control systems. System dynamics. When and how much to order; discounts; safety stock; record accuracy; physical handling, storage and security. Zero inventories quest. (BBUQ-460)
Credit 4

**BBUQ-408 Priority and Capacity Planning**
Registration #0106-408
Order release; dispatching; requisitions and purchase orders; order follow-up; shop floor reporting; backlog and lead time control; KAN-BAN and other just-in-time execution systems. (BBUQ-408)
Credit 4

**BBUQ-433 Operations Management**
Registration #0106-433
Theory and practice of production and operations management utilizing quantitative methods and computer techniques as applied to business problems. (BBUQ-352, BBUQ-334)
Credit 4

**BBUQ-463 Systems Analysis and Design**
Registration #0106-463
The system development process, with emphasis on the analysis of information and logical design of a system. Topics include: the life cycle of a computer—based system, the role of the systems analyst, systems analysis tools and techniques, system performance analysis and feasibility analysis. (ICSP-303) (Not offered in 1984—85)
Credit 4

**BBUQ-474 Micro/Mini Computer Applications**
Registration #0106-474
A survey of current micro and mini computer systems, available hardware and software, and their applications. Microcomputer applications in small businesses will be emphasized. Word processing is discussed. (ICSP-208) (Not offered in 1984—85)
Credit 4

**BBUQ-478 Systems Simulation**
Registration #0106-478
The development of system models and their manipulation using simulation. Topics include: statistical review, sampling of random events, elementary queueing theory, data collection and analysis for simulation modeling and model validation. A special purpose simulation language, such as GPSS, will be used in team projects that simulates a production process. (BBUQ-352, ICSP-210) (Not offered in 1984—85)
Credit 4
An analysis and development of decision support systems which serve users in management. This system provides qualitative and quantitative information derived from data bases and used by managers in decision-making. Theory and applications will be blended in course projects. (BBUB-420, BUUF-441, BUM-463, BUQ-460)
Credit 4

Students will select an information systems development project, identifying an associated problem, present a solution proposal, solve and implement the solution, and present the results. Oral and written presentation techniques are required. (BBUQ-363, 463 and ICSP-300, 303, 483) (Not offered in 1984-85)
Credit 4

The course content depends on the instructor and quarter when offered. Specific content for a particular quarter will be announced prior to course offering. (BBUQ-352)
Credit 4

A seminar addressing the specific role of the buyer within the retail organization and the retailers' markets, performing the following functions: merchandise management and planning, the buying and selling activity and merchandise resource relationships. Information gathering as it specifically supplements the buyers' knowledge of the field is accomplished through exposure to many periodicals, trade journals, trade associations, retail buying offices, and other market contacts. (BRER-201, BRER-301)
Credit 4

An overview of interior design principles for the home furnishings retailer. Topics include basic principles of design, color theory, floor plans, electrical plans and furniture history.
Credit 4

An introduction to the tasks, functions, and structures of the retail industry. The major forms and types of retailers will be studied along with the various approaches to the controllable retail variables including location, merchandising, image pricing, and promotion. The nature and expectations of various career paths will be considered.
Credit 4

A course that studies and identifies the forces that promote trends in fashion and home furnishings. (BRER-301)
Credit 4

An opportunity to apply and integrate all previous retailing and business core courses to solve retail management problems in a number of different organizations and situations. The problems will reflect a mix of actual managerial problems and complex cases. Written and oral presentations of analysis and conclusions will be stressed. The course will reflect a top management perspective. (All retail core courses, one senior level co-op).
Credit 4

A seminar addressing the specific role of the buyer within the retail organization and the retailers' markets, performing the following functions: merchandise management and planning, the buying and selling activity and merchandise resource relationships. Information gathering as it specifically supplements the buyers' knowledge of the field is accomplished through exposure to many periodicals, trade journals, trade associations, retail buying offices, and other market contacts. (BRER-201, BRER-301)
Credit 4

An introduction to the tasks, functions, and structures of the retail industry. The major forms and types of retailers will be studied along with the various approaches to the controllable retail variables including location, merchandising, image pricing, and promotion. The nature and expectations of various career paths will be considered.
Credit 4

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Credit 4
Graduate Business Courses

Business Administration Courses

Accounting Group

BBUA-703  Accounting Concepts for Managers
Registration #0101-703
An introduction to financial and managerial accounting concepts, with particular emphasis placed on their use for managerial decision making. Topics covered will include: financial statements, transaction analysis, measuring economic values, responsibility accounting, budgeting, decentralized and divisional performance measurement.
Credit 4

BBUA-704  Accounting Theory I
Registration #0101-704
A comprehensive exposure at an intermediate level to accounting theory and practice. Emphasis is placed on applying underlying accounting theory to complex accounting problems. The effects of alternative methods are considered throughout the entire course. (BBUA-703)
Credit 4

BBUA-705  Accounting Theory II
Registration #0101-705
Continuation of Accounting Theory I with emphasis on liabilities, equity, long-term debt and special reporting problems. Included here is the Statement of Changes in Financial Position, pensions, leases, and accounting for changes in the price level. (BBUA-704)
Credit 4

BBUA-706  Cost Accounting
Registration #0101-706
A thorough study of the principles and techniques used to accumulate costs for inventory valuation and managerial decision making. Includes problems and procedures relating to job order, process, and standard costs systems, with particular attention to the problems of overhead distribution and control. (BBUA-703)
Credit 4

BBUA-707  Advanced Accounting and Theory
Registration #0101-707
Analysis and evaluation of current accounting thought relating to the nature, measurement and reporting of business income and financial position; concepts of income in relation to the reporting entity; attention to special areas relating to consolidated statements, foreign currency statement translation, governmental and not-for-profit accounting. (BBUA-705)
Credit 4

BBUA-708  Auditing
Registration #0101-708
The theory and practice of auditing examined; critical study of auditing procedures and standards in the light of current practice; measurement and reliance of internal control covered by case studies; modern auditing techniques by statistical sampling and electronic data processing applications. (BBUA-705)
Credit 4

BBUA-709  Basic Taxation Accounting
Registration #0101-709
Study of federal income taxation of individuals, partnerships and corporations. Problems of the S Corporation and corporate accumulations are examined. Income tax and accounting concepts affecting revenues and deductions are compared, including concepts of gross income, basis, recognition of gain and loss, capital asset transactions, exemptions, deductions and credits. (BBUA-703)
Credit 4

BBUA-810  Advanced Taxation Accounting
Registration #0101-810
A study of federal income taxation as it relates to corporate and partnership tax planning particularly in reorganization, merger, and liquidation. Problem areas in property transactions including non-taxable exchanges and valuation will be explored. Family tax planning, including the use of trusts, and other income shifting devices in the environment of estate and gift taxes is examined. Emphasis will be on the need for tax planning in the complex business or personal situation. (BBUA-709 or admission to the MS in accountancy)
Credit 4

BBUE-711  Auditing Theory
Registration #0101-811
Advanced course in auditing where classical auditing cases, uses of computer and statistical accounting techniques, current official auditing pronouncements and changes in legal and ethical considerations are fully explored. (BBUA-708 or equivalent)
Credit 4

BBUE-812  Accountancy Seminar
Registration #0101-812
A variety of advanced accounting topics are covered, depending on the instructor. Topics included would be: CPA problems, SEC accounting, small business accounting, non-profit accounting, internal auditing. (BBUA-705 or equivalent)
Credit 4

BBUE-813  Financial Accounting Theory
Registration #0101-813
An advanced course in financial accounting theory that examines the basic assumptions, principles and postulates upon which current practice rests; and alternative theories of valuation and measurement. Critical analysis of the historical cost model and the several major current value models is the main emphasis throughout discussions of financial statements and their individual components. (BBUA-707 or equivalent)
Credit 4

BBUE-814  Accounting Information Systems
Registration #0101-814
A complete analysis of management's need for financial data in decision making and the various alternatives available to provide the information in a timely, cost-effective manner. Topics covered will include manual, mechanical, and computerized alternatives to the capturing, compiling, and reporting of relevant data. (BBUA-703)
Credit 4

Economics Group

BBUE-711  Microeconomics
Registration #0103-711
This is an intermediate microeconomic theory course with applications. The fundamentals of consumer behavior theory, market demand, and the theory of the firm are stressed with applications. Also, resource allocation and product distribution are fundamentals to management and to understanding the role of a firm in an economy. (BBUQ-780)
Credit 4

BBUE-712  Macroeconomics
Registration #0103-712
This is an intermediate macroeconomic theory course with applications. A basic framework of product and money market equilibrium is explored with applications in fiscal and monetary policy. An understanding of major aggregate economic relationships is developed, as well as economic policy. (BBUE-711)
Credit 4

BBUE-713  Advanced Microeconomic Theory
Registration #0103-713
An advanced study of the fundamental economic principles underlying the nature of a business firm. Topics include: theories of demand and revenue; theory of costs and production analysis in both the short-run and the long-run; equilibrium of demand and supply and efficiency of competition; market structures and their characteristics; pricing and output under perfect competition, pure monopoly, imperfect competition, and oligopoly; resource allocation and product distribution. Business applications are given along with the exposition of the theory. (BBUE-711)
Credit 4
BBUE-714 Advanced Macroeconomic Theory
Registration #0103-714
An advanced study of the fluctuations and growth of economic activity in a modern complex society. Topics include measuring macroeconomic activity; modeling economic activity; microeconomic foundations in macroeconomic theory (the labor, the commodity, the money, and the bond markets); a parallel discussion of the complete classical and Keynesian macroeconomic models; recent criticism of the two models; the general equilibrium; the phenomena of inflation and unemployment and the way business can forecast them; the impact of fiscal and monetary growth; reality and macroeconomic disequilibrium; and wage-price policies. (BBUE-712)
Credit 4

BBUE-715 Managerial Economics
Registration #0103-715
Analysis of the economic conditions facing the firm. Topics include: demand and cost analyses, resource utilization, pricing, market structure, and other selected topics. (BBUA-703, BBUE-711, BBUB-782)
Credit 4

BBUE-716 Seminar in Economics
Registration #0103-716
Content will differ depending on the quarter and instructor. Topics that may be covered include international finance, monetary theory, labor economics and market structure. (Permission of instructor)
Credit 4

Finance Group

BBUF-721 Financial Management I
Registration #0104-721
An examination of the basic financial theories relating to the valuation of assets and the analysis of risk. The course will concentrate on both the theory and practice of capital budgeting decision making. Topics include, capital budgeting techniques, portfolio risk and diversification, the capital asset pricing model and practical problems in the selection of long term assets. (BBUQ-782, BBUA-703, BBUQ-782)
Credit 4

BBUF-722 Financial Management II
Registration #0104-722
An introduction to the concept of capital market efficiency. In this course, capital structure decisions and dividend policy will receive primary emphasis. Other topics will include option valuation, leasing, working capital management, and financial analysis. (BBUF-721)
Credit 4

BBUF-723 Theory of Finance
Registration #0104-723
This course involves a study of the current literature and most recent developments relating to the theories of valuation, risk, investment analysis, cost of capital, capital structure and dividend policy. Topics will be studied within the framework of the capital asset pricing model and the option pricing model. Also considered are specific areas of application and the policy implications of the theories studied. (BBUF-721, BBUF-722)
Credit 4

BBUF-724 Problems in Finance
Registration #0104-724
This course is designed to give the student greater in-depth understanding of contemporary problems in finance. The focus will be on state-of-the-art techniques in both theory and practice. Examples of specific topics that might be addressed in this course include leasing, agency cost problems, mergers and acquisitions, international finance, financial distress, and regulatory impacts on capital markets. Specific topics will be determined by the instructor. (BBUF-723)
Credit 4

BBUF-725 Securities & Investment Analysis
Registration #0104-725
Study of securities and other investment media and their markets. Analysis of investment values based on financial and other data. Considers factors such as return, growth, risk and the impact of various institutional arrangements on value determination. (BBUF-721, BBUF-722)
Credit 4

BBUF-726 Capital Markets
Registration #0104-726
This course will review the statistical tools employed in financial analysis and examine the descriptive evidence on the behavior of security prices. The course will consider theory and evidence of capital market efficiency, portfolio theory, and the theory and evidence on the relationship between expected return and risk. The implications of the theory for applied practice will also be considered. Other topics will include: The evaluation of portfolio performance; international capital markets and efficient markets for other assets. (BBUF-721, BBUF-722)
Credit 4

BBUF-729 Seminar in Finance
Registration #0104-729
This course will take on different content depending on the instructor and quarter when offered. Topics that may be covered are: financial models, financial analysis techniques, financial institutions and capital markets. Specific content for a particular quarter will be announced prior to course offering. (Permission of instructor)
Credit 4

Management Group

BBUB-740 Organizational Behavior
Registration #0102-740
A study of human behavior in organizations, primarily at the individual and small group level of analysis. The implications of knowledge from psychology, social psychology, and sociology are emphasized. Major topics include motivation, leadership, group dynamics, conflict, organizational power and politics, stress and burnout, and research methods in organizational behavior. Most topics are related to individual and organizational performance. Course includes lectures and experimental learning.
Credit 4

BBUB-741 Organization and Management
Registration #0102-741
A study of organizations as systems, including their subsystems and interrelationships with other organizations and the external environment. Focus is placed on the role of managers as those responsible for understanding and integrating the needs of the organization, its members, and its external environment. Major topics studied include organization structure and design, organizational effectiveness, organizational change, organizational analysis, and bureaucracy. (BBUB-740)
Credit 4

BBUB-742 Business and Society
Registration #0102-742
A study of the impact on the manager and organization of needs, demands, and restrictions imposed by employees, government, consumer, citizen’s groups, and other environmental forces. The course examines possible managerial responses within the framework of several definitions of social responsibility. The implications of current events are an integral part of the course. (BBUB-740)
Credit 4

BBUB-746 Management and Career Development
Registration #0102-746
Study and application of current methods of developing managers, with a primary emphasis on career development of both managerial personnel in general and the person taking this course. Student is required to develop a career plan (career pathing). Implications of current technological developments for training, replacement, and advancement of managerial personnel are discussed. Insight is also provided into the organizational function of management development. (BBUB-740)
Credit 4

BBUB-748 Employee and Labor Relations
Registration #0102-748
A study of labor-management relations as they influence managerial decision making in both union and nonunion organizations. Topics may include collective bargaining, conflicts and agreements between labor and management, sharing of productivity gains between labor and management, and contemporary issues. An analysis is made of how market forces, labor unions, employee associations and labor law influence employee compensation. Employee-labor relations are studied in both private and public sector firms. (BBUB-740, BBUE-710)
Credit 4
BBUB-750 Personnel Systems
Registration #0102-750
A study of personnel systems or the methods of the personnel and human resource management function in organizations. The major personnel topics studied include organizational staffing (selection and recruitment), training and development, compensation, safety and health, employee employment opportunity, human resource forecasting, and performance appraisal. Course includes experiential learning in such topics as job design, job analysis, selection interviewing, and performance evaluation. (BBUB-740, BBUQ-782)
Credit 4

BBUB-751 Legal Environment of Business
Registration #0102-751
An introduction to legal principles and their relationship to business practices. Business ethics and the environmental impact of the federal administrative agencies are stressed. Among the agencies considered will be the EPA, EEOC, FDA, OSHA, FTC and the NLRB. (BBUA-703, BBUB-740)
Credit 4

BBUB-753 Small Business Administration
Registration #0102-753
Students enrolled in this course are provided the opportunity to serve as consultants to a specific small business firm within this geographic area. Under an arrangement with the Small Business Administration, and working under the supervision of a senior faculty member, teams of students provide management consulting about a variety of problems to small businesses. As a practicum this course does not have regularly scheduled class hours. Instead students confer with their faculty member on an as-needed basis. (BBUA-703, BBUF-721, BBUM-761)
Credit 4

BBUB-754 Business Law
Registration #0102-754
An introduction to the law of contracts, sales, agency, commercial paper, and partnerships. Among the subjects covered are: consumer protection, unfair methods of competition and the ethics of the business community. (BBUA-703, BBUB-740)
Credit 4

BBUB-755 Compensation and Reward Systems
Registration #0102-755
A comprehensive analysis of compensation (wages and benefits) in contemporary organizations. Among the major topics studied are the role of money, the practical problems of developing and administering compensation programs, motivational factors related to compensation, motivational features of benefits, the role of government, and current trends in benefit packages. Forces shaping the establishment of wage rates in a given firm are also studied. (BBUB-740, BBUB-750)
Credit 4

BBUB-758 Seminar in Management
Registration #0102-758
A presentation of current specialty topics within the broad field of management. Seminar topics have included organizational power and politics, improving individual and managerial effectiveness, managerial control systems, money and motivation, organization development, conflict resolution, and small business information systems. The course topic for a specific quarter will be announced prior to the course offering. Although a seminar, the course may include some lectures and examinations. (BBUB-740, BBUB-741)
Credit 4

BBUB-759 Integrated Business Analysis
Registration #0102-759
Also referred to as business strategy and policy, this course provides experience in combining theory and practice gained in other course work. This integrative exposure is achieved by solving complex and interrelated business policy problems that cut across the functional areas of marketing, production, finance, and personnel. This course is aimed at the formulation and implementation of business policy as viewed by top management. The case method is used extensively. Since this is a capstone course, the workload is considerably above average. (All other required courses)
Credit 4

BBUB-770 Business Research Methods
Registration #0102-770
Research as a basis for policy building, planning, control and operation of the business enterprise. Concepts, tools, sources, methods, and applications are covered. Procurement and evaluation of data for business use from government and private sources. Introduces the use of multivariate techniques as a means of data reduction and the analysis of complex data bases. (BBUQ-782, BBUM-761)
Credit 4

BBUB-771 Research Option
Registration #0102-771
A practicum of thesis alternative permitting the student to confront a real management problem. Requirements include steps from design to completed management report. (To be developed with selected faculty)
Credit 4

BBUB-799 Independent Study
Registration #0102-799
A supervised investigation and report within a business area of professional interest. The exact content should be contained in a proposal for review, acceptance, and assignment to an appropriate faculty member, who will provide supervision and evaluation. Appropriateness to written career objectives and availability of faculty will be included in the review and considerations for acceptance. (To be developed with selected faculty)
Credit 1-4

Marketing Group

BBUM-761 Marketing Concepts
Registration #0105-761
Critical examination of the marketing system as a whole; functional relationships performed by various institutions such as manufacturers, brokers, wholesalers, and retailers. Analysis of costs, strategies and techniques related to the marketing system. Both behavioral and quantitative aspects of marketing are considered. (BBUA-703 or BBUE-711)
Credit 4

BBUM-762 Advanced Marketing Management
Registration #0105-762
Advanced study of selected problems that face marketing managers concerned with promotion, place, price, and product. Material centers on staff marketing functions. Research topics unique to the field of marketing are covered. (BBUM-761)
Credit 4

BBUM-763 Consumer Behavior
Registration #0105-763
A study of the market in terms of the psychological and socio-economic determinations of buying behaviors, including current trends in purchasing power and population movements. (BBUM-761)
Credit 4

BBUM-764 Marketing Logistics
Registration #0105-764
The study of an integrated system for the distribution of products from producer to consumer. The emphasis is on the physical flow of goods both between and within marketing institutions. Specific topics covered are unit geographic location, internal product flow, inter-unit transportation, and warehousing. (BBUM-761)
Credit 4

BBUM-765 Sales Management
Registration #0105-765
An examination of selling and sales management as they pervade both the marketing process and the management communications process. Topics covered include building and managing an effective sales force and to selling philosophy and techniques creating managerial "win-win" situations with both superiors and subordinates. (BBUM-761)
Credit 4 (offered upon demand)
BBUM-766  DECISION SCIENCE GROUP
International Marketing
Registration #0105-766
A study of the differences in market arrangements as well as in the legal, cultural, and economic factors found in foreign countries. Topics included are planning and organizing for international marketing, operations, forecasting and analysis; inter-relationships with other functions; and product, pricing, promotion, and channel strategy. (BBUM-761)
Credit 4

BBUM-767  DECISION SCIENCE GROUP
Marketing Communications
Registration #0105-767
A study of inter-relationships of three communications mix functions; public, relations, advertising, and sales promotion. Topics covered will center on the use of these functions in the development of models for persuasive communications and their inter-relationships with other elements of the marketing mix. (BBUM-761)
Credit 4

BBUM-769  DECISION SCIENCE GROUP
Seminar in Marketing
Registration #0105-769
This course will take on different content depending on the instructor and quarter when offered. Topics that may be covered are: marketing models, marketing channels, articulation with top marketing executives, and marketing positioning. Specific content for a particular quarter will be announced prior to course offering. (Permission of instructor)
Credit 4

BBUQ-743  DECISION SCIENCE GROUP
Operations Management
Registration #0106-743
An analytical approach to the theory and application of production and operations management. Combines quantitative models and qualitative considerations relating to analysis of time series data forecasting, quality assurance, inventory control, MRP, Project Management, and Systems Design. (BBUQ-780, BBUQ-782)
Credit 4

BBUQ-780  DECISION SCIENCE GROUP
Management Science
Registration #0106-780
An introduction to quantitative approaches to decision making. Topics covered include linear programming, goal programming, integer programming, computer simulation, and calculus-based solution procedures. The emphasis is not on the techniques perse, but rather on showing how quantitative approaches can be used to contribute to a better decision-making process. (BBUQ-781 or equivalent)
Credit 4

BBUQ-781  DECISION SCIENCE GROUP
Introduction to Statistics
Registration #0106-781
An introduction to the use of statistics in business. Topics covered include descriptive statistics, probability concepts, probability distributions, sampling methods, and sampling distributions. Includes the use of computerized data analysis.
Credit 4

BBUQ-782  DECISION SCIENCE GROUP
Applied Statistical Analysis
Registration #0106-782
The course emphasizes the use of statistical tools in decision making. Topics include estimation of means and proportions, one and two sample tests of means, proportions, and variances, chi-square tests, and simple and multiple regression analysis. Extensive use of a statistical software package. (BBUQ-781 or equivalent)
Credit 4

BBUQ-784  DECISION SCIENCE GROUP
Decision Analysis
Registration #0106-784
An introduction to decision analysis for the manager. Emphasis will be on (1) structuring the problem in terms of alternatives possible, decision attributes, and operational constraints; (2) quantifying the manager's judgments as probabilities; (3) assessing the utility of the manager's preferences; (4) analyzing the problem via evaluation of the alternatives and checking the sensitivity of the solution(s). Single and multiple attribute cases under certainty will be covered. (BBUQ-782)
Credit 4

BBUQ-790  DECISION SCIENCE GROUP
Information Systems
Registration #0106-790
The concepts and techniques for the design and implementation of a computer-based management system are studied. Topics include systems theory, the generation and collection of data, the transformation and dissemination of information, and the economics of information. (BBUQ-743)
Credit 4

BBUQ-793  DECISION SCIENCE GROUP
Business Forecasting Methods
Registration #0106-793
An introduction to quantitative and qualitative forecasting methods and their use in business forecasting. The student will be taught how to recognize which forecasting procedures to use based upon an analysis of problem characteristics. Includes the use of interactive forecasting techniques. (BBUQ-782)
Credit 4

BBUQ-794  DECISION SCIENCE GROUP
Multivariate Methods in Business
Registration #0106-794
An introduction to the use of multivariate techniques (other than multiple regression analysis) and their use in analyzing business data. The major objective will be to demonstrate the proper use of a variety of multivariate techniques using several large-scale data sets. The student will be required to use a standard statistical package. A major objective will be to teach the student how to interpret the output of a computer package in terms of the decision-making situation underlying the problem being investigated. (BBUQ-785)
Credit 4

BBUQ-795  DECISION SCIENCE GROUP
Seminar in Decision Sciences
Registration #0106-795
This course will take on different content depending on the instructor and quarter when offered. Specific content for a particular quarter will be announced prior to course offering. (Permission of Instructor)
Credit 4 (offered upon demand)
Human Services Group

BBUH-701  Economic Environment of Human Services
Registration #0115-701
Studies of the macroeconomic forces impacting the agency environments, such as funding and service populations, and the microeconomic concepts which can be used to aid agency resource allocation decisions and in the analysis of alternate agency policies. Topics include national income concepts and policies and economic demand for services and benefit/cost considerations.
Credit 4

BBUH-711  Law and the Administrative Process
Registration #0115-711
Practices, problems, and issues in the implementation of public policy. Civil law, regulation, and statutes affecting contracts, internal and external publics, employee welfare, and fiduciary responsibilities. The exercise of governmental power and control over administrative action. Specific legal areas such as rule making, licensing, adjudication, and judicial review will be examined. (BBUH-701)
Credit 4

BBUH-712  Bureaucracy In Modern Society
Registration #0115-712
The nature of bureaucratic organization in modern Western societies, especially the United States: business corporations, trade unions, the military, hospitals, law enforcement agencies. Problems resulting from conflicts and values, constituencies, and theories among these institutions. (BBUB-740)
Credit 4

BBUH-731  Intervention in the Community
Registration #0115-731
Methods of agency intervention in specific problem areas, identified as needed by the community, with focus on the role of management. Covers approaches to community intervention with special attention focused on such problem areas as crime, poverty, health, mental health, education, cultural resources, and population conflict. Issues will regard the manner in which agencies formulate interventive strategies and implementation, particularly as the process involves the management role. (BBUB-740)
Credit 4

BBUH-732  Cooperation and Conflict
Registration #0115-732
Establishing working relationships between various providers of services and the resolution of system conflict. Topics to be covered include: the development of conflict between and within agencies, the evolution of a cooperative system of services, incompatible interest groups, competition among providers, problems of limited funding, and problems associated with the growth or decline of services. Emphasis is placed on the manager in the resolution of conflict. (BBUB-740)
Credit 4

BBUH-733  Interpersonal Skills
Registration #0115-733
The development of skills related to leadership, group dynamics, public relations, and aspects of personal growth. Self-awareness for the person in a managerial role will be stressed, particularly as this involves interaction with colleagues both within and outside the agency of employment. Management styles will be analyzed for strengths and weakness to develop an increased awareness of the particular characteristics leading towards beneficial managerial outcomes. (BBUB-740)
Credit 4

BBUH-734  Deviance, Conformity, and Criminal Behavior
Registration #0115-734
A study of the social and psychological factors identified with the genesis of specific social pathologies which are exhibited by groups and individuals. The course presents an analysis of the various forms of deviance including deviance from professional rules and norms; deviance from expected interaction patterns and traditional areas of deviance such as crime, alcoholism, mental illness, homosexuality, prostitution, counterculture, and revolutionary activities; methods of social reaction to deviance.
Credit 4

BBUH-735  Special Populations
Registration #0115-735
The needs of special populations such as the elderly, youth, ethnic minorities, women, the educationally disadvantaged, poor, and others. The course will address the particular considerations relevant to programming for these specific populations. Historical considerations will be raised.
Credit 4
College of Continuing Education

Graduate Courses in Applied and Mathematical Statistics

CQAS-711  Fundamentals of Statistics I
Registration #0280-711
For those taking statistics for the first time. Covers the statistical methods used most in industry, business and research. Essential for all scientists, engineers, and administrators.
Topics: organizing observed data for analysis and insight; learning to understand probability as the science of the uncertain; concepts of random variables and their associated probability models; meaning and practical use of the Central Limit Theorem. (Consent of the department)
Credits 3 or 4 (offered each quarter)

CQAS-712  Fundamentals of Statistics II
Registration #0280-712
Continuation of CQAS-711
Topics: concepts and strategies of statistical inference for making decisions about a population on the basis of sample evidence; tests for independence and for adequacy of a proposed probability model; learning how to separate total variability of a system into identifiable components through analysis of variance; regression and correlation models for studying the relationship of a response variable to one or more predictor variables. (All standard statistical tests) (CQAS-711 or equivalent)
Credit 3 or 4 (offered each quarter)

CQAS-721  Quality Control: Control Charts
Registration #0280-721
A practical course designed to give depth to practicing quality control personnel.
Topics: statistical measures; theory, construction and application of control charts for variables and for attributes; computerization procedures for control charts; tolerances, specifications, and process capability studies; basis concepts of total quality control, and management of the quality control function. (Consent of the department)
Credit 3 (offered in Fall and Spring Quarters)

CQAS-731  Quality Control: Acceptance Sampling
Registration #0280-731
Investigation of modern acceptance sampling with emphasis on industrial application.
Topics: single, double, multiple, and sequential techniques for attributes sampling; variables sampling; techniques for sampling continuous production. The course highlights Dodge-Romig plans. Military Standard plans, and recent contributions from the literature. (Consent of the department.)
Credit 3 (offered in Winter and Summer Quarters)

CQAS-761  Reliability
Registration #0280-761
A methods course in reliability practices; what a reliability engineer must know about reliability prediction, estimation, analysis, demonstration, and other reliability activities. Covers most methods presently being used in industry.
Topics: applications of normal, binomial, exponential, and Weibull graphs to reliability problems; hazard plotting; reliability confidence limits and risks; strength and stress models; reliability safety margins; truncated and censored life tests, sequential test plans; Bayesian test programs. (CQAS-712 or equivalent)
Credit 3 (offered in Spring Quarter)

CQAS-801  Design of Experiments I
Registration #0280-801
How you design and analyze experiments in any subject matter area; What you do and why.
Topics: basic statistical concepts, scientific experimentation, completely randomized design, randomized complete block design, nested and split plot designs. Practical applications to civil engineering, pharmacy, aircraft agronomy, photoscience, genetics, psychology, and advertising. (CQAS-712 or equivalent)
Credit 3 (offered in Winter, Spring and Summer Quarters)

CQAS-802  Design of Experiments II
Registration #0280-802
Continuation of CQAS-801
Topics: factorial experiments; fractional, three level, mixed; response surface exploration. Practical applications to: medical areas, alloys, highway engineering, plastics, metallurgy, animal nutrition, sociology, industrial and electrical engineering. (CQAS-801)
Credit 3 (offered in Fall, Spring, and Summer Quarters)

CQAS-821  Theory of Statistics I
Registration #0280-821
Provides a sound theoretical basis for continuing study and reading in statistics.
Topics: constructs and applications of mathematical probability; discrete and continuous distribution functions for a single variable; theoretical basis for the multivariate case; expected value and moment generating functions; special continuous distributions. (Consent of department)
Credit 3 (offered in Fall Quarter)

CQAS-822  Theory of Statistics II
Registration #0280-822
Continuation of CQAS-821
Topics: Supporting theory for, and derivation of, sampling distribution models; applications and related material. Point estimation theory and applications, the multivariate normal probability model, its properties and applications; interval estimation theory and applications.
Credit 3 (offered in Winter Quarter)

CQAS-830  Multivariate Analysis I
Registration #0280-830
Deals with the summarization, representation, and interpretation of data sampled from populations where more than one characteristic is measured on each sample element. Usually the several measurements made on each individual experimental item are correlated, so univariate analysis should not be applied to each measurement separately. This course covers the use of the basic multivariate techniques. Computer problem solving will be emphasized. Topics will include multivariate, t-test, ANOVA, regression analysis, repeated measures, quality control and profile analysis. (CQAS-801, 802)
Credit 3 (offered in Spring Quarter)

CQAS-831  Multivariate Analysis II
Registration #0280-831
A continuation of CQAS-830, this course covers the use of advanced multivariate techniques. Topics include principal component analysis, cluster analysis, multi-dimensional contingency tables, discrete discriminant analysis, multi-dimensional scaling, and regression with errors in the independent variables. Practical applications will be emphasized. (CQAS-830)
Credit 3 (offered in Summer only)

CQAS-841  Regression Analysis I
Registration #0280-841
A methods course dealing with the general relationship problem.
Topics: the matrix approach to simple and multiple linear regression; analysis of residuals; dummy variables; orthogonal models; computational techniques. (CQAS-802 or equivalent)
Credit 3 (offered in Winter Quarter)

CQAS-842  Regression Analysis II
Registration #0280-842
A continuation of CQAS-841.
Topics: selection of best linear models; regression applied to analysis of variance problems; nonlinear estimation and model building. (CQAS-841 or equivalent)
Credit 3 (offered in Spring Quarter)

CQAS-851  Nonparametric Statistics
Registration #0280-851
Distribution-free testing and estimation techniques with emphasis on applications.
Topics: sign tests; Kolmogorov-Smirnov statistics; runs tests; Wilcoxon test; Mann-Whitney test; chi-square tests; rank correlation; rank order tests; quick tests. (CQAS-712 or equivalent)
Credit 3 (offered in Fall, Spring, and Summer Quarters)
CQAS-853 Managerial Decision Making
Registration #0280-853
Statistical decision analysis for management.
Topics: utilities, how to make the best decision (but not necessarily
the right one); normal and best Bayesian theory; many action prob-
lems; optimal sample size; decision diagrams. Applications to mar-
keting; oil drilling, portfolio selection; quality control; production;
and research programs. (CQAS-881 or equivalent)
Credit 3 (offered in Winter Quarter)

CQAS-856 Interpretation of Data
Registration #0280-856
Advanced topics related to use of statistics in investigational analy-
sis, including narrow limit gauging, practical designs of experiments,
analysis of small sample data, analysis of means, identifying assign-
able causes and other methods for trouble shooting with statistical
methods. (CQAS-712 or equivalent)
Credit 3 (offered in Spring Quarter)

CQAS-871 Sampling Theory and Applications
Registration #0280-871
An introduction to sample surveys in many fields of applications with
emphasis on practical aspects.
Topics: review of basic concepts, sampling problem elements;
sampling; random, stratified, ratio, cluster, systematic, two-stage
cluster, wild life populations, questionnaires, sample sizes. (CQAS-
712 or equivalent)
Credit 3 (offered in Winter and Summer Quarters)

CQAS-873 Time Series Analysis
Registration #0280-873
A methods course in modeling and forecasting of time series with
emphasis on model identification, model fitting and diagnostic
checking.
Topics: survey of forecasting methods, regression methods, mov-
ing averages, exponential smoothing, analysis of forecast errors,
Box-Jenkins models, transfer function models, case studies. (CQAS-
841 or equivalent)
Credit 3 (offered in Fall Quarter)

CQAS-875 Empirical Modeling
Registration #0280-875
A course in model building based on the application of empirical data
gathered through appropriate experimental design and analyzed
through regression techniques.
Topics: response variable construction, experimental design
methods, and related analysis techniques. (CQAS-802, -842)
Credit 3 (offered in Winter Quarter)

CQAS-881 Bayesian Statistics
Registration #0280-881
An introduction to Bayesian statistics and Decision Making which
explores Bayes Theorem in its relation to classical and Bayesian
methodology.
Topics: probability, Bayes Theorem, assessment of prior probabili-
ties and likelihoods, hypothesis testing, and the multi-variable case.
(CQAS-712)
Credit 3 (offered in Fall and Spring Quarters)

CQAS-886 Sample Size Determination
Registration #0280-886
The question most often asked of an industrial statistician is “What
size sample should I take?” This course answers that question for a
wide variety of practical investigational projects. Techniques for the
full use of the optimal sample evidence are also offered. (CQAS-712
or equivalent)
Credit 3 (offered in Summer Quarter)

CQAS-891, 892, 893 Special Topics in Applied Statistics
Registration #0280-891, -892, -893
These courses provide for the presentation of subject matter of
important specialized value in the field of applied and mathematical
statistics not offered as a regular part of the statistics program.
(Consent of the department)
Credit 3/Qtr. (offered upon sufficient demand; usually in Fall Quarter)

CQAS-M5 Statistics Seminar
Registration #0280-895
This course or sequence of courses, provides for one or more quar-
ters of independent study and research activity. This course may be
used by other departments at RIT (or other colleges) to provide
special training in statistics for students who desire an independent
study program in partial fulfillment of graduate degree requirements.
(Consent of all departments involved.)
Credit 3 (offered each quarter)

CQAS-896, 897, 898 Thesis
Registration #0280-896, -897, -898
For students working for the MS degree in applied and mathematical
statistics who use a research project and thesis for three, six or nine
credits. (Consent of the department.)
Credit 3 (offered each quarter)
College of Engineering

Computer Engineering

Required Courses

EECC-265  Foundations of Discrete Math
Registration #0306-265
for Computer Engineers

This course is an introduction to the fundamental concepts, terminology, and manipulative skills associated with combinatorial structures and logic which are necessary to an effective understanding of modern computer science and engineering. Topics include: Symbolic logic, naive sets, relations and functions, mathematical induction, recursive definition, introduction to infinity and an invitation to graph theory and its applications.

Class 4, Credit 4 (S/Sr)

EECC-341  Introduction to Digital Systems
Registration #0306-341
for Computer Engineers

This course will study the combinational and sequential SSI, MSI, and LSI components used in the construction of a simple CPU and other digital systems. Analytical and design techniques used in creating digital subsystems will be discussed. A study of the organization and design of a classical digital computer system including instruction fetch, decode, and execution. (Working knowledge of some representative assembly language and SMAM 265 or EECC-265)

Class 3, Lab 2, Credit 4 (W)

EECC-550  Computer Architecture I
Registration #0306-550
for Computer Engineers

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

Class 4, Credit 4 (S/Sr)

EECC-551  Computer Architecture II
Registration #0306-551
for Computer Engineers

This course provides knowledge about many important architectural issues of a computer system, with emphasis on the interaction between software and hardware. Student projects will be required. Topics to include: the impact of VLSI on computer architecture; the influence of software and applications on computer architecture; data representations; instruction set (the introduction of instructions to enhance operating system performance and high-level language processing will be emphasized); stack machines; control design channels and I/O processors; memory hierarchy and memory protection; multiprocessor computer systems; and fault-tolerant computer systems. (EECC-550)

Class 4, Credit 4 (F/W)

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

Introduction to some common transducers transformations from raw measured quantity to transducer output. Instrumentation amplifier analysis, analog switching for applications in multiplexers and sample and hold circuits. The analog to digital and digital to analog conversions processes. Analysis and synthesis of sequential machines using asynchronous and synchronous discrete logic as well as programmed logic. (4th year status in Computer Engineering)

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

EECC-561  Digital System Design
Registration #0306-561
for Computer Engineers

This course explores the methods of digital design used at the MSI and LSI level. It introduces the structure of a digital hardware problem solution from the architectural view, through data flow concepts and control flow concepts, to implementation. A series of digital design examples that form a framework for showing systematic solutions of common design situations at the MSI level will be investigated. The impact of modern LSI technology, microprogramming, bit slicing, and microprocessors on computer design will be studied. Projects will be required. (EECC-341, EECC-560)

Class 4, Credit 4 (S/Sr)

EECC-655  Projects In Computer Engineering
Registration #0306-655

Several detailed projects involving the design of hardware and software will be posed to exercise the students' engineering design creativity and ability to integrate concepts from throughout the curriculum. Some lectures will be presented on real time programming techniques such as interrupt handlers, multitasking concepts, process synchronization, response time considerations, input noise reduction, and debugging techniques. Other topics will also be presented. (5th year standing in computer engineering)

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

Technical Electives

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

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

Class 4, Credit 4 (S)

EECC-630  VLSI Design
Registration #0306-630

An introduction to the design and implementation of Very Large Scale (VLSI) systems. Basic MOS devices and circuits are described. From this base, a variety of methods for designing both combinational logic and state machines are developed, with emphasis on the use of regular structures such as programmed logic arrays. System architecture and use of Computer Aided Design (CAD) tools will be stressed. (5th year status in Computer Engineering, Computer Science, Electrical Engineering or Microelectronic Engineering)

Class 4, Credit 4 (W, S)

EECC-722  Advanced Computer Architecture
Registration #0306-722

This course will emphasize the impact of VLSI and communication issues on computer architecture. Topics covered will include highly concurrent, multiprocessor and fault-tolerant computer systems as well as data flow architectures. Modeling Techniques for system verification will also be included. (EECC-551 or ICSS-720)

Class 4, Credit 4 (S)

EECC-758  Fault-Tolerant Digital Systems
Registration #0306-758

Formal models and concepts in fault diagnosis. Test generation and minimization redundant and self-checking systems. Fault tolerant hardware and software based computer systems. (ICSS-400 or EEEE-650 or EEEE-750, EECC-550 or ICSS-720)

Class 4, Credit 4 (S)

EECC-759  Digital Interface Circuits
Registration #0306-759

Standard bus interface — parallel and serial. LSI interface devices. Interface design — peripherals and memory, Data acquisition—A/D & D/A converters, multiplexing. Logic — PIA, ROM based designs, spectral techniques. Error detection and correction. (EECC-560 or permission of instructor)

Class 4, Credit 4 (W)

Electrical Engineering

Required Courses and Scheduled Technical Electives

The following courses are required of electrical engineering students and are offered at least once a year.

EEE-200  Electrical Engineering Graphics
Registration #0301-200

A two-hour per graphics laboratory which stresses elementary graphic communication techniques. The accent is on the graphical description rather than on drafting methods.

Class 0, Lab 2, Credit 1 (Fall Quarter)
EEE-240
Introduction to Digital Systems
Registration #0301-240
This course will survey digital circuits and systems from the viewpoint of a user. It will describe these circuits’ operation and typical uses in terms of the external connections to commercially available circuit packages. This course is designed to be taken in the freshman year and is the replacement for EEEE-340 in the revised curriculum.
Class 3, Lab 0, Credit 3 (Fall Quarter)

EEE-310
Numerical Modeling
Registration #0301-310
The objective of this course is to develop the ability to evaluate many of the common engineering equations through use of the digital computer. Specific topics include making a table of values from a formula, obtaining a formula from a table of values; solving linear, nonlinear and transcendental equations; solving systems of equations; finding the solution of an ordinary differential equation; numerical differentiation.
Class 2, Lab 0, Credit 2 (Fall and Winter Quarters)

EEE-351
Circuit Analysis I
Registration #0301-351
Potential Difference: voltage polarity notation; current power and energy sources and sinks; linearity; resistance; source model; voltage dividers; Kirchhoff's Laws; series circuit; parallel circuit; series-parallel circuits; ladder networks; branch current method of circuit analysis. Principles of nodal analysis; nodal analysis; general discussion of nodal analysis Network topology; principles of loop and mesh analysis; duality; general loop analysis. Thevenin's and Norton's theorems: maximum power transfer; superposition and reciprocity theorems. Properties and relationships of inductances; RL circuit with a step input; properties and relationships of capacitance; RC circuit with a step input; pulse response of RC circuits; RLC circuit response with step input. (This will be an overall discussion rather than detailed analysis.) Sinusoidal Steady State-introduction: combination and decomposition of sinusoidal functions; single components; series RL circuit, series RC circuit - time domain solution; parallel RLC circuit - time domain solution; duality; instantaneous and average power; RMS values. Complex Exponential Functions: Phasor concepts; impedances, reactance, resistance; admittance; susceptance, conductance; impedance to admittance conversions; impedance bridges; power.
Class 4, Recitation I, Lab 2, Credit 4 (Spring and Summer Quarters)

EEE-352
Circuit Analysis II
Registration #0301-352
AC Network Analysis (nodal analysis, loop and mesh analysis) Thevenin's and Norton's theorems: maximum power transfer; superposition and reciprocity theorems, voltage dividers, current dividers, function, transforms of common sequences, basic theorems, partial fractions, convolution in time and frequency. Discrete representations; convolution and decomposition of sinusoidal functions; single components; series RL circuit, series RC circuit - time domain solution; parallel RLC circuit - time domain solution; duality; instantaneous and average power; RMS values. Complex Exponential Functions: Phasor concepts; impedances, reactance, resistance; admittance; susceptance, conductance; impedance to admittance conversions; impedance bridges; power.
Class 3, Recitation 2, Lab 2, Credit 4 (Fall and Winter Quarters)

EEE-353
Circuit Analysis III
Registration #0301-353
This course has been discontinued. The topics have been integrated into EEEE-351 and EEEE-352 in the revised curriculum.

EEE-365
Introduction to Microcomputers
Registration #0301-365
Introductory course on microcomputers. Begins with computer architecture, including detailed discussions of the memory unit, the central processing unit, its registers and its functions. This is followed by a study of computer arithmetic, logic operations, number systems and codes. Computer programming is then introduced at the machine and assembly language levels with emphasis on computer instruction sets and addressing modes. Straight line, branching and looping programs are studied and compared. The student is next introduced to computer input/output with emphasis placed on programmed controlled input/output. The course requires extensive hands-on exercises, which range from simple computational programs to more complex programs which use the computer as a digital controller. (EEE-240)
Class 4, Lab 0, Credit 4 (Fall and Winter Quarters)
A research or development project will be carried out under the general supervision of a staff member. The project need not be of the "state of the art" type. A reasonable problem of theoretical and/or experimental investigation will be acceptable as a thesis topic.

This is the introductory course dealing with the structure and operation of microprocessors. It includes descriptions of computer number systems and computer architecture and analyzes the major parts of a computer including the CPU, memory and I/O structure. Computer instruction sets and addressing methods are discussed and then applied to the machine language programming of computers. Software and hardware aspects of input/output are discussed along with consideration of special I/O chips. The course concludes with discussions of subroutine and stack operations. Most discussions are based upon the Motorola 6800 and Intel 8085 microprocessors. Lab sessions are an integral part of the course. (EEE-240, or consent of instructor and ICSP-220)

This course will cover the effective application of 8-bit and 16-bit microprocessors in the design of digital systems. It will develop an understanding of assembly language programming and hardware design techniques. The role of macro-assemblers, editors, linking loaders, and other systems software aids used in microcomputer development systems to produce efficient modular code will be covered. Several aspects of hardware/software organization of input/output programs will be considered including interrupts and direct memory access. The use of special LSI interface devices to connect a microcomputer with peripheral devices such as AID and D/A converters, CRT terminals, floppy disks, etc. will be studied. Laboratory sessions will be used to provide experience in the use of software development systems, incircuit emulators, and logic analyzers in developing and testing a microcomputer design.

This course will cover the study of logic errors and digital error control, and fundamentals of system design. (SMAM-441)

This course is concerned with the design of larger digital systems. LSI and VLSI components are largely used as building blocks. Top down design and the use of algorithmic state machine flow charts as design aids are stressed. The design aspects of microprogramming are discussed in detail. (EEE-240)

This is a one-quarter study of linear control systems and their physical behavior including stability and transient response. This is approached through the classical methods of the LaPlace domain; Routh's Criterion, Nyquist, Bode and Nichols charts and root locus. Lead and lag compensators are introduced using these tools. Analog computation techniques are studied and used, in laboratory, as a means of verifying the analysis and design of complex systems. (EEE-453, SMAM-420 desirable)

The second half of the course deals with methods of practical filter design including the circuit layout and process specification. This course is a prerequisite for EEEE-676, I.C. Processing Laboratory, in which integrated circuits are actually made.

An electronic design course utilizing the medium of thick film hybrid technology. Functional electronic modules will be designed, produced and tested, from original specifications to finished package, with students performing all steps.

This course covers the effective application of 8-bit and 16-bit microprocessors in the design of digital systems. It will develop an understanding of assembly language programming and hardware design techniques. The role of macro-assemblers, editors, linking loaders, and other systems software aids used in microcomputer development systems to produce efficient modular code will be covered. Several aspects of hardware/software organization of input/output programs will be considered including interrupts and direct memory access. The use of special LSI interface devices to connect a microcomputer with peripheral devices such as AID and D/A converters, CRT terminals, floppy disks, etc. will be studied. Laboratory sessions will be used to provide experience in the use of software development systems, incircuit emulators, and logic analyzers in developing and testing a microcomputer design.

This course is concerned with the design of larger digital systems. LSI and VLSI components are largely used as building blocks. Top down design and the use of algorithmic state machine flow charts as design aids are stressed. The design aspects of microprogramming are discussed in detail. (EEE-240)

This course is concerned with the design of larger digital systems. LSI and VLSI components are largely used as building blocks. Top down design and the use of algorithmic state machine flow charts as design aids are stressed. The design aspects of microprogramming are discussed in detail. (EEE-240)
Technical Elective Courses Offered Upon Sufficient Demand

**Electrical Machines I**

*EEE-532*  
Registration #0301-532  
The design and operating characteristics, both static and dynamic, of transformers and synchronous and induction machines. (EEE-531)  
Class 3, Lab. 3, Credit 4

**Introduction to Power Electronics**

*EEE-535*  
Registration #0301-535  
This course provides an introduction to the theory of thyristor circuits with emphasis on applications. The course builds upon the theory of static switching, SCR characteristics, triggering and communication. This leads the way to the study of controlled and uncontrolled rectification and inversion. AC and DC line control and frequency conversion using thyristors. The laboratory is an integral part of the course where the experiments complement the classroom lectures by providing exposure to the device characteristics, testing and measuring techniques and various thyristor systems. (EEE-441, EEEE-531 or concurrent registration for EEEE-531)  
Class 3, Lab. 3, Credit 4

**Motor Application and Control**

*EEE-536*  
Registration #0301-536  
A review of the speed torque characteristics of DC and AC motors. A study of the characteristics of mechanical loads and the transient response of electromechanical systems. A review of thyristor characteristics and the design of solid state motor control systems. (EEE-453,531)  
Class 3, Lab. 3, Credit 4

**Design of Control Systems**

*EEE-614*  
Registration #0301-614  
This course continues the analytical skills developed in EEEE-513 and extends them to sampled data systems and digital control systems. The stress throughout is on system design and compensation. The Z-transform is thoroughly discussed, and both root locus and frequency design techniques are described. The student is expected to utilize the available computer aided design packages in both the lab and the course. (EEE-513)  
Class 3, Lab. 3, Credit 4

**Transmission Propagation and Waves**

*EEE-621*  
Registration #0301-621  
(Applied Electromagnetic Theory)  
A course in guided and unguided wave propagation; transmission lines, wave guides, antennas, antenna arrays, radio frequency, and optical interference and diffraction; aperture effects and beam-forming. (EEE-471, 472)  
Class 3, Lab. 3, Credit 4

**Optical Devices and Systems**

*EEE-672*  
Registration #0301-672  
An introductory applied optics course designed not only to familiarize and review optical fundamentals but to introduce state of the art concepts and applications. Fundamental aspects of laser operation, lens system analysis, optical modulation, optical detection, and noise problems associated with optical components will be discussed. Applications to fiber optic, integrated optic, and solar systems will be considered. A demonstration lab complements course activities. (SPSP-314, 315; EEEE-471, 472—concurrent)  
Class 3, Lab. 3, Credit 4

**Fiber Optics: Theory and Application**

*EEE-674*  
Registration #0301-674  
To familiarize the engineer with the basic concepts involved in dealing with an ever-expanding field of applied optics, called fiber optics. Fundamentals as well as design applications will be discussed: light wave characteristics, fiberoptical waveguide fundamentals and selection; fiber optical coupling. Source and detector characteristics and selection will be considered. Examples of fiber systems employed by various organizations will be analyzed. A project lab assignment will be selected and will complement course content. (EEE-672)  
Class 3, Lab. 3, Credit 4

**Analog/Hybrid Computation**

*EEE-675*  
Registration #0301-675  
An introduction to the concepts of digital logic as applied to analog simulation and computation. This will include the basic concepts of iterative analog computation, hybrid computation, interface hardware and software and hybrid computer applications. Instruction and practice will be provided in the techniques of programming and operating the DES-30/TR48 analog/hybrid computer. (EEE-513)  
Class 4, Credit 4

**Digital Filters and Signal Processing**

*EEE-677*  
Registration #0301-677  
This course deals with the analysis and design of systems which are discrete in nature. General topics include difference equation description of discrete systems, definition of linearity, impulse response and Z-Transform analysis. Digital signal processing topics will include the definition and design of digital filters and the use of Fast Fourier Transforms (FFT) in signal processing. The effects of quantization errors in digital computations will be considered. Digital processing will be related to analog processing through the sampling theorem and a discussion of the methods of sampling, A/D and D/A conversion. Class projects will deal with digital filter design and implementation using microcomputer hardware. (EEE-453 and consent of instructor)  
Class 4, Credit 4

**Power System Analysis**

*EEE-687*  
Registration #0301-687  
An introductory course dealing with basic power network concepts; matrix transformations and the use of the digital computer to solve them; parameters of power system equipment; the symmetrical component approach for handling balanced and unbalanced faults; load flow studies and the numerical techniques for solving them; and an introduction to system stability. (EEE-531)  
Class 4, Credit 4

**Introduction to Audio Engineering**

*EEE-695*  
Registration #0301-695  
A course based on topics from dynamics, acoustics and audio systems. Topics include: electro-mechanical equivalents, plane and spherical acoustic waves, radiators and resonators, loudspeaker systems, equalization in recording and playback, and an introduction to the application of digital techniques to audio. (EEE-463, EEEE-442, EEEE-472 or suitable equivalents)  
Class 4, Credit 4

**Communication Circuit Design**

*EEE-696*  
Registration #0301-696  
Design and operation of representative circuits used in radio systems. Oscillators, directional couplers, amplifiers, matching networks, phase-locked loops and antennas. A project type laboratory and computer simulation problem are included. (EEE-442, EEEE-534, EEEE-472)  
Class 3, Lab. 3, Credit 4

Graduate Courses in Electrical Engineering

The courses listed below are normally open to students who have been formally admitted into the graduate electrical engineering programs. Students with a baccalaureate degree in engineering or science may be permitted to enroll in any of these courses as non-matriculated students if they have already completed the stated prerequisites for a particular course. Undergraduate students may be permitted to take some of these courses as undergraduate technical electives provided they are fifth year students and have already completed the prerequisites. The permission of the director of graduate programs is required for enrolling in these courses except in the case of matriculated graduate students.

**Semiconductor Physics**

*EEE-723*  
Registration #0301-723  
An introductory course in semiconductor physics for engineering students. The emphasis in this course is on semiconductor materials rather than semiconductor devices. Topics include band tap theory, equilibrium carrier concentrations, transport mechanisms, deep and shallow impurities and properties of silicon, GaAs, Ge and other semiconductors.  
Credit 4
EEE-744 Advanced Microprocessor Systems Design
Registration #0301-744
The effective application of microprocessors in the design of digital systems requires a knowledge of both hardware and software. This course will develop an understanding of assembly language programming and hardware design techniques. The role of microassemblers, editors, linking loaders, and other system software aids used in microcomputer development systems to produce efficient modular code will be covered. Several aspects of hardware/software organization of input/output programs will be considered including interrupts and direct memory access. The use of special LSI interface devices to allow a microcomputer to operate with peripheral devices such as A/D and D/A converters, CRT terminals, floppy disks, etc., will be studied. Laboratory sessions will be used to provide experience in the use of software development systems, and logic analyzers in developing and testing a microcomputer system design. (EEE-666)
Credit 4

EEE-745, 746 Topics in Digital Systems
Registration #0301-745, -746
Design I, II
Topics will be selected on different aspects of digital systems design. Some of the proposed topics are signature analysis, bit slice processors, timing problems, reliable systems design, and designing for maintainability. (EEE-650)
Credit 4

EEE-747 Topics in Switching Theory
Registration #0301-747
A selection of topics on various theoretical aspects of switching circuits will be presented. Topics such as decomposition of combinational switching functions, experiments on sequential circuits, and regular expressions will be covered. (EEE-650)
Credit 4

EEE-748 Microcomputers in Control and Instrumentation
Registration #0301-748
The use of microcomputers in the process control and instrumentation to achieve intelligent industrial operations will be discussed. Topics include concepts of control, analog vs. digital controllers, sensors, A/D and D/A converters, dc motor and stepper motor controllers, real-time systems, microcomputer bus standards, and the local network. Lab work may include temperature, pressure, and optical controllers, stepper motor controllers, and robotics control. Intel 8086 microcomputer is used. (EEE-744)
Credit 4

EEE-750 Advanced Analog I.C. Design
Registration #0301-750
An advanced course in analog integrated circuit design. Students will study Bipolar and MOS realization of Op Amps, Analog multipliers, A to D and D to A converters, and more. The students will participate in design projects including circuit design, layout, and SPICE simulation. (EEE-724, -670, and a course in computer architecture)
Credit 4

EEE-751 Analytical Techniques I
Registration #0301-751
Introduction to state variable approach for continuous and discrete systems.
Credit 4 (Offered every fall)

EEE-752 Analytical Techniques II
Registration #0301-752
Transfer function and its properties. The Z transform and the solution of difference equations. Relationship between the LaPlace and the Z transforms.
Credit 4 (Offered every fall)

EEE-753 Analytical Techniques III
Registration #0301-753
Vector analysis; Gauss’s law and Stoke’s theorem; curvilinear coordinates. Random variables. Probability densities and distributions; functions of random variables; moments; parameter estimation; statistical decision theory.
Credit 4 (Offered every fall)

EEE-754 Analytical Techniques I
Registration #0301-754
Complex variable theory including conformal mapping; the Laurent expansion; residues; and the evaluation of contour integrals. The Nyquist stability criterion. The LaPlace transform, its existence and convergence; use in the solution of differential equations; the transfer function and its properties.
Credit 4 (Offered every fall)

EEE-755 Analytical Techniques II
Registration #0301-755
Fourier analysis. Signal and power spectra; the Fourier transform related to the LaPlace transform. The convolution integral. Determinants and matrices; linear transformations; eigenvalues and eigenvectors; the solution of matrix differential equations; introduction to state variable approach for continuous and discrete systems.
Credit 4 (Offered every fall)

EEE-756 Analytical Techniques III
Registration #0301-756
Vector analysis; Gauss’s law and Stoke’s theorem; curvilinear coordinates. Random variables. Probability densities and distributions; functions of random variables; moments; parameter estimation; statistical decision theory.
Credit 4 (Offered every fall)

EEE-757 Network Theory
Registration #0301-757
Credit 4

EEE-760 Practical R&D Management
Registration #0301-760
The course is intended to help engineers currently in industrial R&D management careers, understand the concepts and practical aspects of project and organizational management and planning in R&D environment. Topics to be discussed will include: objectives of industrial R&D, types of R&D organizations, selection of new products for development, long- and short-range planning, methods of project scheduling and control, communication within R&D, financial controls and budget preparation, proposal and report writing. The participants will be expected to carry out planning, organization and control of a simulated R&D project.
Credit 4 (Offered upon sufficient demand)

EEE-761 Modem Control Theory
Registration #0301-761
Review of state-space formulation of SISO systems; solution of state equations; STM and its properties. Applications of state-space concepts; state variable design. Multivariate systems; preliminaries; systems of least order; stability and control. (EEE-754, -755, -613)
Credit 4
EEE-762 Nonlinear Control Systems
Registration #0301-762
An introduction to the physical nature and mathematical theory of nonlinear control systems' behavior using phase plane techniques. Liapunov theory (including Aizerman's method, variable gradient methods, and the Lure forms), perturbation methods, describing function techniques, and Popov's criterion. Analysis of switching and relays. These are applied to both piecewise-linear and analytical nonlinear systems. (EEE-761)
Credit 4

EEE-763 Stochastic Estimation and Control
Registration #0301-763
Stochastic control and optimization; estimation and filtering techniques such as Wiener filtering and Kalman filtering; stochastic stability; applications. (EEE-756, -761)
Credit 4

EEE-764 Digital Control Systems Design
Registration #0301-764
Introduction to the analysis and design of control systems in which microcontroller plays a principal role. Topics include: sampled data systems, Z and W-plane analysis and design, algorithm generation, and the effect of computer word length on noise and stability. The student will be expected to make use of the digital computer in the implementation of design procedures. (EEE-754, -755)
Credit 4

EEE-765 Optimal Control
Registration #0301-765
Introduction of calculus of variations: conditions of optimality; optimizing transient performance by statistical and variational procedures, dynamic programming and by Pontryagin's maximum principle; design of optimal linear systems with quadratic criteria. (EEE-761)
Credit 4

EEE-767 Thyristor Power Control and Conversion
Registration #0301-767
The objective of this course is to provide an adequate, application-oriented knowledge to those interested in the areas of control, power, and power electronics. Topics to be discussed: preliminaries, basic principles of static switching, thyristor theory, triggering, commutations; rectifiers; principles of controlled rectification, analysis of single and three-phase controlled rectifiers; inverters; series and parallel SCR inverters, design of inverters, sine wave filters, forced commutated inverter, McMurray inverter; DC systems; principles of DC-DC conversion, choppers, DC motor control, single phase DC motor drives, three phase DC motor drives, dual converter, cyclo-converter; frequency conversion using SCR's phase-controlled cyclo-converters; cyclo-converter controls. Modeling and simulation of thyristor circuits; thyristor models; approximations, digital simulation of choppers, inverters and cyclo-converters, areas of further research. Demonstration experiments will be set up. Also individual projects by interested students will be encouraged.
Credit 4

EEE-772, -773, -774 Special Topics in Electrical Engineering
Registration #0301-772, -773, -774
Topics and subject areas that are not among the courses listed here are frequently offered under the title of Special Topics. Such courses are offered in a normal format, that is, regularly scheduled class sessions with an instructor.
Credit 4 per course (No regular course schedule)

EEE-775 Optical Engineering I
Registration #0301-775
An introduction to the properties of optical components and their combination into systems, primarily from a geometrical optics point of view, but with reference to the wave nature of light where appropriate. Refracting and reflecting components. Radiation sources. Object-image relations. Stops and energy. Ray tracing and matrix methods of analysis and design. Discussion of common optical devices and instruments.
Credit 4

EEE-776 Electro-optics
Registration #0301-776
An advanced treatment of optical systems through the use of Maxwell's equations describing light interaction will be considered. Lens systems, optical modulation, laser operation, optical detection and associated noise problems will be discussed. Classroom work will be complemented by demonstrations. (EEE-775, -471)
Credit 4

EEE-777 Optical Engineering II
Registration #0301-777
Credit 4

EEE-778 Fiber Optics
Registration #0301-778
The objective of this course is to educate the engineer in the applied optics field. Fundamentals of the fiber waveguide are treated using geometrical optics and Maxwell's equations. Other topics include design criteria, practical coupling techniques, discussion of optical sources and detectors used in fiber optical systems. Applications to communications and other areas will be discussed. (EEE-775, -776, -777)
Credit 4

EEE-779 Digital Image Processing
Registration #0301-779
Introduction to digital image processing concepts, image digitization, 2D discrete Fourier transforms; topics on image enhancement including contrast equalization, false color displays, and edge enhancement techniques; topics in image reconstruction to include causes of image degradation, deblurring procedures, and homomorphic filters; 3D image reconstruction from 2D projections. (EEE-754, -755, 677)
Credit 4

EEE-780 Independent Study
Registration #0301-780
This course number should be used by students who plan to study a topic on an independent study basis. The student must obtain the permission of the appropriate faculty member before registering for the course.
Credit 4

EEE-781 Electromagnetic Fields
Registration #0301-781
Development of electromagnetic theory from basic postulated leading to Maxwell's equations in differential and integral forms. Solution of Maxwell's equations for the plane waves, transmission lines, waveguides, and antennas.
Credit 4

EEE-782 Boundary Value Problems
Registration #0301-782
Credit 4

EEE-783 Antennas and Antenna Systems
Registration #0301-783
Theoretical and practical characteristics of electromagnetic radiators. Equivalent circuits and radiating properties of antenna elements. Dipoles, slots, small loops, helical and dielectric radiators. Pattern analysis, primary and secondary patterns. Theory of phased antenna arrays, reflectors, and horns. (EEE-781)
Credit 4

EEE-784 Advanced Electromagnetic Engineering
Registration #0301-784
Time varying electromagnetic fields. Field theories, propagation and reflection of plane waves, transmission theory, waveguides, resonators, radiation and diffraction. Microwave networks. (EEE-781)
Credit 4

EEE-785 Special Topics in Electromagnetic Theory
Registration #0301-785
Advanced and current topics in electromagnetic theory. Topics vary each time and may include: array theory, electromagnetic compatibility, numerical methods, propagation and radiation in ionized media, moving media, and random media. May be repeated for additional credit. (Permission of the instructor)
Credit 4
Industrial Engineering

The following courses are required of Industrial Engineering students and are offered at least once a year.

**EIEI-201 Introduction to Industrial Engineering**
Registration #0303-201
A first course in industrial engineering for freshmen. The course describes what engineering is, what current and projected opportunities exist for engineers. The course material is concerned with the general principals of engineering design. (F)
Class 3, Lab. 1, Credit 4

**EIEI-202 Computing for Industrial Engineers**
Registration #0303-202
A first course in computer programming for engineers and in particular industrial engineers. The course involves extensive development of programming skills required in the engineering disciplines. (W)
Class 4, Credit 4

**EIEI-301 Computer Tools for increased Productivity**
Registration #0303-301
This course is designed to expose the student to the range of computer software tools and packages that are available on the VAX. The student will learn how to use this software to improve his/her productivity in all the courses that will follow. It will also review and sharpen the student's skills in using the VAX/VMS system and the FORTRAN language. (EIEI-202 or consent of instructor) (W)
Class 2, Credit 2

**EIEI-401 Introduction to Operations Research I**
Registration #0303-401
An introduction to the methodology of mathematical problem formulation. Investigation of mathematical programming techniques including linear programming and special types of linear programming problems such as the transportation and assignment algorithms. (SMAM-308 or consent of instructor) (F)
Class 4, Credit 4

**EIEI-402 Introduction to Operations Research II**
Registration #0303-402
A survey of elementary mathematical models within the field of systems and industrial engineering. Areas of study include queuing theory, network analysis, and inventory theory. (SMAM-351, SMAM-352) (F)
Class 4, Credit 4

**EIEI-415, 516 Human Factors I, II**
Registration #0303-415, 516
A survey of human factors from 1) physiological constraints of the human; 2) behavioral/psychological characteristics of the human; and 3) the psycho-motor skills ability of the human. Emphasis is placed on practical applications of each area. (SMAM-352 or consent of instructor) (F, Sp)
Class 3, Lab. 2, Credit 4

**EIEI-420 Work Measurement and Analysis I**
Registration #0303-420
Methods of measuring and analyzing work, human capabilities, micromotion, memomotion study, process and operation analysis. Emphasis placed on methods of operation analysis as applied to the design and evaluation of man-machine systems. (Consent of instructor)
Class 3, Lab. 2, Credit 4

**EIEI-422 Systems & Facilities Planning**
Registration #0303-422
A basic course in plant layout. Topics covered include project-quantity analysis, flow of materials, relationship charts, activity charts, material handling systems, and factors influencing the layout design. The course includes basic drafting application as well as state of the art computer aided layout design. (EIEI-401 or consent of instructor) (Sp)
Class 3, Lab. 2, Credit 4

**EIEI-481 Management Theory and Practice**
Registration #0303-481
Development of the fundamental principles of the industrial enterprise. Internal organization as well as general economic conditions are considered. Emphasis is placed on the role of behavioral science. (Sp) (Consent of instructor)
Class 4, Credit 4
EIEI-503 Registration #0303-503
A first course in simulation emphasizing the role of the computer in developing simulation models. The SLAM simulation language is emphasized (EIEI-202, SMAM-351 or equivalent) (Sp)
Class 4, Credit 4

EIEI-510, -511 Applied Statistical Analysis Registration #0303-510, -511
An applied approach to statistics utilizing theoretical tools acquired in other math-stat courses. Heavy emphasis on understanding and applying statistical analysis methods in real-world situations in engineering. Topics include quality control, reliability, analysis of variance, and regression. (SMAM-351, 352) F-510, Sp-511)
Class 4, Credit 4

EIEI-520 Registration #0303-520
Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting. (F) (SMAM-351 or consent of instructor)
Class 4, Credit 4

EIEI-530 Engineering Design Registration #0303-530
A case study approach of ten real world experiences in engineering design, (consent of instructor) (W)
Class 4, Credit 4

EIEI-560 Project Design Registration #0303-560
A design course oriented to the solution of on-site industrial engineering problems. Each student group will attempt to define, analyze, design, and implement a solution to actual ongoing problems in the Rochester community, (consent of instructor) (Sp)
Class 4, Credit 4

The following courses can be used as professional electives within industrial engineering and are offered subject to sufficient demand. You should consult with your advisor for advice on professional electives outside of the industrial engineering discipline.

EIEI-450 Applied Human Factors Design of Experiments Registration #0303-450
An applied approach to the problem of how one goes about running a study or experiment in human factors. (EIEI-511 or consent of instructor)
Class 4, Credit 4

EIEI-482 Production Control I Registration #0303-482
A basic course in production control emphasizing the systems approach. Topics covered include forecasting, mathematical inventory models, material requirements planning and scheduling including PERT. (EIEI-511 or consent of instructor)
Class 4, Credit 4

EIEI-483 Production Control II Registration #0303-483
A design course in production control. Each student is asked to design, test, and implement a complete production control system for an operating plant. (EIEI-482)
Class 4, Credit 4

EIEI-504 Introduction to Operations Research III Registration #0303-504
A course intended to provide an integrated view of advanced programming techniques and their applications to industrial problems. Selected topics might include a working knowledge of PGERT, GQERT, etc. (EIEI-401, 402 or consent of instructor)
Class 4, Credit 4

EIEI-512 Reliability Registration #0303-512
Concepts of reliability, basic failure laws, reliability measurement, structural analysis reliability, repair problems, surveillance problems, maintenance problem. (EIEI-510, 511 or consent of instructor)
Class 4, Credit 4

EIEI-540 Introduction to Operations Research IV Registration #0303-540
An introduction to some advanced topics in operations research and industrial engineering. Areas of study may include game theory, Markov chains and their applications, decision analysis, network analysis. (5th year I.E. standing or consent of instructor)
Class 4, Credit 4

EIEI-545 Techniques of Systems Engineering Registration #0303-545
LaPlace, Fourier and Z transforms; transform methods for solving differential, difference and differential-difference equations; feedback networks; classical optimization techniques; search techniques; theory of graphs (5th year I.E. standing or consent of instructor)
Class 4, Credit 4

EIEI-550 Safety Engineering Registration #0303-550
To acquaint students with practical aspects of safety engineering. Students will acquire a working knowledge of legal and technical aspects of safety. Recent developments in this area will be stressed, such as OSHA, Consumer Product Safety Commission, and the Federal Highway Safety Act. Students will also be exposed to research methodology and ways of evaluating safety programs and related research. Reference sources will be outlined.
Class 4, Credit 4

EIEI-599 Independent Study Registration #0303-599
A supervised investigation within an industrial engineering area of student interest. (Consent)
Class variable, Credit variable

EIEI-625 Computer Aided Manufacturing I Registration #0303-625
To introduce the area of Computer Aided Manufacturing (past, present and future). Emphasis will be placed on advantages/disadvantages, methods, applications and availability of current systems. Topics include Numerical Control Language, Group Technology, Flexible Manufacturing Systems, Robotics, Automatic Process Planning and Adaptive Control. (Consent of instructor)
Class 4, Credit 4

EIEI-630 Computer Aided Manufacturing II Registration #0303-630
To familiarize students in Industrial Engineering with the basic concepts and techniques needed to specify, design, and implement systems that are computer controlled. Emphasis is on real-time data acquisition and process control as related to Computer-Aided Manufacturing. Physical Simulations relate to real-world systems such as automated storage and retrieval systems, material handling systems, flexible manufacturing systems using robots. Topics include real-time programming, interface electronics, and microprocessor-based data acquisition systems and programmable controllers. (EIEI-503, consent of instructor)
Class 3, Lab. 3, Credit 4

EIEI-690 Seminar in Computer Integrated Manufacturing Registration #0303-690
This course is designed to provide a broad overview of current technology and management practice and trends related to the evolving factory of the future. It is designed as a multi-disciplinary offering for upper-division undergraduate and graduate students enrolled in any RIT program. The course follows a seminar format. Topics of discussion include Quality Assurance, Robots, CAD, Group Technology, MRP, Flexible Manufacturing Systems, Material Handling, and Systems Integration through Computer Application.
Class 3, Credit 3

Graduate Courses
The following courses are recommended as part of the Master of Engineering program in Industrial Engineering and Engineering Management. They are offered on sufficient demand.

EIEI-620 Engineering Economy Registration #0303-620
Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting.
Credit 4
EIEI-715, 716  
**Statistical Analysis for Engineers I & II**  
A basic two-quarter course in probability and statistics designed to give the student a foundation for further study in areas such as design of experiments, stochastic systems, and simulation.  
Credit 4

The following courses can be used as part of the Master of Engineering program in Industrial Engineering and Engineering Management. The courses are generally offered in alternating years and/or as demand dictates.

EIEI-601  
**Value Analysis**  
Registration #0303-601  
This course examines the nature and measurement of value. The concept and construction of a value index representing average value is related. Numerical estimation methods such as ranking, pair comparison, magnitude estimation, and criteria analysis are explained and used to measure the value of diverse items. The methods used are applicable to the study of a wide variety of problems and have special utility in engineering design studies.  
Credit 4

EIEI-701  
**Principles of Operations Research I**  
Registration #0303-701  
Applied linear programming. Computational techniques for solving constrained optimization problems. Linear programming, the Simplex method and variations, duality and sensitivity testing.  
Credit 4

EIEI-702  
**Mathematical Programming**  
Registration #0303-702  
Application of non-linear programming techniques. Classical optimization techniques; quadratic, stochastic, integer programming and dynamic programming. Applications to industry. (EIEI-701)  
Credit 4

EIEI-705  
**Survey of Operations Research**  
Registration #0303-705  
A survey course designed to introduce the student to such topics as waiting line analysis, inventory, scheduling, replacement, and simulation. This course is intended to present an integrated view of the field of operations research to students who will take more specialized courses as well as those in other disciplines desiring only a limited exposure to the field.  
Credit 4

EIEI-710  
**Systems Simulation**  
Registration #0303-710  
Methods of modeling and simulating man-machine systems. Model validation, design of simulation experiments, variance reduction techniques, random number generation and distribution generation are discussed. However, emphasis is placed on the G.P.S.S. simulation language.  
Credit 4

EIEI-718  
**Inventory Design**  
Registration #0303-718  
Overview of inventory problems. Single period models under risk and uncertainty, dynamic models under certainty, dynamic models under risk and uncertainty. Forecasting, inventory system analysis.  
Credit 4

EIEI-720  
**Production Control**  
Registration #0303-720  
A systems approach to the design of production control operations. Investigation of forecasting, operations planning, inventory control, and scheduling. Case studies and the design of actual production systems is encouraged.  
Credit 4

EIEI-723  
**Facilities Planning**  
Registration #0303-723  
Principles of plant layout and material handling. Topics covered include criterion selection, cost elements, the layout design process, SLP, computerized plant layout and material handling techniques relating to operations research.  
Credit 4

EIEI-725  
**Technological Forecasting**  
Registration #0303-725  
Technological forecasting is concerned with the Delphi method, SOON charts, trend extrapolation, relevancy trees, cross input analysis, internally consistent scenarios, and decision matrices. The course will provide a thorough introduction to the basic concepts and techniques of technological forecasting.  
Credit 4

EIEI-730  
**Biotechnology and Human Factors I**  
Registration #0303-730  
Credit 4

EIEI-731  
**Biotechnology and Human Factors II**  
Registration #0303-731  
Effect of mechanical and physical environment on: physiology, behavior, performance of man. Design considerations to protect man against environmental effects (thermal environment, noise, vibration, acceleration, light, altitude).  
Credit 4

EIEI-732  
**Biotechnology and Human Factors III**  
Registration #0303-732  
Theoretical fundamentals of human body mechanics. Development and applications of biomechanics and biomechanical models. Kinematics of the link system of the body and extremity joints.  
Credit 4

EIEI-733  
**Biotechnology and Human Factors IV**  
Registration #0303-733  
Measurements of human performance. Functions that man performs in man-machine systems. Techniques to quantify man's behavior at work.  
Credit 4

EIEI-734  
**Systems Safety Engineering**  
Registration #0303-734  
Credit 4

Special courses related to a particular student's interest can be arranged via the following course:

EIEI-771, 772, 773, 774  
**Special Topics in Industrial Engineering**  
Registration #0303-771, -772, -773, -774  
This is a variable credit, variable topics course which can be in the form of regular courses or independent study under faculty supervision.  
Credit variable (maximum 4 per course number)

EENG-777  
**Engineering Internship**  
Registration #0302-777  
This course number is used by students in the master of engineering degree program for earning internship credits. The actual number of credits is to be determined by the student's faculty advisor and subject to approval of the Graduate Committee of the College of Engineering.  
Credit variable

**Mechanical Engineering**

**Required Courses**

EMEM-201  
**Mechanical Engineering Graphics I**  
Registration #0304-201  
This course is designed to introduce the student to the engineering profession in general and also to develop skills in engineering graphical communication sufficient to meet industrial standards. The use of computer graphics is introduced. The course is intended for students with little or no background in engineering drawing. Students having two years of engineering graphics or drawing in school or equivalent may take a qualifying examination to exempt this course.  
Class 2, Lab. 4, Credit 4 (F,W)


EMEM-331 Mechanics I
Registration #0304-331
This course is intended for students majoring in computer, electrical, and industrial engineering. Statics and introduction to strength of materials: Newton’s laws, the principle of transmissibility of forces, couples, centroids, trusses, frames, machines, and friction. Axial stresses and strains, statically indeterminate problems, thin-walled pressure vessels, direct shear, torsion, and bending. (SPSP-311, Corequisite: SMAM-253)
Class 4, Credit 4 (F, W)

EMEM-332 Mechanics II
Registration #0304-332
This course is meant for students majoring in computer and industrial engineering. Topics include dynamics of particles and rigid bodies with an introduction to mechanical vibrations, kinematics and kinetics of particles and rigid bodies, work, energy, impulse momentum, and vibrations. Emphasis is on problem solving. (EMEM-331)
Class 4, Credit 4 (Sp)

EMEM-335 Elements of Statics
Registration #0304-335
This course is intended as an introduction to the principles of statics for non-mechanical engineering students. This basic course treats the equilibrium of particles and rigid bodies under the action of forces. Topics include forces, couples, equilibrium, centroids, frames, machines, and friction. (SPSP-311, Corequisite: SMAM-253)
Class 2, Credit 2 (W)

EMEM-336 Statics
Registration #0304-336
This basic course treats the equilibrium of 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 Newton’s laws. (SPSP-311, Corequisite: SMAM-253)
Class 4, Credit 4 (F)

EMEM-337 Strength of Materials I
Registration #0304-337
This basic course in statics of deformable bodies integrates the mathematical subjects of calculus and differential equations with the fundamental physical considerations which govern the mechanics of deformable solids in equilibrium. Topics covered include stress and strain, Hook’s Law, axial loading, torsion, and bending stresses and deflections. (EMEM-336)
Class 3, Lab/Rec 2, Credit 4 (F, W)

EMEM-338 Strength of Materials II
Registration #0304-338
A continuation of Strength of Materials to include pressure vessels, superposition of stresses, transformation of stress, Mohr’s Circle, failure theories, energy techniques, and column theory. (EMEM-337)
Class 3, Lab/Rec 2, Credit 4 (Sp, Su, F*)

EMEM-340 Mechanical Engineering Graphics II
Registration #0304-340
The objective of this course is to study advanced engineering graphics. The laboratory sessions are devoted to working drawings, shop processes, mechanical elements, tolerances and fits, assembly and detail drawings, and an introduction to computer graphics. (EMEM-201 or equivalent)
Class 2, Credit 2 (W, Sp)

EMEM-341 Introduction to Fortran Programming
Registration #0304-341
The objective of this course is to provide an introduction to Fortran programming. Topics covered include terminal and batch processing, input-output statements, arithmetic and logical IF statements, implicit and explicit DO loops and subroutines.
Class 2, Credit 2 (W, SP)

EMEM-343 Materials Processing
Registration #0304-343
This course involves a study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Topics covered include such metal fabrication processes as cutting (conventional and non-conventional), forming, casting, and welding. Plastics are covered from the standpoint of thermostatting and thermo-plastic processing.
Class 3, Lab. 2, Credit 4 (F, W)

EMEM-344 Materials Science
Registration #0304-344
This course deals with the structure and properties of metallic, organic, and ceramic materials as related to structural imperfections, atom movements, and phase changes. The intent of the course is to develop a basic understanding of the structure/properties relationship in materials and their behavior in service environments. (SCHG-208)
Class 3, Lab. 2, Credit 4 (W, Sp)

EMEM-349 Elements of Dynamics
Registration #0304-349
This is a basic course in the fundamentals of dynamics of particles and rigid bodies, with introduction to mechanical vibrations. Topics include kinematics and kinetics of particles and rigid bodies, work, energy, momentum, and vibrations. (EMEM-331)
Class 3, Credit 3 (W, Sp)

EMEM-413 Thermodynamics I
Registration #0304-413
A basic course that introduces the mathematical theory of thermodynamics and heat energy via a series of classical experiments. After the complete first law analysis of air standard engines and refrigerators (Carnot, Otto, Diesel, etc.), the Clausius and Kelvin statements of the second law are correlated with the concept of entropy. Both real and reversible processes are studied on the pressure vs. specific volume and the temperature vs. entropy coordinate systems. (SMAM-306, EMEM-336)
Class 4, Credit 4 (F, W)

EMEM-414 Thermodynamics II
Registration #0304-414
The second thermodynamics course begins with a study of phase space and the properties of real gases, liquids and solids. Using a control volume analysis, we use the basic fluid properties, the first and second law of thermodynamics to study and design gas turbine power plants, steam power, steam power plants, and vapor compression refrigeration systems. The properties of gaseous mixtures and combustion shall also be considered. (EMEM-413)
Class 3, Lab/Rec 2, Credit 4 (W*, Sp, Su)

EMEM-415 Fluid Mechanics I
Registration #0304-415
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: the flux vector, systems and control volumes, Reynolds Transport theorem, integral control volume analysis of basic equation for stationary and moving control volumes. Inviscid Bernoulli and the Engineering Bernoulli equations, some applications. Incompressible flow in pipes; Laminar and turbulent flows, separation phenomenon. Dimensional analysis: Buckingham’s Pi-theorem, similarity, model studies. (EMEM-308, EMEM-413)
Class 3, Lab/Rec 2, Credit 4 (Sp, Su)

EMEM-431 Thermodynamics
Registration #0304-431
A basic course in thermodynamics for electrical engineering students. Applications of the first and second law to closed and open systems; elementary heat transfer considerations.
Class 4, Credit 4 (Sp, Su, F*)

EMEM-437 Introduction to Machine Design
Registration #0304-437
The analysis and theory of machine design and applications to systems design problems; particular emphasis is placed on the design and analysis of machine elements. A discussion of engineering professionalism and ethics. (EMEM-338)
Class 4, Credit 4 (F, W)

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Extended Day Schedule
EMEM-439
Registration #0304-439
Dynamics I
A basic course in the fundamentals of kinematics and kinetics of single-particle motion in one, two, and three dimensions. Vector algebra is reviewed and vector calculus is used to define the derivative of a unit vector in rotating coordinate systems. Newton's second law of motion is introduced, along with the review of "the free body diagram," to generate the differential equations of motion of particles. The differential equations of motion are solved by using classical methods. Variations of Newton's second law of motion, such as the work and energy technique and the impulse and momentum technique, are introduced and applied to two-dimensional problems. Two-body collisions (impact) are defined, and the equations relating the velocities of the two particles before and after impact are derived. Kepler's three laws of planetary motion are used to derive Newton's Universal Law of Gravitation. The central force-field problem is thus defined, and problems involving satellite motion of satellites about the Earth are solved. (EMEM-336, SMAM-308)
Class 4, Credit 4 (W*, Sp, Su)

EMEM-440
Registration #0304-440
Numerical Modeling for Engineers
This course involves a study of the numerical methods for solving engineering problems using computers, and to interpret and analyze the numerical results obtained. Topics include roots of algebraic and transcendental equations, solution of homogeneous and non-homogeneous systems of linear algebraic equations, numerical integration and differentiation, and ordinary differential equations. Problems will be taken from student's background in statics, strength of materials, dynamics, mathematics and thermodynamics. Students are expected to write a number of programs. (EMEM-341, or equivalent computer experience, and third-year standing)
Class 4, Credit 4 (Sp, Su)

EMEM-501
Registration #0304-501
Mechanical Engineering Laboratory
A course in experimental methods, with laboratory experiments and lectures on the underlying theory. Topics considered are design of experiments, experimental error and error analysis including some statistical analysis of data, calibration of equipment, presentation of results in engineering reports. The theory and use of measuring devices for the determination of strain, pressure, temperature, flow rate, vibration, etc., and transient response of transducers. In addition to standard laboratory exercises and experiments, an original experiment to measure a particular physical phenomenon is to be designed and implemented by the student either individually or in a small group. (Fourth-year standing)
Class 3, Lab. 2, Credit 4 (F, W)

EMEM-514
Registration #0304-514
Heat Transfer I
This is a basic course in the fundamentals of heat transfer by conduction, convection and radiation together with application to typical engineering systems. Topics covered include one-dimensional steady state and transient heat conduction, radiation between black bodies and gray bodies, correlation of data for forced and natural convection, and an introduction to heat exchanger design. (EMEM-413, EMEM-415)
Class 4, Credit 4 (F, W)

EMEM-516
Registration #0304-516
Fluid Mechanics II
This course is a continuation of Fluid Mechanics I. However, the analysis is developed with emphasis on the differential rather than the integral approach. Continuity and momentum equations in differential form: stream function, vorticity, velocity potential, fluid rotation and viscosity. Integration of Euler's equation along a streamline for steady flow. Parallel Flows: Analytical solution of Plane Poiseuille, Couette, and pipe flows. Pipe design: Major and minor head loss, sinuous and multichip pipe-line problems. Boundary layer concept elucidated from vorticity transport and order analysis. Boundary layer thicknesses, Von-Karman momentum integral equation and solutions for laminar and turbulent boundary layers over a flat plate. Pressure and friction drag, differential and integral drag, lift and drag calculations for external flow. One-dimensional compressible flows: review of thermodynamic fundamentals, stagnation properties, speed of sound, Mach cones, critical Mach number, nozzle flows, normal shockwaves. (EMEM-415, SMAM-306)
Class 3, Lab/Rec 2, Credit 4 (F, W)

EMEM-543
Registration #0304-543
Dynamics II
The equations of motion for a single particle are applied to systems of particles to define Euler's first and second laws of motion relative to the motion of a system of particles. Then a very special system of particles is defined, the rigid system (rigid body), and Euler's first and second laws of motion are derived for the rigid body. The mass moment of inertia for the rigid body is defined with respect to Carte-sian coordinates. The kinematics and kinetics of rigid body motion are developed for two and three-dimensional motion. Rotating coordinate systems are used. Vector algebra and vector calculus are used. SI units are used throughout the course.
One laboratory period per week is devoted to the introduction and use of the analog computer. The analog flow diagram using the dimensionless computer variable is defined and used in all problems. Lumped parameter systems made up masses, springs, and dashpots are analyzed by classical methods and by using the analog computer. The laboratory introduces the vibrations of single particle systems. (EMEM-439)
Class 3, Lab/Rec 2, Credit 4 (F, W)

EMEM-544
Registration #0304-544
Dynamics of Physical Systems
A basic course in the dynamics of electrical, mechanical, thermal, and fluid lumped parameter systems. Classical and mobility analogs that relate these systems are defined and used. Singularity functions, using Clebsch's notation, are introduced and used to force first and second order lumped parameter systems with varied damping in the second order systems. Convolution integral is introduced and used to obtain the response of these systems to various inputs. Sinusoidal inputs along with the definitions of the transfer function, the root locus method, and bode plots are placed on these systems. Fourier series, Fourier integrals, and Laplace transforms are defined and used for more general periodic and transient inputs. In-class displays are accomplished by a portable oscilloscope, x-y plotter and analog computer system. Homework problems include the use of the digital computer using FORTRAN. (EMEM-543)
Class 4, Credit 4 (Sp, Su, W*)

EMEM-599
Registration #0304-599
Independent Study
An assigned project encompassing both analytical and experimental work integrating the student's education in mechanical engineering. Class variable, Credit variable (F, W, Sp, Su)

Group I Courses
Elective courses that are offered at least once every three years:

EMEM-601
Alternative Energy Sources
Registration #0304-601
Emphasis on the technical aspects of solar and wind energy. Wind characteristics and site analysis, aerodynamics of horizontal and vertical axis rotors, and the economics of wind power. Fundamentals of solar radiation, solar hot water heating and solar space heating, and the economics of solar utilization. Included, but to a lesser extent, are tidal power, wave power, geo-thermal energy, ocean thermal gradient, and energy from waste. Individual term projects are required. (EMEM-514)
EMEM-652 Fluid Mechanics of Turbomachinery
Registration #0304-652
The conservation laws, Newton's second law, the second law of thermodynamics and appropriate equations of state are used to study water turbines, gas turbines, steam turbines, compressors, and centrifugal pumps. Dimensional analysis and empirical data are also used and studied. The student is expected to write a design-oriented term paper. (EMEM-415)
Class 4, Credit 4 (Sp, Su)

EMEM-658 Engineering Vibrations
Registration #0304-658
A design-oriented course in mechanical vibrations and noise control with emphasis on design applications and instrumentation. Free and forced vibrations of systems containing three degrees of freedom are covered including machinery unbalance and isolation, Fourier Analysis, numerical and experimental analysis and design methods. Modal analysis of multi-degree of freedom systems is introduced. Industrial acoustics and noise control techniques are also covered. In addition to laboratory exercises in each area of vibration, a design project is assigned. (EMEM-544)
Class 3, Lab. 2, Credit 4 (F, W)

EMEM-660 Refrigeration and Air Conditioning
Registration #0304-660
A basic course in the principles and the applications of refrigeration and air conditioning involving mechanical vapor compression and absorption refrigeration cycles, associated hardware, psychrometrics, solar radiation, heat transmission in buildings, and thermodynamic design of air conditioning systems. Students are expected to do a design project. (EMEM-514)
Class 4, Credit 4 (F, W)

EMEM-672 Dynamics of Machinery
Registration #0304-672
The course treats the fundamentals of dynamic design of machinery. Topics include complete cycle dynamic analysis of mechanisms, graphical kinematics, the method of virtual work applied to dynamical systems, cam design and balancing. The digital computer and the ZETA plotter are used. (EMEM-543)
Class 4, Credit 4 (Sp, Su)

EMEM-694 Stress Analysis
Registration #0304-694
This course deals with numerical and experimental analyses of stressed mechanical components. The governing state properties are reviewed and definitions and relationships between stress, strain, and deformation are established. Two- and three-dimensional coordinate transformations are discussed. The Finite-Element method is introduced and the student is presented with simple instructional software programs which demonstrate the Finite-Element analysis and computer graphic pre- and post-processing of data files. Commercial Finite-Element programs are discussed and demonstrated. A design project is assigned. Experimental methods are presented including strain gages, photoelasticity, and brittle coating. (EMEM-437)
Class 4, Credit 4 (Sp, Su)

Group II Courses

EMEM-608 Thermo-Fluids Design & Management Principles
Registration #0304-608
This course consists of a team oriented design project supplemented with class lectures and discussion on the industrial design and development process. The project consists of the design, performance, and economic analyses, of the complete system with particular emphasis on the analysis of mechanical components contributing to the fluid processes of the system. The project includes a formal written project report and an oral. Students may elect to continue their work in the second thermal design course offered in the spring quarter. (EMEM-414, EMEM-516, EMEM-852)
Class 4, Credit 4 (F, W)

EMEM-610 Thermo-Fluids Project Design and Analysis
Registration #0304-610
This course involves the development of a pragmatic approach to engineering design with particular emphasis in the area of thermal and fluid sciences. The course introduces basic engineering design methodology illustrated by examples from existing designs. The course contents include the design of workable systems, selection from alternative designs, and design optimization from the process and economic considerations. Engineering principles and computer analysis will be used in practical, open-ended design problems such as heating systems, cooling systems, fluid machinery, and other thermal and fluid flow systems and components. (EMEM-414, EMEM-516, EMEM-835)
Class 4, Credit 4 (Sp)

EMEM-620 Introduction to Optimal Design
Registration #0304-620
The student is introduced to some basic optimization techniques for engineering design with emphasis on real applications in the work of mechanical design synthesis. Topics covered include: basic theory and techniques for optimization of engineering designs, with emphasis on the method of optimal design, geometric programming, method of Lagrangian multipliers, and the use of digital computers. Summary comparison of various optimization techniques. Many real problems and industrial examples are covered. Selection of a factor of safety for optimal design use. (EMEM-440, EMEM-543, EMEM-457)
Class 4, Credit 4 (T.B.A.)

EMEM-625 Creative Design of Mechanical Devices
Registration #0304-625
Purpose of the course is to study basic problems of creative design, to present explicit techniques for stimulating creative action in the work of mechanical design synthesis, and to illustrate applications of the same in real problem settings by industrial examples.
Topics covered include: basic techniques for stimulating creative action with specific emphasis on the systematics of linkages, the logical building block approach, synthesis by implication from goals of optimal design, and synthesis with mechanical circuit diagrams. For each topic, basic theory is presented along with many industrial examples of application, including a description of patents received where applicable. Also covered are decision table techniques for selecting the optimum configuration. (EMEM-543, EMEM-437)
Class 4, Credit 4 (T.B.A.)

EMEM-632 Advanced Mechanical Systems Design
Registration #0304-632
Procedures and techniques for designing a mechanical engineering system are presented and illustrated with many examples from professional practice. Process system flow charts, machine system flow charts, determination of functional requirements to meet system needs, conceptual design, optimal design, dynamic programming, and computerized design are topics specifically covered for systems related open-ended design problems. Knowledge from basic mathematics and engineering science is integrated with intuitive thinking and the inclusion of practical factors in solving systems related design problems. The professionalism and ethics of engineering are discussed. The student is encouraged to work on an approved system related open-ended project of his/her choosing. For students who have had EMEM-620 and/or EMEM-625, the systems related project is mandatory. (EMEM-437)
Class 4, Credit 4 (Sp)

EMEM-665 Thermal Fluid Design
Registration #0304-665
This course involves development in the student of a pragmatic approach to engineering design with particular emphasis in the area of thermal-fluid science. The course highlights basic design philosophy illustrated by examples from existing designs to enable the student to undertake an open-ended design problem. Situations involving engineering ethics are discussed. Engineering principles and computer analysis will be used in practical design problems such as heating systems, cooling systems, power plants, etc. (EMEM-414, EMEM-514, EMEM-516)
Class 4, Credit 4 (Sp)
This course involves an indepth study of the second law of thermodynamics, equilibrium, and its consequences. The course further deals with vacuum pumps, vacuum system design and performance, vacuum measurements, and leak detection. Current applications of vacuum technology will be treated and will correspond to the areas of interest expressed by the class. (EMEM-413 or equivalent)

Class 3, Lab/Rec 2, Credit 4 (T.B.A.)

**EMEM-61S Robotics**
Registration #0304-61S

This is an applied course in the fundamentals and applications of industrial robots. Topics include computer vision, sensors, gripper design, safety, economics, flexible manufacturing systems, and case studies. A major emphasis is placed on a term project involving an actual industrial problem. (EMEM-543)

Class 4, Credit 4 (F, W)

**EMEM-618 Computer-Aided Engineering**
Registration #0304-618

This course introduces the mechanical engineering student to the procedures and techniques used to integrate the computer into the industrial design and manufacturing cycle. The student is exposed to the computer hardware and software used in the design phase (i.e., mechanical drawing, solids modelling, etc.) and the manufacturing phase (i.e., NC machining, mold-flow analysis, heat-transfer analysis, robotics, work-cell simulation, etc.). The students are also instructed in the design of interactive software programs for the graphic display. A design project is selected from one or more of the topics covered. (Fifth-year standing)

Class 4, Credit 4 (F, W)

**EMEM-650 Gas Dynamics**
Registration #0304-650


Class 4, Credit 4 (T.B.A.)

**EMEM-651 Viscous Flows**
Registration #0304-651

An advanced course in fluid mechanics covering incompressible laminar and turbulent boundary layers, General properties of Navier-Stokes equations, some exact solutions, Boundary layer equations, some exact and approximate solutions for two-dimensional steady flows. Boundary layer controls. Three-dimensional boundary layers. Transition of boundary layers. Theories of turbulence. (EMEM-516)

Class 4, Credit 4 (T.B.A.)

**EMEM-669 Introduction to Water Pollution**
Registration #0304-669

Hydrologic cycle; water supply requirements and sources; waste water generation volumes and characteristics; chemical and biological treatment processes; waste water transport and hydraulics; thermal discharges; basic dispersion analysis for rivers, estuaries, and lakes.

Class 4, Credit 4 (T.B.A.)

**EMEM-680 Advanced Thermodynamics**
Registration #0304-680

This course involves an indepth study of the second law of thermodynamics and its consequences. The course further deals with thermodynamic properties of reacting and non-reacting mixtures, chemical equilibrium, thermochemistry, Nernst theorem, and Onsager relations. (EMEM-414)

Class 4, Credit 4 (T.B.A.)

**EMEM-685 Advanced Strength of Materials**
Registration #0304-685

Statically indeterminate problems for beams; frames; continuous beams; beams of variable cross section, reinforced-concrete beams; beams on elastic foundation; stability of columns; plastic deformation in bending and torsion; limit analysis; energy methods with applications to beams, curved bars, and frames; rotating disks; introduction to bending of plates. (EMEM-339)

Class 4, Credit 4 (T.B.A.)

**EMEM-687 Engineering Economy**
Registration #0304-687

An engineering approach to deal with the economic aspects of proposed engineering designs and/or in-service engineering installations. Also considered are economic factors in the operation of systems and equipment, such as: cash flow, rate of return, present worth, future worth, valuation and depreciation, and benefit cost analysis.

Class 4, Credit 4 (T.B.A.)

**EMEM-689 Patent Law and Protection**
Registration #0304-689

A study of protection of intellectual property including study of patent rights, inventions, procedures for obtaining patents as well as a study of the law and drafting techniques of patents and their claims. Insights to invention protection and legal ramifications of inventor's and attorney's activities will be included.

Class 4, Credit 4 (T.B.A.)

**EMEM-690 Environment and the Engineer**
Registration #0304-690

This course will study the role of engineers in society and in particular their responsibility in the analysis and solution of the problems facing the environment in an increasingly technological society. Problems to be studied from a "case study" standpoint will include such things as air, water, and noise pollution, thermal pollution, and the effects of population growth. The course will include field trips, outside expert speakers, and each student will be expected to participate in the in-depth study of one problem of particular interest to him or her and to submit a formal report to the class. Use of the digital and analog computing facilities as a systems simulation tool will be encouraged.

Class 4, Credit 4 (T.B.A.)

**EMEM-692 Analysis for Engineers**
Registration #0304-692

Partial differentiation, chain rule, and total differential; multiple integration and manipulation of multiple integrals; linear constant coefficient ordinary differential equations; vector algebra and differentiation of vectors or complex variables.

Credit 4 (F)

*Offered upon sufficient demand (at least 12 students registered) to students wishing to enter the graduate program.

**Graduate Courses**

**EMEM-693* Thermo Fluid System Analysis**
Registration #0304-693*

Thermodynamic properties and processes, ideal and real gas, vapors and gases; laws of thermodynamics and selected power cycles; fluid statics; control volume and conservation of mass, momentum and energy; Bernoulli's equation; viscosity, loss of heat due to friction (flow through pipes), concept of boundary layer; basic law of conservation, convection, radiation.

Credit 4 (T.B.A.)

**EMEM-697* Applied Mechanics System Analysis**
Registration #0304-697*

Methods currently employed in component and system analysis of the static and dynamic behavior of rigid and elastic bodies. The topics will include a review and advanced studies of vector statics and dynamics of rigid and elastic bodies and systems.

Credit 4 (T.B.A.)

*These courses are provided for students who have been out of school for a number of years and feel it necessary to review or update their educational background.
EMEM-510 Introduction to Continuum Mechanics
Registration #0304-810
A rigorous basis for the study of advanced fluid mechanics and theory of elasticity is presented. Cartesian tensors. Analysis of stress and deformation. Motion of a continuous medium. Applications to theory of elasticity, thermoelasticity, viscoelasticity, and fluid mechanics. (EMEM-871)
Credit 4 (T.B.A.)

EMEM-511 Theory of Elasticity
Registration #0304-811
Credit 4 (T.B.A.)

EMEM-512 Theory of Plates and Shells
Registration #0304-812
Theory of thin plates for small deflections. Rectangular and circular plates with various boundary conditions, elliptic and triangular plates. Navier and Levy solutions. Thermal stresses in plates. Membrane theory of shells, cylindrical shells, pressure vessels, and shells of revolution. (EMEM-685 or equivalent)
Credit 4 (T.B.A.)

EMEM-515 Experimental Stress Analysis
Registration #0304-815
Experimental methods of analysis of structural machine members, including strain gages and instrumentations, photoelastic methods, brittle coating, Moiré fringe method, holographic techniques; and the hydrodynamic, electrical, and membrane analogs. Laboratory tests of models. (EMEM-694 or equivalent)
Credit 4 (T.B.A.)

EMEM-516 Finite Elements
Registration #0304-816
Development of theory from variational principles. Two-dimensional applications to elastic continua, considering plane stress, plane strain, and axisymmetric loading problems. Problem-solving sessions using RIT computer. Applications in structural mechanics, considering beam elements, plate elements, and shell elements. Utilization of these elements in solving specific structural problems. Introduction to three-dimensional stress analysis. Features of large general-purpose computer programs. (EMEM-694 or equivalent)
Credit 4 (T.B.A.)

EMEM-810 Introduction to Continuum Mechanics
Registration #0304-810
A rigorous basis for the study of advanced fluid mechanics and theory of elasticity is presented. Cartesian tensors. Analysis of stress and deformation. Motion of a continuous medium. Applications to theory of elasticity, thermoelasticity, viscoelasticity, and fluid mechanics. (EMEM-871)
Credit 4 (T.B.A.)

EMEM-811 Theory of Elasticity
Registration #0304-811
Credit 4 (T.B.A.)

EMEM-812 Theory of Plates and Shells
Registration #0304-812
Theory of thin plates for small deflections. Rectangular and circular plates with various boundary conditions, elliptic and triangular plates. Navier and Levy solutions. Thermal stresses in plates. Membrane theory of shells, cylindrical shells, pressure vessels, and shells of revolution. (EMEM-685 or equivalent)
Credit 4 (T.B.A.)

EMEM-815 Experimental Stress Analysis
Registration #0304-815
Experimental methods of analysis of structural machine members, including strain gages and instrumentations, photoelastic methods, brittle coating, Moiré fringe method, holographic techniques; and the hydrodynamic, electrical, and membrane analogs. Laboratory tests of models. (EMEM-694 or equivalent)
Credit 4 (T.B.A.)

EMEM-816 Finite Elements
Registration #0304-816
Development of theory from variational principles. Two-dimensional applications to elastic continua, considering plane stress, plane strain, and axisymmetric loading problems. Problem-solving sessions using RIT computer. Applications in structural mechanics, considering beam elements, plate elements, and shell elements. Utilization of these elements in solving specific structural problems. Introduction to three-dimensional stress analysis. Features of large general-purpose computer programs. (EMEM-694 or equivalent)
Credit 4 (T.B.A.)

EMEM-820 Advanced Optimal Design
Registration #0304-820
Topics from nonlinear programming as applied to automated optimal design. Use of penalty functions for the transformation of constrained nonlinear optimization problems. Multivariate pattern and gradient based algorithms, such as the method of steepest descent, Newton’s method, quasi-Newton methods, and generalized conjugate gradient techniques. Algorithms for the univariate subproblem of the line search. Applications to the solution of practical nonlinear optimization problems using the digital computer. Decomposition strategies for improving efficiency in the search process. (EMEM-871 and EMEM-874)
Class 4, Credit 4 (T.B.A.)

EMEM-821 Vibration Theory and Applications
Registration #0304-821
Credit 4 (T.B.A.)

EMEM-828, 829 Special Topics in Applied Mechanics
Registration #0304-828, -829
In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of regular courses will be presented. These courses will be structured as ordinary courses with specified prerequisites, contact hours and examination. A listing of special courses is found at the end.
Credit variable (maximum of 4 credits/quarter) (T.B.A.)
Microelectronic Engineering

EMCR-210 Introduction to Microelectronics
Registration #0305-210
This course will provide the student with introductory and career information about the profession of microelectronic engineering.
Class 2, Lab. 2, Credit 2

EMCR-215 Intro, to Microelectronics (Transfer)
Registration #0305-215
This course contains approximately 75% of the material in EMCR-210 and EMCR-340. For transfer students.
Class 3, Lab. 3, Credit 3

EMCR-340 Integrated Circuit Technology
Registration #0305-340
An introduction to circuit technology and the physics, chemistry and metallurgy of processing with an emphasis on photolithography. The laboratory will emphasize safety, laboratory techniques, processes and evaluation.
Class 2, Lab. 2, Credit 2

EMCR-440 Linear Systems
Registration #0305-440
A study of time and spatial transform methods important to electrical and optical systems.
Class 4, Credit 4

EMCR-530 Electromagnetic Fields I
Registration #0305-530
A study of electrostatics and magnetostatics important to the understanding of physics of semiconductor devices and microelectronic processing.
Class 4, Credit 4

EMCR-540 Electromagnetic Fields II
Registration #0305-540
A study of time varying electromagnetic fields important to optical and electrical systems. Topics include Maxwell's equations, wave equations, electromagnetic propagation in free space and guided structures. Concepts of reflection, transmission, and matching.
Class 3, Lab. 3, Credit 4

EMCR-550 Device Physics
Registration #0305-560
A basic course dealing with the physics of semiconductor devices. Topics include physics of semiconductor materials, metal-semiconductor contacts, PN junctions, bipolar transistors, MOS structures and IGFET transistors.
Class 4, Credit 4

EMCR-630 Microelectronic Chemistry IV
Registration #0305-630
A selection of topics from physical and plasma chemistry important to the understanding of integrated circuit processing.
Class 3, Lab. 3, Credit 4

EMCR-640 Microelectronics
Registration #0305-640
An intermediate level course in the study of integrated circuit processing.
Class 4, Credit 4

EMCR-650 Integrated Circuit Processing Lab
Registration #0305-650
A laboratory course in which the student builds an integrated circuit. The Integrated Circuit Facility is the laboratory for this course.
Class 1, Lab. 9, Credit 4

EMCR-660 Seminar/Research
Registration #0305-660
An investigation of a problem in microelectronic processing. Seminars by experts from the various phases of the microelectronic industry.
Class 2, Lab. 6, Credit 4

EMEM-874 Numerical Methods
Registration #0304-874
The course emphasizes the use of digital computers for obtaining solutions to practical engineering problems through numerical techniques. Algebraic and transcendental equations, systems of linear algebraic equations using matrix manipulations and iterative methods, numerical integration and differentiation, ordinary differential equations including initial value and boundary value problems, partial differential equations including elliptic, parabolic, and hyperbolic with stability analysis. Extensive use of the computer will be required. (Graduate standing and experience in the use of digital computers)
Credit 4 (F)

EMEM-875 Instrumentation and Experimental Analysis
Registration #0304-875
Various displacement, strain, velocity, acceleration, pressure transducers will be discussed along with the associated electronic equipment and recorders to measure and record the variables. A laboratory session will be substituted in place of class when experiments are assigned. The static and dynamic characteristics of the instruments will be obtained as these instruments are mathematically modeled and subjected to impulse, step and ramp frequency functions of time. (Graduate standing)
Credit 4 (Sp)

EMEM-880 Independent Study
Registration #0304-880
An opportunity for the advanced student to undertake an independent investigation in a special area under the guidance of a faculty member. A written proposal is to be forwarded to the sponsor's faculty member and approved by the department head prior to the commencement of work.

EMEM-890 Thesis, Design Project, or Literature Search
Registration #0304-890
In conference with an advisor, a topic is chosen. The work may involve a thesis, design project, or literature search. Periodic progress reports and a final written document with an oral examination are required.
Credit variable (5 to 12 credits total) (F, W, Sp, Su)

SESM-701 Introduction to Material Science
See course description under Materials Science and Engineering in the graduate catalog.

Special topics courses will be offered in the following areas if there is a sufficient demand.

Continuum Mechanics
Theory of Elasticity
Energy Methods in Mechanics
Advanced Vibration Theory
Lubrication
Advanced Heat Transfer
Advanced Thermodynamics
Advanced Fluid Dynamics
Control Systems
Thermal Stresses
Advanced Optimal Design

Microelectronic Engineering
College of Fine and Applied Arts

School of Art and Design

In September 1982, the Communication Design program name was changed to Graphic Design, and Environmental Design was changed to Industrial and Interior Design.

See Packaging Science for Packaging Design course descriptions.

FADC-301, -302, -303 Introduction to Graphic Design Registration #0402-301, -302, -303
An introduction to the field of graphic design through explorations of formal and perceptual understanding and control; deals with point, line, shape, color, pattern, organizational systems, Gestalt principles, dimension interaction and communications. The relationship of typography and photography to graphic design is included. (Foundation program or equivalent)
Recommended co-related courses include introductory photography, introductory typography, photomechanics, motion picture, and television. No special sequence required. Prerequisite for major in Graphic Design.
Lab. 9, Credit 3 (offered each year)

FADC-401, -402, -403 Graphic Design (Junior Major) Registration #0402-401, -402, -403
Creative problem solving experiences relating to visual communication imagery based on strong emphasis of formal design values and their utilization for the communication of ideas and information. Assignments oriented to building a working knowledge of communication media areas such as print, photography, typogrophy, etc. Media Center facility available for extension and application of studio experiences. (FADC-301, -302, -303 or equivalent)
Lab. 12, Credit 6 (offered each year)

FADC-411, 412, 413 Graphic Design Registration #0402-411, -412, -413
An elective providing the opportunity to carry on problem solving in graphic design. Each quarter concentrates on a specific design topic of study (such as design for reproduction, design of self-promotional material, or computer graphics)
Lab. 6, Credit 3 (offered each year)

FADC-501, -502, -503 Graphic Design (Senior Major) Registration #0402-501, -502, -503
Advanced creative problem solving experiences relating to visual communication imagery based on a strong emphasis of formal design values and their utilization for the communication of ideas and information. Assignments oriented to include thematic graphic design applications such as visual identity, signage, audio-visual, packaging or computer graphics.
Lab. 18, Credit 9 (offered each year)

FADC-511, -512, -513 Graphic Design Registration #0402-511, -512, -513
A professional elective providing the opportunity to work in aspects of graphic design. Each quarter concentrates on specific topic of design study.
Lab. 6, Credit 3 (offered each year)

FADD-301, 302, 303 Industrial and Interior Design Registration #0403-301, -302, -303 (Sophomore Core)
An introduction to the fields of industrial and interior design. Emphasis on basic processes for design conceptualization and development.
301 - Graphic Visualization
302 - Spatial Form
303 - Object Form
Lab. 6, Credit 3 (offered each year)

FADD-311, 312, 313 Industrial and Interior Design Registration #0403-311, -312, -313
An elective offering basic instruction and involvement in industrial and interior design projects.
311 - Exhibit Design
312 - Industrial Design
313 - Interior Design
Lab. 6, Credit 3 (offered each year)

FADD-320 Graphic Visualization Registration #0403-320
Graphic visualization techniques for the development and presentation of concepts for three-dimensional designs. Familiarization with various media in developing and improving graphic communication skills of value to the designer.
Lab. 6, Credit 3 (offered each year)

FADD-401, -402, -403 Industrial and Interior Design Registration #0403-401, -402, -403 (Junior Major)
The acquisition of a technical and theoretical base in industrial and interior design. Application of communicative and problem solving skills to comprehensive design projects involving form.
401 - Industrial: Packaging — Graphics Interior: Space — Materials
402 - Industrial: Product — Human Factors Interior: Space — Decorative Arts
403 - Industrial: Product — Materials and Processes Interior: Space — Environmental Control
Lab. 12, Credit 6 (offered each year)

FADD-411, -412, -413 Design Applications Registration #0403-411, -412, -413
An elective that provides projects in industrial design, display interiors, and packaging, developed through visual, materials and processes.

FADD-501, 502, 503 Industrial and Interior Design Registration #0403-501, -502, -503 (Senior Major)
The application of design methods and skills to professional level projects in either industrial or interior design depending on individual choice. Partial concentration in:
502 - Industrial: Product — Furniture Interior: Space — Furniture
Lab. 18, Credit 9 (offered each year)

FADF-201, 202, 203 Design (Crafts Majors) Registration #0404-201, -202, -203
The elements of design and color and their structural relationship as applied to problems in two and three dimensions.
Lab. 6, Credit 3 (offered each year)

FADF-205, 206, 207 Creative Sources Registration #0404-205, -206, -207
This course is designed to make students aware of their environment, their physical being and their experiences as tools for creative problem solving. This will be accomplished through lectures, individual and group assignments and demonstrations.
Class 1, Lab. 1, Credit 2 (offered each year)

FADF-210, 211, 212 Drawing Registration #0404-210, -211, -212
A basic foundation in drawing as a form of creative expression and a means to communicate information. Through the use of organic and inorganic materials attention is given to individual response to “seeing” as interspersed with all sensory conditioning. The figure is utilized in the analysis of action, structure, and gesture through quick sketches.
Lab. 9, Credit 4 (offered each year)

FADF-221, 222, 223 Design for Photo I Registration #0404-221, -222, -223
Study of principles of two- and three-dimensional design as a means of communication and expression.
Class 1, Lab. 2, Credit 2 (offered each year)

FADF-231, 232, 233 2-D Design Registration #0404-231, 232, 233
The elements of design and color and their structural relationship as applied to problems in two dimensions using a variety of media.
Lab. 6, Credit 3 (offered each year)
The elements of design and color and their structural relationship as applied to problems in three dimensions. A variety of media are used.
Lab. 6, Credit 3 (offered each year)

Drawing in a variety of media. Introduction to line form, and color as elements of pictorial expression. Organic and inorganic materials are used.
Lab. 6, Credit 3 (offered each year)

Emphasis upon problems which are related to visual phenomena, fundamentals, and communications. Expression through image making viewing and discussion.
Class 1, Lab. 2, Credit 2 (offered each year)

Emphasis is placed upon drawing and the objective mastery of form and space from a variety of visual sources including the human figure. Development of basic techniques, materials and concepts of painting media. Prerequisite for major in Painting; 301 and 302 for Medical Illustration.

301 - Drawing — Media
302 - Drawing — Composition
303 - Drawing — Illustration

Lab. 6, Credit 3 (offered each year)

Introduction to carbon dust illustration techniques. Beginning sequence of illustrative techniques leading to mastery of medical illustration. Emphasis upon a professional approach.

Lab. 6, Credit 3 (offered each year)

One-quarter course dealing with the examination of basic color phenomena by visual comparison. Study the differences between light and pigment. Class problems exploring such relationships as intensity, vibration, temperature, after-image, spatial effects and image-ground distortion.
Class 3, Lab. 3, Credit 3 (offered each year)

One-quarter course exploring the art of illustrators; their relation to audience, publishers, and media. Studio problems will develop and expand basic concepts of illustration.

Studio sessions will be devoted to illustrative problems that reflect the class study for that period. Class critiques at appropriate times.
Class 3, Lab. 3, Credit 3 (offered each year)

Second year of Painting in a three-year degree sequence. Development of mastery of painting media. Emphasis placed upon individual solutions and expression. Completion of a specialized project during the Spring Quarter.
Lab. 12, Credit 6 (offered each year)

An elective providing the opportunity for exploration of personal expression through a painting medium.
Lab. 6, Credit 3 (offered each year)

Development of range and mastery of medical illustration techniques. Laboratory sessions scheduled in bio-medical illustration facilities.

Lab. 6, Credit 5 (offered each year)
Lab. 12, Credit 8, Winter, Spring (offered each year)

Study of traditional and contemporary means of developing form and space in drawing. Individual drawing projects exploring drawing as a conceptual tool or as a fine art medium.
Lab. 6, Credit 3 (offered each year)

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 (offered each year)

An elective that provides further exploration of personal expressive styles through a painting media.
Lab. 6, Credit 3 (offered each year)

Advanced medical illustration techniques. Graphic design related to illustrative and photographic practice. Lab sessions to be scheduled in operating room facilities.

Jointly sponsored between RIT and the University of Rochester.
Lab. 18, Credit 6 (offered each year)

Development of printmaking techniques through personal statements in lithography, intaglio and relief printing. For junior printmaking students and transfer students. Expansion and development in combined and complex print forms including papermaking and non-silver photo techniques are encouraged.

Lab. 12, Credit 6 (offered each year)

An elective providing the opportunity to explore personal statements through one of the following: lithography, etching, woodcut, papermaking.
Lab. 6, Credit 3 (offered each year)

Continuation of third-year printmaking, expanding the technical involvement in paper making and non-silver photo techniques in etching and lithography. Opportunity is presented for involvement in developing a more concentrated and personal art form through any singular technique or any combination. A limited edition portfolio project is developed with the participation of all students. (FADR-401, 402, 403) Encouragement is offered for students to exhibit professionally in regional and national exhibitions and emphasis is placed on preparing a strong professional body of prints for future use in seeking job placement and admission to graduate study.
Lab. 18, Credit 9 (offered each year)

An elective that provides further exploration of printmaking with emphasis on personal statement.
Lab. 6, Credit 3 (offered each year)
School for American Craftsmen

FSCC-200 Ceramics Materials and Processes Registration #0409-200 (Freshman Major) Sequential course for three quarters providing fundamentals of the preparation and use of clay. Methods of fabrication from hand building to wheelthrown wares, application of glazes. Stacking and firing of kilns. Ceramic Sculpture. The organization of the ceramic shop, with planning for efficient production. Survey of pottery.
Lab. 6, Credit 3 (offered each year)

FSCC-251, 252, 253 Ceramics Elective I Registration #0409-251, -252, -253 An elementary course in design and techniques in ceramics. Hand built pottery and primitive firing techniques.
Lab. 6, Credit 3 (offered each year)

FSCC-300 Ceramics Materials and Processes Registration #0409-300 (Sophomore Major) Sequential course for three quarters providing intensive work on individual clay and glaze problems. Designing for production and production problems. Mold-making, slip casting, jiggering and decorative techniques. Ceramic raw materials, sources of supply, use and maintenance of equipment and glaze chemistry. Independent study, papers, reports.
Lab. 15, Credit 5 (offered each year)

FSCC-351, 352, 353 Ceramics Craft Elective II Registration #0409-351, -352, -353 An elective course providing an opportunity for more advanced study in ceramics. Wheel and hand built pottery, along with glaze information, will be studied.
Lab. 6, Credit 3 (offered each year)

FSCC-400 Ceramics Materials and Processes Registration #0409-400 (Junior Major) Sequential course for three quarters. Summary of kiln types, fuels, and construction. Materials and sources of supply. Development of bodies and glazes for specific purposes. Problems requiring new uses, adaptations, and applications. Independent study, papers, reports.
Lab. 15, Credit 5 (offered each year)

FSCC-500 Ceramics Techniques and Thesis Registration #0409-500 (Senior Major) Sequential course for three quarters, treating problems related to ceramic production culminating in a research and thesis project.
Lab. 24, Credit 8 (offered each year)

FSCF-225, 226, 227 Art and Civilization Registration #0410-225, -226, -227 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 (offered each year)

FSCF-300 History of Design Registration #0410-300 Explores the historical precedents of two and three dimensional design including fine arts, industrial, graphic and environmental design. The course will provide a foundation for individual decisions on planning and designing to complement and enhance present and future environments.
Class 3, Credit 3 (offered each year)

FSCF-310 History of Crafts Registration #0410-310 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 craftsmen.
Class 3, Credit 3 (offered each year)

FSCF-320 History of Art Criticism Registration #0410-320 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 (offered each year)

FSCF-330 Philosophy In Art Registration #0410-330 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 (offered each year)

FSCF-340 Symbols and Symbol-Making Registration #0410-340 A concentrated study of symbols, legends and myths and their creation in the visual arts with emphasis on symbol making for communication.
Class 3, Credit 3 (offered each year)

FSCF-350 Asian Art Registration #0410-350 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 craftsmen.
Class 3, Credit 3 (offered each year)

FSCF-360 18th & 19th Century Art Registration #0410-360 The development of the arts in these two centuries in the areas of painting, printmaking, sculpture, architecture and the crafts with emphasis on their influence of 20th century styles and focusing on their impact on the artist/craftsman/designer.
Class 3, Credit 3 (offered each year)

FSCF-370 20th Century Art Registration #0410-370 The development of the arts in the 20th century in the areas of painting, printmaking, sculpture, architecture, and the crafts with focus on their impact on the artist/craftsman/designer.
Class 3, Credit 3 (offered each year)

FSCF-380 Contemporary Art Registration #0410-380 A study of the painting, printmaking, sculpture, architecture and crafts from the present year to the 1960's with focus on the current American scene.
Class 3, Credit 3 (offered each year)

FSCF-390 Selected Topics Registration #0410-390 Consideration of special art historical themes, areas, and topics not covered in regular courses.
Class 3, Credit 3 (offered each year)

FSCG-200 Glass Materials and Processes Registration #0411-200 (Freshman Major) A sequential course for three quarters providing fundamentals of glassworking. The function and use of hand and machine glassworking tools. An analysis of glass as a material: its history, chemical make-up, intrinsic qualities and potential. Fundamental techniques of stained glass and glass fabrication. An introduction to the use of cold-working techniques: slump molds, lamination, non-glass surface decoration, etching, sandblasting, grinding, polishing.
Lab. 15, Credit 5 (offered each year)
A survey course emphasizing furnace glassblowing and stained glass as a means of personal expression and appreciation. A portion of the course is a basic investigation of the history, chemistry, techniques and technical aspects of glass.

Lab. 6, Credit 5 (Offered each year)

FSC-300 Glass Materials and Processes Registration #0411-300 (Sophomore Major)
A sequential course for three quarters providing an analysis and discussion of glass design and problems of fabrication with emphasis on surface decoration. The formulation and adjustment of various glass batches with in-depth analysis of color. Explores the history of ancient through contemporary glass with studies at the Corning Museum of Glass and its collections. The use and construction of studio equipment, museum visits, papers and reports.

Lab. 15, Credit 5 (offered each year)

FSCG-351, 352, 353 Glass Elective II Registration #0411-351, -352, -353
A sequential course for three quarters dealing with more advanced work in both hot and cold glass. Emphasis is placed upon individual expression with glass and may involve slumping, casting, blowing, cutting, polishing or sculptural construction.

Lab. 6, Credit 3 (offered each year)

FSCG-400 Glass Materials and Processes Registration #0411-400 (Junior Major)
A sequential course for three quarters treating the organization and design of the glass studio. The development of production techniques for blowing and forming glass. The development of unique approaches to visual self-expression, papers and reports.

Lab. 15, Credit 5 (offered each year)

FSCG-500 Glass Techniques and Thesis Registration #0411-500 (Senior Major)
A sequential course for three quarters providing individual research in technical problems culminating in a thesis. The student will organize and present a senior exhibition of work related to the thesis, papers, lectures and demonstrations.

Lab. 24, Credit 8 (offered each year)

FSCG-520 Stained Glass Registration #0411-520
An elective relating advanced individual exploration using structural elements of color design and visual expression. Fabricating techniques involve cutting, shaping, soldering, leading, foiling, glazing stained glass.

Lab. 6, Credit 3 (offered each year)

FSCM-200 Metalcrafts Materials and Processes Registration #0412-200 (Freshman Major)
A sequential course for three quarters introducing basic exercises in the use of equipment and metalcrafts techniques through holloware and jewelry design in various metals. Included will be the discussion and metal design utilizing the techniques of fabrication, forging, raising and casting.

Lab. 15, Credit 5 (offered each year)

FSCM-251, 252, 253 Metalcrafts Elective I Registration #0412-251, -252, -253
An elective course providing an opportunity for introductory study in metals either holloware or jewelry.

Lab. 6, Credit 3 (offered each year)

FSCM-300 Metalcrafts Materials and Processes Registration #0412-300 (Sophomore Major)
Sequential course for three quarters, introducing stone setting, repoussé and chasing and moldmaking. Analysis of design and production problems relating to holloware and jewelry.

Lab. 15, Credit 5 (offered each year)

FSCM-351, 352, 353 Metalcrafts Elective II Registration #0412-351, -352, -353
An elective course providing an opportunity for more advanced study in metals either holloware or jewelry.

Lab. 6, Credit 3 (offered each year)
Graduate Courses

School of Art and Design

Beginning September 1982, the Communication Design program name has been changed to Graphic Design, and Environmental Design has been changed to Industrial and Interior Design.

Courses for the education concentration of the MST program are offered through the College of General Studies, and course descriptions are given under that heading with a GS call number.

Art Education

FADA-701, 702 (MST) Methods and Materials in Art Education Registration #0401-701, -702 (Major) Intensive study of curriculum in terms of teaching materials for both studio and appreciation aspects of elementary, early secondary and high school art education. Includes studio and elementary school teaching experience.
Class 2, Lab. 9, Credit 5 (offered every year-Fall, Winter)

FADA-820 (MST) Seminar in Art Education Registration #0401-820 (Major) Evaluation and study of the practice teaching experience. Discussion of the professional role of the art teacher in terms of professional associations, supervision, teacher training, and research. A final project on some intensively studied aspect of art education is required.
Lab. 25, Credit 3 (offered every year-Spring)

FADA-860 (MST) Practice Teaching in Art Registration #0401-860 (Major) A seven-week full-time practice teaching experience in secondary school, including professional duties of the art teacher in humanities courses, publication advising, audiovisual work, and supervision. Supplements the studio-theoretical education. Meets the state education requirements.
Credit 9 (offered every year-Spring)

FSCW-300 Woodworking Materials and Processes Registration #0414-300 (Sophomore Major) Sequential course for three quarters, covering advanced design, layout and construction. Plywood construction, chairmaking and chest of drawers technique. Limited production of small accessories including jigs, and pricing. Historical development of furniture and interiors, papers, reports.
Lab. 15, Credit 5 (offered each year)

FSCW-351, 352, 353 Wood Elective II Registration #0414-351, -352, -353 An elective course providing an opportunity for more advanced study in wood. Hand and power tools will assist in the small scale making of wood objects.
Lab. 6, Credit 3 (offered each year)

FSCW-400 Woodworking Materials and Processes Registration #0414-400 (Junior Major) Sequential course for three quarters covering advanced concepts in furniture and woodworking, wood sculpture, and veneering. Analysis of construction problems in both traditional and contemporary furniture, papers, reports.
Lab. 15, Credit 5 (offered each year)

FSCW-500 Woodworking Techniques and Thesis Registration #0414-500 (Senior Major) Sequential course for three quarters, allowing each student, with the approval of the instructors, to either specialize in one branch of woodworking or to develop a particular design trend. This culminates during the final quarter in the completion of a thesis project.
Lab. 24, Credit 8 (offered each year)

Graphic Design

Beginning September 1982, the Communication Design program name has been changed to Graphic Design, and Environmental Design has been changed to Industrial and Interior Design.

FADC-750 (elective, minor) Graphic Design Registration #0402-750 Advanced creative problem solving experiences in graphic design imagery. Professional problems in visual techniques for communication media. Media Center facility available for extension of studio problems.
Lab. 6, Credit 3 (offered every quarter)

FADC-780 Graphic Design Registration #0402-780 Advanced creative problem-solving experiences relating to graphic design imagery. Formal design values are emphasized and utilized in communications applications. Studio involvement is directed toward the solution of individual, group and assigned graphic design problems. Specification of the program is developed in accordance with the professional goal of the individual student and work leading toward the master's thesis. Media Center facilities are available for application of studio imagery.
Lab. 9-27, Credit 3-9 (offered every quarter)

Computer Graphics Design

FADG-780 Introduction to Computer Graphics Design Registration #0432-780 (MFA Major) An introduction to programming for the design of computer graphics. Basic familiarity with using the keyboard, CRT, disk drive, tablet, printer, plotter and image digitizer to create imagery. Emphasis on creating shape files, pictures and writing simple programs.
Lab. 9, Credit 3 (offered each year)

FADG-781 Two-Dimensional Computer Graphics Design Registration #0432-781 (MFA Major) Extension of previous experience to include two-dimensional objects, hidden lines and surfaces, solid modelling, perspective, etc. Projects involve complex programming.
Lab. 9, Credit 3 (offered each year)

FADG-782 Three-Dimensional Computer Graphics Design Registration #0432-782 (MFA Major) Extension of previous experience to include three-dimensional objects, hidden lines and surfaces, solid modelling, perspective, etc. Projects involve complex programming.
Lab. 9, Credit 3 (offered each year)

FADG-783 Visual Semiotics/Graphic Design Registration #0432-783 (MFA Major) The application of syntactic, semantic and pragmatic levels of visual design activities. These concepts will be applied to creative projects utilizing the computer as the primary tool.
Lab. 9, Credit 3 (offered each year)

FADG-784 Digital Typography Registration #0432-784 (MFA Major) A study of the evolution of typography, typesetting and typesetting systems from metal type through photo typesetting to today's digital typesetting. Hands-on experiences in production typesetting including photo typesetting, digital typesetting, word processing and pre-press planning for accurate typographic reproduction.
Lab. 9, Credit 3 (offered each year)

FADG-785 Computer-Generated Slide Design Registration #0432-785 (MFA Major) The design of slides for business graphics and audio-visual presentations. Hands-on experience with a sophisticated computer graphics system for the generation of high resolution slides. Emphasis on both commercial production concerns and creative problem solving.
Lab. 9, Credit 3 (offered each year)
FADG-786 Computer-Generated Animation
Registration #0432-786 (MFA Major)
Extension of computer generated slide design using keyframe animation techniques to automatically create frames for film, video or multi-image slide presentations.
Lab. 9, Credit 3 (offered each year)

FADG-787 Advanced Computer Graphics Design
Registration #0432-787 (MFA Major)
Advanced explorations of computer graphic applications. Projects include such topics as computer generated layout, digital type development, computer-aided instruction lessons, TV and electronic mail promotions and computerized animation.
Lab. 18, Credit 6 (offered each year)

Industrial and Interior Design

FADD-750 (elective, minor) Industrial and Interior Design
Registration #0403-750
The reasoned application of theoretical and practical background to advanced projects in industrial and interior design.
Lab. 6, Credit 3 (offered every quarter)

FADD-780 Industrial and Interior Design
Registration #0403-780 (Major)
Selected projects in industrial or interior design which allow individual application of design methodology and technical skills toward professional goals. Selection of the projects is directed at providing an adequate background for development of the master's thesis.
Lab. 9-27, Credit 3-9 (offered every quarter)

Painting

FADP-750 (elective, minor) Painting
Registration #0405-750
The study of the techniques and concepts of present day painting and its relation to the great sweep of the painting of the past for those who intend to paint and to teach.
Lab. 6, Credit 3 (offered every quarter)

FADP-751 Drawing Problems
Registration #0405-751 (elective painting minor)
Individual drawing projects related to graduate students' major area of study. Opportunity to refine drawing skills on the graduate level.
Lab. 6, Credit 3 (offered each year)

FADP-780 Painting
Registration #0405-780 (Major)
The pursuit of the pertinent, the ecstatic, the beautiful, by a small group of those dedicated to the art. The student will become familiar with the trends and questings of modern painting, and by strengthening both intellectual and technical facilities, be prepared for a career as a professional painter. The work leads toward the master's thesis.
Lab. 9-27, Credit 3-9 (offered every quarter)

Printmaking

FADR-750 (elective, minor) Printmaking
Registration #0406-750
Advanced techniques in etching, lithography and woodcutting, as well as in many experimental areas including color processes, photo-etching, photo-lithography, paper making and combination printing. Students are expected to develop along independent lines, and direction is offered in contemporary thought and concept. The emphasis is toward developing a complete respect for the printmaking craft and profession.
Lab. 6, Credit 3 (offered every quarter)

FADR-780 Printmaking
Registration #0406-780 (Major)
Contemporary and historical printmaking concepts are presented as stimulant and provocation for the development of an individual approach to expression. Advanced techniques are demonstrated in intaglio, relief and lithography with resources available in non-silver photo processes, paper making and combinations. A complete understanding of the development and maintenance of the print studio is supportive for the professional artist. The work leads toward the master's thesis.
Lab. 9-27, Credit 3-9 (offered every quarter)

Sculpture

FADS-750 Sculpture
Registration #0407-750
Sculptural concepts are approached through a variety of processes and materials. The studio work is executed in paper, wood, fabrics, metal, stone, clay and plastics.
Lab. 6, Credit 3 (offered each year)

Medical Illustration

FADM-781 Medical Illustration Topics
Registration #0408-781 (MFA Major)
This is an introductory course, designed to acquaint the illustration student with art techniques commonly used in medical illustration, and with the medical library and audio-visual television supporting milieu in which the medical illustrator works.
Lab. 6, Credit 3 (offered each year)

FADM-782 Medical Illustration Graphics
Registration #0408-782 (MFA Major)
A course emphasizing the use of titles, animation, charts and graphs, schematics, and illustrative procedures as vehicles for meeting instructional and communicative needs. Students will learn the various techniques available and will apply those techniques to needs presented, culminating in a personal project dealing with "real world" contingencies.
Lab. 6, Credit 3 (offered each year)

FADM-783 Medical Illustration Surgical I
Registration #0408-783 (MFA Major)
Students will apply their knowledge of anatomy to illustrating operative procedures. Emphasis will be placed on techniques for surgical illustration and situations wherein those techniques are appropriated. Students will learn to simplify and highlight complex procedures. Finally, they will select illustrative techniques best suited for reproduction in medical journals, texts, motion pictures and television.
Lab. 6, Credit 3 (offered each year)

FADM-784 Medical Illustration Surgical II
Registration #0408-784 (MFA Major)
A continuation of Surgical Illustration I, wherein students: work and communicate closely with the surgeon. Interpret medical terminology and recognize relevant issues and problems affecting the illustration. Develop an analysis of theoretical concepts when planning, executing, and evaluating surgical illustrations for the doctor and the publisher.
Lab. 6, Credit 3 (offered each year)

FADM-785 Medical Illustration Exhibits and Design
Registration #0408-785 (MFA Majors)
Students will learn to plan cost-analyze, and construct three dimensional illustrations for in-house presentation or for traveling displays. Practical experience will be given in the problems of collaborating with clients, selecting appropriate display techniques and modes, and developing a manageable display.
Lab. 6, Credit 3 (offered each year)

PPHB-781 Medical Illustration Photography
(MFA Major)
See description under School of Photography

Thesis

FAD (C, D, P, R, M or G-890) Research and Thesis Guidance
Registration #0440 (2, 3, 5, or 8)-890 (Major MFA only)
The development of a thesis project instigated by the student and approved by a faculty committee and the Special Assistant to the Dean for Graduate Affairs. Primary creative production, the thesis must also include a written report.
Lab. 27, Credit 3-14 (offered every quarter)

FASA-785 Forms of Inquiry
Registration #0402-785 (Required for MFA)
The exploration and organization of forms of inquiry in the fields of art, craft and design.
Class 2, Credit 2 (offered each year)
Graduate Courses

School for American Craftsmen

Ceramics and Ceramic Sculpture

FSCC-750 (elective, minor)  Ceramics and Ceramic Sculpture
Registration #0409-750
Basic instruction and experience in ceramic design, fabrication and
production of ceramic forms is undertaken. This study provides
terminology and concepts. The development
development of design awareness is encouraged through lectures and critiques.
Lab. 6, Credit 3 (offered every quarter)

FSCC-780  Ceramics and Ceramic Sculpture
Registration #0409-780 (Major)
A program structured on the basis of individual needs, interests and
background preparation as they may be determined through faculty
counseling. There will be a strengthening of ceramic techniques,
design fundamentals and encouragement of personal ceramic
expression. The student will be encouraged to evaluate new tech-
niques, materials and concepts. This sequence leads to the master's
thesis, suggested by the student and approved by the faculty.
Lab. 9-27, Credit 3 (offered every quarter)

Glass

FSCG-720 (elective minor)  Stained Glass
Registration #0411-720
An elective providing exploration of personal approaches to visual
expression and techniques in flat glass. Technical processes may
incorporate all hot and cold processes used in glass.
Lab. 6, Credit 3 (offered every year)

FSCG-780  Glass
Registration #0411-780 (elective, minor)
Collaborative work with the student's major area of study and glass
fabrication is encouraged. Various techniques, both hot and cold
will be considered: casting, slumping, fusing, blowing, cutting electro-
plating, lamp working and sculptural construction. Course emphasis is
on personal, independent development encouraging contemporary
thought and concept.
Lab. 6, Credit 3 (offered every quarter)

FSCG-780  Glass
Registration #0411-780 (Major)
A program structured on the basis of individual needs, interests and
background preparation as they may be determined through faculty
counseling. All technical processes and techniques are to be consid-
ered relevant. The course is structured to provide a foundation for
professional activity and to encourage exploration of personal con-
cepts relating to the presentation of a body of visual work. This
sequence leads to the master's thesis, suggested by the student and
approved by the faculty.
Lab. 9-27, Credit 3-9 (offered every quarter)

Metalcrafts and Jewelry

FSCM-750 (elective, minor)  Metalcrafts and Jewelry
Registration #0412-750
This is the study and manipulation of metals for hollow ware/jewelry.
Design sensitivity and concepts are approached through the raising,
forming and planishing or casting, forging, and fabricating tech-
niques.
Lab. 6, Credit 3 (offered every quarter)

FSCM-780  Metalcrafts and Jewelry
Registration #0412-780 (Major)
A program structured on the basis of individual needs, interests and
background preparation as they may be determined through faculty
counseling. Both hollow ware and jewelry areas will be explored. It is
designed to give the student a broad exposure to metal working
techniques, expand the student's knowledge of applied design,
strengthen perceptual and philosophical concepts and develop an
individual mode of expression. This sequence leads to the master's
thesis, suggested by the student and approved by the faculty.
Lab. 9-27, Credit 3-9 (offered every quarter)

Weaving and Textile Design

FSCT-750 (elective, minor)  Weaving and Textile Design
Registration #0413-750
This is the study and appreciation of weaving and textile techniques,
soft sculpture, off loom weaving and printing. Design approaches are
stressed.
Lab. 6, Credit 3 (offered every quarter)

FSCT-780  Weaving and Textile Design
Registration #0413-780 (Major)
A program structured on the basis of individual needs interests and
background preparation as they may be determined through faculty
counseling. Techniques offered are combination weaves and pattern
design, double weave, embroidery and stitchery, finn-weave, ikat,
multiple layer, dyeing, non-loom, pile rug, printed surface, silk-
screen, tapestry, and soft sculpture. Design concepts are compli-
ments to the techniques. This sequence leads to the master's thesis,
suggested by the student and approved by the faculty.
Lab. 9-27, Credit 3-9 (offered every quarter)

Woodworking and Furniture Design

FSCW-750 (elective, minor)  Woodworking and Furniture Design
Registration #0414-750
This is a course in woodworking techniques and procedures. It enables
the student to gain design competency through wood and
an individual solution to wood projects based on suggested needs.
Lab. 6, Credit 3 (offered every quarter)

FSCW-780  Woodworking and Furniture Design
Registration #0414-780 (Major)
A program structured on the basis of individual needs, interests and
background preparation as they may be determined through faculty
counseling. This provides an opportunity for technical, aesthetic
and design competency to grow through the exploration of hand and
machine tools; solid wood theory, joinery and practice; veneer the-
ory, and practice; production theory; chair, table, cabinet design and
construction. This sequence leads to the master's thesis, suggested
by the student and approved by the faculty.
Lab. 9-27, Credit 3-9 (offered every quarter)

Thesis

FSC (C, G, M, T, or W)-890  Research and Thesis Guidance
Registration #04 (09,11,12,13 or 14)-890 (Major MFA only)
Research and presentation of an acceptable thesis with a focus on
technique, design, production, or a combination of these approved
by the faculty. The thesis subject will be chosen by the candidates
with the approval of the faculty advisor. The thesis will include a
written summation or report of the research and a thesis show.
Lab. 27, Credit 3-14 (offered every quarter)
College of Graphic Arts and Photography

School of Photographic Arts and Sciences

All courses in the School of Photographic Arts and Sciences are offered at least once annually, except as noted.

Fine Art Photography

PPHA-207, 208, 209 Still Photography Registration #0921-207, -208, -209
In the first quarter the 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 is 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/Qtr.

PPHA-301, 302, 303 History of Aesthetics and Photography Registration #0921-301, -302, -303
Covering the history and aesthetics of photography from 1839 to the present, with special emphasis on the development of photographic seeing, and its related effect on other media. A survey of the numerous processes and how their development affected the image-making of their particular period, i.e., daguerreotypes, calotypes, ambrotypes, etc. Student projects are designed to illuminate phases of photographic history best understood by personal visual exploration.

Class 3, Credit 3/Qtr.

PPHA-401, 402, 403 Photography as a Fine Art I Registration #0921-401, -402, -403
The major emphasis is placed on the individual's learning to identify and articulate personal response to his environment through the medium of photography. Students design their own projects and work under the guidance of the professor. Traditional silver, as well as non-silver, printmaking techniques may be utilized. (PPHL-313)

Class 2, Lab 8*, Credit 4/Qtr.

PPHA-460 Photo for Printers Registration #0921-460
A workshop in black-and-white and color photography for non-photography majors. Technical and aesthetic information will be given to enhance the non-photographers' use of their equipment. Darkroom work will be limited to the black-and-white negative and print. Color work will emphasize improvement of camera techniques.

Class 2, Lab 4, Credit 4

PPHA-501, 502, 503 Photography as a Fine Art II Registration #0921-501, -502, -503
Emphasis is placed on the student's setting of goals, selection of assignments and projects, and expansion of work on his or her own terms. Lectures and experiences are oriented to encourage awareness of shared concepts in the other arts, goals set by working artists, and the relevance of the history of the visual arts to the student's work. (PPHA-403)

Class 2, Lab 8, Credit 4/Qtr.

PPHA-506, 507, 508 Photo Media Workshop Registration #0921-506, -507, -508
Photo Media Workshop emphasizes 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 and offset printing and other methods of altering images. The course is best when taken in order, but students may join at any quarter.

Class 2, Lab 4, Credit 4/Qtr.

PPHA-521, 522, 523 Color Photography Workshop Registration #0921-521, -522, -523
Emphasis is on the creative and aesthetic aspects of color photography and other color imaging systems. Students are provided 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 prerequisite)

Class 2, Lab 4, Credit 4/Qtr.

PPHA-539 Photographic Careers Seminar Registration #0921-539
This seminar examines career options available to photography graduates. Students develop skills in resume preparation, interview practices and techniques, and personal goal setting. Students attend three special sessions offered by the Center for Cooperative Education and Career Services.

Class 2, Credits 2

PPHA-540 Biomedical Photography Registration #0921-540
Minimum of 15 quarter hours is required to gain the knowledge needed to become a biomedical photographer. Students develop skills in the basic techniques and resources employed in picture researching for collections, exhibitions, publications, motion pictures, and television. Students also become familiar with the ethical, professional, and personal responsibilities associated with their career.

Class 4, Credits 4

PPHA-551 Picture Researching Registration #0921-551
An introductory course surveying current practices, procedures, techniques and resources employed in picture researching for collections, exhibitions, publications, motion pictures, and television. Students explore the variety of ways photography is used in communications; to establish what pictures are needed, to discover how they may be found (or produced), and to make arrangements. A personal picture researching project will be produced by each student.

Class 4, Credits 4

PPHA-560 Special Topics Registration #0921-560
An exploratory course offered at the discretion of an instructor and the interest of the students to extend and broaden existing curriculum.

Credits 1-9

Biomedical Photography

PPHB-201, 202, 203 Biomedical Photography I Registration #0901-201, -202, -203
Basic photography program for biomedical photographers with emphasis on theory, craftsmanship and visual communication. Patient photography, close-up and other photography as a foundation for future biomedical photography.

Class 4, Lab 8, Credit 6/Qtr.

PPHB-211 Survey of Biomedical Photography Registration #0901-211
Career opportunities, typical biomedical photography settings, types of photography performed. Ethical, professional, and personal relationships with patient, physicians, research and staff personnel.

Class 1, Credit 1 (Spring quarter only)

PPHB-301, 302, 303 Biomedical Photography II Registration #0901-301, -302, -303
Further study and practice of theory and principles used in biomedical photography, including photomacrophraphy, photomicrography, hospital photography techniques, infrared and ultraviolet radiation, biological field studies.

Class 2, Lab 10, Credit 5/Qtr.
PPHB-331, 332, 333 Preparation of Biomedical Visuals Registration #0901-331, -332, -333
Study of basic principles of effective visual communication and design. Students will produce slide presentations and exhibition displays as well as anatomical demonstrations using cell animation techniques.
Lab. F-4, W-4, S-6, Credit 3/Qtr.

PPHF-402 Advanced Photography in Biomedical Communications Registration #0901-402
Sophisticated and creative applications of photography serving the needs of the scientific community. Students explore a variety of specialized photographic techniques and a variety of philosophies. Assignments are performed which are similar to those encountered in biomedical and research institutes.
Class 2, Lab 4, Credit 4

PPHF-501, 502, 503 Senior Thesis Production Registration #0901-501, -502, -503
Investigation, planning, organization and production of an audiovisual presentation, a learning package or an informational program for biomedical communications clients.
Class 2, Lab, 8, Credit 4/Qtr.

PPHF-551, 552, 553 Special Topics in Photography Registration #0901-551, -552, -553
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper level students.
Credit variable.

PPHB-599 Independent Study Registration #0901-599
A student proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper level students with a G.P.A. of 3.0 or greater.
Credit variable.

PPHB-781 Medical Illustration Advanced Photography Registration #0901-781
This study of photography is for the medical illustration major. It involves the study of sophisticated and creative applications of scientific photography used by contemporary medical illustrators. Students review basic photography techniques including film selection, exposure determination and copying. They explore a variety of specialized photographic techniques such as surgical photography, ophthalmic photography and photomicrography. Assignments are performed in the laboratory and studio as well as in hospital environments, including the surgical suite and the morgue. (Undergraduate photography courses in RIT Medical Illustration or equivalent)
Lab 4, Lecture 2. Credit 3/Qtr.

**Film and Television**

PPHF-201 Structuring the Moving Image and Conceptual Film Production Registration #0902-201
A fundamental course in Conceptual Film Production. Film making as a means of interpretation and expression. Film as a medium of communication, as a structural unity, the main elements of structure, organizational principles, with special application to the conceptual film form. A combined theoretical-practical approach to the dynamics of the film medium. The student is expected to demonstrate the techniques in film assignments. Production will be in non-sync (Super 8) format. Students furnish film processing; equipment is furnished by the department. (Elective to all undergraduate 3rd and 4th year Photographic Illustration or Professional Photography students, and other students by special permission)
Class 3, Lab 4, Credit 5

PPHF-202 Narrative Film Production Registration #0902-202
A fundamental course in straight Narrative Film Production. Film making as a means of interpretation and expression with emphasis on the straight narrative but not to the exclusion of the conceptual film form. Application of the elements of structure and organizational principles appropriate to the main area of emphasis. A combined theoretical-practical approach to the dynamics of the film medium. The student is expected to demonstrate technical and theoretical knowledge of the film making process through a series of film assignments. Production will be in non-sync (Super 8) format. Students furnish film and processing; equipment is furnished by the department. (PPHF-201 or a satisfactory equivalent or by permission of instructor)
Class 3, Lab 4, Credit 5

PPHF-203 Fiction and Dramatic Short Film Production Registration #0902-203
A fundamental course in Fiction and Dramatic Short Film Production. Film making as a process of interpretation and expression with an emphasis in the narrative film form as applied to fiction and dramatic short films. Included will be the non-fictional narrative and conceptual film form. Application of the elements of structure and organizational principles appropriate to the main area of emphasis. A combined theoretical-practical approach to the dynamics of the film medium. The student is expected to demonstrate technical and theoretical knowledge of the film making process through a series of film assignments. Production will be in a non-sync (Super 8) format. Students furnish film and processing; equipment is furnished by the department. (PPHF-202 or a satisfactory equivalent)
Class 3, Lab 4, Credit 5

PPHF-204, 205, 206 Film History and Aesthetics Registration #0902-204, -205, -206
Survey of developments in film from the early beginnings to the present. Objective is to explore the uses of the medium within a historical, cultural and theoretical context. Each quarter will emphasize a different film form: 407 fiction feature, 408 documentary, 409 experimental and animation. No prerequisites. Admission during any quarter of the academic year.
Class 3, Credit 3/Qtr.

PPHF-207 Introduction to Portable Video I Registration #0902-207
A basic course for novices. Emphasis is on video as an interpretive and expressive medium. There is no restriction on the choice of image, style or content. Learning will take place in a communal, participatory environment so that ideas and experiences can be shared.
Two short video projects are required. 1/2" beta equipment, including editing facilities, is provided by RIT. Students must purchase a minimum of two 60-minute, 1/2" video cassettes.
Class 3, Lab 3, Credit 4 (Fall and Spring)

PPHF-206 Introduction to Portable Video II Registration #0902-206
In this course the student applies the basic video skills acquired in PPHF-207 to the design and realization of mature narrative imagery (1/2" beta). Progress is supervised by the instructor through regular screenings and conferences with the student. (PPHF-207)
Class 3, Lab 3, Credit 4 (Winter)

PPHF-210 Materials and Processes of the Moving Image I Registration #0902-210
This course is primarily designed to familiarize students with the basic technical concepts of film making. By taking this course, students should gain an understanding of the technical procedures required to commit an image to the medium of film in a professional manner.
Credit 2

PPHF-211 Materials and Processes of the Moving Image II Registration #0902-310
A technical survey of the tools and materials used in video production. (PPHT-210, PPHF-203)
Credit 2
PPHF-311 Portable Video Production  
Registration #0902-311  
A rigorous "hands-on" introduction to both the practical-technical and aesthetic considerations of portable video production. The emphasis is on single system shooting and post production editing. This includes visual continuity, storyboarding, graphics design, camerawork, portable lighting, sound work and off-line insert editing. Lectures cover structure and visualization, how the electronic image is formed, displayed and recorded, audio mixing and editing. In-class critiques, outside readings, and viewings supplement the production experience.

Class 2, Lab 4, Credit 4

PPHF-312 Studio and Documentary Video  
Registration #0902-312  
An introduction to studio "real time" television. Acquiring skills in preproduction planning, scriptwriting, staging, lighting, studio production and directing skills. Lectures include broadcast history, rating, cable and satellite television, the viewing and discussion of several commercial and independent productions and a tour of a local broadcast affiliate. In addition to individual studio productions and a "lab" news show, each student is expected to refine the skills learned in the first quarter by producing an independent mini-documentary due at the end of the quarter. (417 or permission of instructor)

Class 2, Lab 4, Credit 4

PPHF-313 Electronic Field Production  
Registration #0902-313  
Lab work explores television remotes, advanced studio lighting, the still and motion picture interface, the technical limits of the video image, advanced editing, video art and image processing. Lectures include production budgeting, public broadcasting, copyright, the job market, educational/industrial television, experimental video and computer interfacing. The major spring project, a final "portfolio production," concludes the broad-based, three-quarter program. (PPHF-312)

Class 2, Lab 4, Credit 4

PPHF-321, 322 Writing for Film and Television  
Registration #0902-321, -322  
This course explores the writing of non-fiction and fiction for theatrical and non-theatrical films and television. Experience in the writing of fiction concentrates on the elements of dramatic construction. The exploration of non-fictional writing examines information gathering techniques and methods of investigation. Both non-fiction and fiction are treated as expository, 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 (Winter and Spring quarters)

PPHF-324, 325, 326 Animation and Graphic Film Production  
Registration #0902-324, -325, -326  
An introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a wide variety of approaches to single frame motion picture production. Students produce a number of short film exercises utilizing both existing and original artwork. Some techniques covered in the course are: optical printer, direct modification of the film surface, cell, ink, and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. In the third quarter students produce a short animated film with sound using techniques of their own choosing.

Proficiency in drawing is not required. No prerequisites.

Class 3, Lab 2, Credit 4  
(Fall, Winter, Spring)

PPHF-404 Senior Project Seminar  
Registration #0902-404  
A required course for 3rd year film/video majors and the prerequisite for PPHF-541. Senior Project. Students will discuss and generate a written plan for their senior film and/or video projects and will select an advisor from among the film/video faculty. (PPHF-412)

Class 1, Credit 1

PPHF-405 Advanced Video  
Registration #0902-405  
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 & store, computer imaging and animation are some of the topics covered. (PPHF-303, -310)

Class 3, Credit 3

PPHF-406 Film Directing  
Registration #0902-406  
An in-depth penetration into the role of the film director as a specialization and a profession in the film making process. Included will be the related organic nature of the structure and function of the film crew and the film; the emerging role of the contemporary director; the categorization of the roles of the film crew; the director's relationship to each category. The director as a creative artist; viewing of films of famous directors and observation of a director in action. (PPHF-203, 313, 413 or equivalents)

Class 3, Credit 3

PPHF-410 Materials and Processes of the Moving Image III  
Registration #0902-410  
The course introduces the student to 16mm film technology and production systems that apply to other media production as well. (PPHF-203, -310)

Class 1, Lab. 2, Credit 2

PPHF-411 Film Production  
Registration #0902-411  
A general review of professional production methods and the theory and practice of visualizing an expressive film continuity. Basic synchronous sound recording is included. (PPHF-303 or permission of the instructor)

Class 2, Lab. 6, Credit 5

PPHF-412 Film Planning and Studio Operations  
Registration #0902-412  
Introduction to studio work and editing systems for professional film. Budgeting and an elementary view of the economics of production are also included. Film writing is introduced and related to production planning (PPHF-411 or permission of the instructor)

Class 2, Lab. 6, Credit 5

PPHF-413 Film Project with Sound  
Registration #0902-413  
A short (5-10 min. suggested) film is produced by student teams. Advanced sound editing, sound mixing and A&B roll conforming are included; Cameras, lighting and editing equipment are provided but students are expected to provide sensitized goods and processing.

Class 2, Lab. 6, Credit 5

PPHF-420 Sound Recording  
Registration #0902-420  
Specialized information and work in sound. To give information and lab work beyond the regular course. To encourage the beginning of vocational level work in sound. Each student prepares a mixed sound track to professional quality standards.

Class 3, Credit 3

PPHF-521 Visualization for Film and Television  
Registration #0902-521  
A basic course in the mechanics and aesthetics of visualization for film and television. Emphasis is on editing, camera, and subject dynamics and their interrelationship. Combined theoretical-practical approach to the development of visual images for film and television.

Class 2, Credit 2

PPHF-541 Senior Production I (Film/Television)  
Registration #0902-541  
Continuation of the introduction to business and legal factors begun in the basic film and Video Production activities. The course assists the student in detailed budgeting and shooting, script preparation and breakdown. Final project shooting begins in this quarter. (PPHF-413)

Credit 6
Continuing the senior project, shooting phase to completion. Production teams meet as sections with faculty whose experience matches the kind of production involved. (PPHF-541)

Credit 6

PPHF-543 Post Production (Film/Television)
Registration #0902-543
Completion of senior projects. Includes a review of post production techniques. (PPHF-542)
Credit 4

PPHF-551, 552, 553 Special Topics in Film & Video
Registration #0902-551, -552, -553
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper level students.
Credit variable

PPHF-599 Independent Study
Registration #0902-599
A student proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper level students with a G.P.A. of 3.0 or greater.
Credit variable

General Photography

PPHG-200 Photography I
Registration #0903-200
An intensive 10-week summer course for students entering the transfer program in professional photographic illustration and technical photography. This is the minimum photographic education needed to gain entry to second year standing and replaces PPHL- & PPHT-201, -202, -203. Since this course is such an intensive offering, some previous photographic experience is highly advisable.
Credit 12

Master of Fine Art Photography

PPHG-701, 702 History and Aesthetics of Photography
Registration #0903-701, 702
The course will survey the major issues throughout the development of the medium: (1st quarter) pre-history up to the 19th century; (2nd quarter) fin de siecle to present.
Credit 3/Qtr.

PPHG-704 Minor White Seminar
Registration #0903-704
A study of the photography and philosophy of Minor White and his contribution to photographic publications, photographic education and photography as an art form.
Credits 3

PPHG-707, 708, 709 Rim History and Aesthetics
Registration #0903-707, -708, -709
An extended comparative survey of the history & aesthetics of film that will explore the four basic forms of the medium: fiction, documentary, animated and experimental. Emphasis is on determining the unique characteristics of the medium and how those characteristics are used as a means of interpretation and expression.
Credits 4/Qtr.

PPHG-719 Early Photographic Processes
Registration #0903-719
This is a non-laboratory technical course which surveys the structure and deterioration mechanisms of major historical photographic processes. It examines the technical basis of preservation strategies within a museum or archive, and presents an approach to preservation which is integral with collection management and curatorial functions.
Credits 3
An advanced course in the production and presentation of images using historical and contemporary visual imaging processes. Emphasis is on extending the students’ experience in image making by incorporating alternatives to conventional photography into their work. Processes to be covered include various light sensitive emulsions, the production of visual books, and generative systems such as electrostatics and offset lithography.

Credits 4/Qtr.

PPHG-877 Museum internship
Registration #0903-877
Experiential learning is provided in collections management, cataloging and classification, exhibition preparation and exhibitions, research and critical writing.

Credits 1-8/Qtr.

PPHG-889 Research Seminar
Registration #0903-889
The seminar serves as a basis for exchanging ideas for research work and for a general orientation of the procedures and requirements for the completion of a successful thesis.

Credit 2 (Spring only)

PPHG-890 Research and Thesis
Registration #0903-890
The thesis is designed and proposed by the candidate. It is considered his culminating experience in the program, involving research, a creative body of work, an exhibition or suitable presentation, and a written illustrated report.

Credit 1-12

Professional Photographic Illustration

PPHL-201, 202, 203 Applied Photography I
Registration #0904-201, -202, -203
An introduction to the major in Applied Photography which will give the student broad experience in various areas of photography, to assist in making vocational decisions and understanding visual communications. The curriculum emphasizes both craft and visual problem solving during the first two quarters. The third quarter continues the attitudes of the previous quarters and allows the student to concentrate in an area of interest from an offering of courses established by the department.

Class 4, Studio 4, Lab 4, Credit 7/Qtr.

PPHL-205, 206 Creative Problems
Registration #0904-205, 206
This course is designed to make students aware of their own creative problem solving potential. Emphasis is placed on students’ personal environments, enthusiasms and experiences. Attention is given to individual thinking and seeing. This will be accomplished through lectures, individual group assignments and demonstrations.

Class 3, Credit 3/Qtr.

PPHL-207 Introduction to Color
Registration #0904-207
A one-quarter course introducing color as a new element in making photographs. The course will offer a theoretical, technical and aesthetic foundation in color photography. The student will gain familiarity with the materials through studio assignments. Emphasis will be placed on developing printing skills.

Class 2, Lab 4, Credit 3/Qtr.

PPHL-300 Photography II, BFA Transfer
Registration #0904-300
A concentrated 10-week summer course for students entering the transfer program in photographic illustration. Students must have had previous photography, design and an AAS degree (or its equivalent) from another institution. All selections will be verified by portfolio. This course is designed for exclusive admission into the complete 3rd/4th year BFA program.

Credit 15 (Pending)

Class 4, Studio 4, Credit 5/Qtr.

PPHL-311, 312, 313 Applied Photography II
Registration #0904-311, 312, 313
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.

Class 4, Studio 5, Credit 5/Qtr.

PPHL-315 Colloquia
Registration #0904-315
A lecture/presentation offering the specific interests and passions of the faculty. The range is academically wide and varied.

Class 1, Credit 1

PPHL-411, 412, 413 Photojournalism I
Registration #0904-411, 412, 413
Journalistic photography for mass media publication with emphasis on the development of specialized skills in projects dealing with various aspects of reportage and all related editorial problems from caption writing, law and history, to organizational structures, printing processes, layout and design. Special emphasis is placed on the story as a total concept from inception to finished layout. Research and origination of material as well as the study of publications is explored. (PPHL-313)

Class 4, Field 4, Credit 4/Qtr.

PPHL-416, 417, 418 Narrative/Documentary/
Registration #0904-416, 417, 418 Editorial Photography I
This course will explore the use of the photographic image in narrative, documentary and editorial form. The emphasis of the course will allow the students a variety of experiences. There will be emphasis on publication and public need.

Class 4, Field 5, Credit 5/Qtr.

PPHL-421, 422, 423 Nature Photography
Registration #0904-421, 422, 423
A course designed to help students become more concerned with and visually aware of the natural environment. This is accomplished principally by direct involvement through study and photography of major natural forms. The student also acquires valuable basic understanding of the natural world, special photographic techniques and a broader concept of people’s attitudes toward and impact on their environment. (PPHL-303)

Class 2, Field 4, Lab 4*, Credit 4/Qtr.

PPHL-431, 432, 433 Illustration Photography I
Registration #0904-431, 432, 433
This course is designed to provide the technique and aesthetic elements necessary for a successful career in illustration photography. The emphasis will be on the making of photographs in three-dimensional space and on location. Emphasis is on the growth of the imagination and aesthetic aspects of creating illusions. Investigation into the photographic medium as a means of communicating ideas. The development of individual vision and self-expression through the disciplines of photography, both in black and white and color images. (PPHL-311, 312, 313)

Class 4, Studio 4, Credit 4/Qtr.

PPHL-437, 438, 439 Visual Communications Workshop
Registration #0904-437, 438, 439
Primarily a photographic course; however, emphasis is placed on experimental approaches to communications. Visual and psychological purpose of media will be explored. This course presupposes a basic background in design, as well as in photography.

Class 2, Lab 8*, Credit 4/Qtr.

PPHL-441, 442, 443 Contemporary, Illustrative
Registration #0904-441, 442, 443
A course in visual problem solving with photography. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered.

Class 4, Studio 5, Credit 5/Qtr.
Photographic Processing and Finishing Management

PPHM-201, 202, 203 Basic Principles of Photography
Registration #0905-201, -202, -203
The program of study is designed to provide photographic marketing students with a thorough knowledge of the basic photographic process in order that they may have an understanding of how photographic products work. The course will include units of study in film characteristics, lighting, optics, photographic chemistry, sensitometry and color theory. Each of these will be related to the actual practice of photography.
Class 2, Lab. 6, Credit 4/Qtr.

PPHM-204 Orientation of Production Photographic
Registration #0905-204
Processing and Finishing
This course is designed to provide the photo management Freshman with an orientation to the facilities, equipment, practices and procedures of the Processing and Finishing Management Lab prior to having to assume responsibility of working in the lab. This course will also introduce the freshman to some of the basic problems of the processing and finishing industry. Prerequisite: freshman standing in the photo management program.
Credit 1 (Fall only)

PPHM-301, 302, 303 Production Processing and Finishing
Registration #0905-301, -302, -303
Provides an opportunity for photographic students to gain an understanding of all aspects of photography. The course will cover causes, effects and benefits of the application of basic principles of optics, mechanics and electronics embodied in the type of hardware handled by retail and wholesale photographic establishments catering to the general public. (PPHM-203)
Class 2, Credit 2 (spring only)

PPHM-320, 321 Mechanics of Photographic
Registration #0905-320, -321
Hardware
The course will cover causes, effects and benefits of the application of basic principles of mechanics and electronics embodied in the type of hardware handled by retail and wholesale photographic establishments catering to the general public. (PPHM-203)
Class 4, Credit 4/Qtr. (winter and spring only)

PPHM-401, 402, 403 Photographic Process Control
Registration #0905-401, -402, -403
Statistical methods of analyzing repetitive processes, with special application to photographic processing; methods of obtaining data about processes, including chemical and physical factors; methods of making process adjustments, including automatic control methods. (PPHM-303 or PPHM-300)
Class 2, Lab. 6, Credit 4/Qtr.

PPHM-410, 411, 412 Training and Supervision of
Registration #0905-410, -411, -412
Photographic Processing and Finishing Laboratory Personnel
Provides an opportunity for the processing and finishing management students to experience supervisory and training techniques as they prepare and use training aids and techniques in the actual supervision of the various work areas in the processing and finishing laboratory. (PPHM-303, or PPHM-300)
Class 2, Lab. 8, Credit 4/Qtr.

PPHM-501, 502, 503 Senior Seminar in Production Processing and Finishing Management
Registration #0905-501, -502, -503
This course is designed to help the photo management student make last minute preparations for entering the world of work. Procedures for obtaining employment, i.e., preparing resumes, taking interviews, plant visits, etc., will be covered in detail, information on the latest business practices and procedures will be discussed in depth as well as the current condition of the processing and finishing market. Prerequisite: senior standing.
Class three times a quarter for three quarters. Credit 1
PPHM-506 Theory of Corrective Color Printing Registration #0905-506
A study of characteristics of color negatives as they relate to corrective color printing. Theory and methods of color and density correction will be presented. The attributes of high, low and variable correction levels will be discussed. Various approaches to automatic classification will be studied. The students will be introduced to matrix control of color printing as utilized in digital computer controlled printing equipments. (PPHM-301, 302)
Class 2, Credit 2, (Spring only)

PPHM-510 Finishing Lab Operations Management Registration #0905-510
This course is designed to provide Photographic Processing and Finishing Management students with the background knowledge which is necessary to plan, set up, and operate a finishing laboratory. Included in this course will be a study of production methods, work flow, layout, and equipment complements which lead to efficient operation. Cost analysis of a laboratory operation will be presented and optimization techniques for cost reduction and scheduling will be discussed.
Class 4, Credit 4

PPHM-511,512,513 Advanced Production Processing Registration #0905-511, -512, -513 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 which the student finds most interesting. This course may also be used to strengthen those areas of interest in which the student feels a weakness (PPHM-303 or PPHM-300)
Lab. 12, Credit 4/Qtr.

PPHM-520 Operation, Care and Maintenance of Registration #0905-520 Photofinishing Equipment
This course will provide the student with an opportunity to gain a thorough understanding of the mechanical, optical, and electrical aspects of the major pieces of photofinishing equipment. This course will employ the latest techniques in programmed learning, demonstrative hands-on experience, and lectures so that the student will be able to operate and perform basic care and maintenance on major pieces of processing and finishing equipment. Broad principles learned here will be applicable over a wide range of equipment. (PPHM-Senior standing)
Lab. 3, Credit 1 (Winter only)

PPHM-599 Independent Study Registration #0905-599
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper level students with a G.P.A. of 3.0 or greater.
Credit variable

Professional Photography

PPHP-395 Photo Electronic Workshop Registration #0906-395
Introductory hands-on course covering basic elementary electronic devices particularly useful in photographic applications. The emphasis is on learning to read circuits, to understand the basic electronic symbols and principles, to learn to make printed circuit boards. Using assembly techniques such as soldering, wire wrap, and proto board to construct a few projects of the student's choice from an available list which includes: light meters, flash meters, slave triggers, sound triggers, timers, intervalometer, basic electronic flash, counters and time delays, etc.
Class 4, Credit 3

PPHP-408 Scientific and Technical Applications of Photography Registration #0906-406
Introduction to special or unusual methods particularly useful in technical, scientific, or research photography. Emphasis is on the student's development of innovative solutions to a set of photographic problems.
Class 2, Lab 4, Credit 4

PPHP-409 Corporate and Special Interest Publications of Photography Registration #0906-409
A survey of this type of publication with particular emphasis on the photographic problems involved. Skill building assignments to improve competence and an introduction to the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHP-303, PPHP or PPHL-313)
Class 2, Lab 8', Credit 4

PPHP-421,422,423 Advertising Photography Registration #0906-421, -422, -423
A course built strictly to the standards of professional photography. Only those students who seriously aspire to be professional craftspeople should enroll. The assignments are specific and vary from strictly commercial to advertising illustration. In addition, the student is encouraged to specialize in the direction of his or her own natural ability and interests. Approximately 2/3 of the photography will be in color. (PPHP-303 and PPHP-313, PPHL-213)
Class 2, Lab 7", Credit 4/Qtr.

PPHP-441,442,443 Advanced Color Printing Registration #0906-441, -442, -443
This course is designed to give the student an advanced study in color techniques and theory in relation to quality and creative use of photographic materials. The student may choose a section for intensive study such as the dye transfer process, quality control methods in printing and processing and special masking. (PPHT-312 or equivalent) (Permission of the instructor)
Lecture 1, Lab 6, Credit 4/Qtr.

PPHP-501, 502, 503 Industrial Photography Seminar Registration #0906-501, -502, -503
Depending on the student's interest, the course is subdivided into two areas of emphasis.
(a) Instrumentation: a continuation of PPHP-408 to a greater depth on a seminar basis. (PPHP-408 or permission of the instructor)
(b) Corporate and Special Interest Publications: a continuation (PPHP-409 or permission of the instructor)
Class 2, Lab 3, Studio 5, Credit 4/Qtr.

PPHP-521, 522, 523 Advanced Color Seminar Registration #0906-521, -522, -523
This course offers the student an opportunity to work relatively independently to complete majors in advertising, illustration photography or portraiture. Individual growth and the development of personal style are stressed. The student is assisted in preparing a portfolio of professional caliber which can include images in black-and-white or color. A knowledge of color harmonies and the ability to create images with exciting and effective color schemes comes from lectures, assignments, analysis of student projects and of contemporary work. The course combines the individual aspects of independent study with the advantages of shared class critiques, lectures and other profession related experiences. (PPHP-303 and PPHP-313, or PPHL-213 and permission of instructor)
Class 3, Studio 4, Credit 4/Qtr.

PPHP-541 Basic Portrait Photography Registration #0906-541
Introduction to basic professional portraiture, the study of the art of lighting (indoors and outdoors), posing, composition, make-up, camera techniques, mounting and communication. (PPHP-303, PPHP-313 or PPHL-213)
Lecture 3, Studio 2, Credit 4 (Fall, Winter, Spring)

PPHP-542 Advanced Portrait Photography Registration #0906-542
Introduction to color harmony, use of "props" backgrounds, vignetting, candid wedding, bridal portraiture, full lengths, groups, multiple exposure, business procedures, sales, pricing, and public relations. (PPHP-541)
Lecture 3, Studio 2, Credit 4 (Winter only)

PPHP-543 Contemporary Portrait Photography Registration #0906-543
The study of the finer arts of lighting and posing, the classical approach to portraiture, environmental portraiture on location, or in the studio, mood in portraiture, coordinating clothing, props, and backgrounds for pleasing results in both low and high key portraiture. Lecture 3, Studio 2, Credit 4 (Spring only)

*Lab hours may not be scheduled and are to be completed in available time.
Imaging and Photographic Science

The two courses, PPHS-200 and PPHS-210, are special intensive summer courses designed for students transferring into the Imaging and Photographic Science Program at the third year level, and for others who desire a background in photographic science and instrumentation at an introductory engineering level. Students normally take both courses concurrently.

PPHS-200 Fundamentals of Photographic Science I
Registration #0907-200
An intensive course presenting the subject matter normally taken by imaging and photographic science students during their first year. Topics include the basic physics and chemistry of photo-sensitive systems, characteristics of radiation, introduction to sensitometry and tone reproduction, and applied photography.
Class 4, Lab 3, Credit 9 (Summer only)

PPHS-210 Fundamentals of Photographic Science II
Registration #0907-210
An intensive course presenting the subject matter normally taken by photographic science and instrumentation students during their second year. Topics include the chemistry and physics of black-and-white and color materials and processes as a continuation of topics covered in PPHS-200. (Permission of the department and PPHS-200)
Credit 9 (Summer only)

PPHS-303 Photographic Instrumentation
Registration #0907-303
Introduction to the use of photographic recording methods to obtain space and time information from object fields; principles for selection of camera, lens parameters, recording material and recording rate; the use of time and space references to facilitate date retrieval. (PPHS-203)
Class 2, Lab 6, Credit 4

PPHS-312 Applied Processing
Registration #0907-312
Problems in applied processing and the application of analytical chemical techniques to the control of black-and-white and color processing solutions. Processing faults, and image restoration, trouble shooting, archival permanence, ecology and processing machine operation. Statistical techniques application to machine control. (SCHG-206, PPHS-203)
Class 2, Lab 6, Credit 4

PPHS-331 Color Systems
Registration #0907-331
Introduction to color and color imaging systems; systems of color specification; additive and subtractive trichromatic systems of color recording and reproduction; the technology of color photography; sensitometry and densitometry of color materials; introduction to graphic reproduction and electronic systems. Laboratory work in the exposure and evaluation of color photographic materials. (SMAM-305, PPHS-201 through PPHS-312)
Class 3, Lab 3, Credit 4

PPHS-401 Radiometry
Registration #0907-401
The course serves as an introduction to the physics of light, its generation, propagation, absorption and measurement. This is combined with an introduction to the human visual process, to general photometry and radiometry, to light sources and to light receivers. (SMAM-205, SPSP-313)
Class 3, Lab 6, Credit 4

PPHS-402 Image Microstructure
Registration #0907-402
Introduction to image formation and structure; mathematical models for spread functions of image-forming elements and detectors; superposition and convolution; noise; sinusoidal response functions; figures of merit; characteristics of instruments used for small-scale image measurements. Laboratory work in microdensitometry and subjective image evaluation. (SMAM-305, PPHS-203, SPSP-313)
Class 3, Lab 5, Credit 5

PPHS-404 Introduction to Scientific Research
Registration #0907-404
A course for third-year students in photographic science and instrumentation designed as preparation for the fourth-year research project. Project selection and the use of scientific literature; preparation of proposals; research notebooks; patents; consideration in data collection and analysis; written and oral presentations. (Third-year status in Imaging and Photographic Science or permission of the instructor)
Class 2, Credit 2/Qtr.

PPHS-411 Statistical Inference
Registration #0907-411
Hypothesis testing, confidence intervals, and sample size for variables; probability functions and distributions. (SMAM-305, Computer Programming)
Class 2, Lab 2, Credit 3

PPHS-412 Design of Experiments
Registration #0907-412
Basic designs for experiments, objectives, conclusions, error estimation, data analysis, continuation of analysis of variance and regression analysis; response surfaces and factorials. (PPHS-411)
Class 2, Lab 2, Credit 3

PPHS-413 Statistical Quality Control
Registration #0907-413
Basic probability, control charts, sampling plans, power and O.C. curves, and modern applications of product and process control. (PPHS-412)
Class 2, Lab 2, Credit 3

PPHS-421, 422, 423 Photographic Chemistry
Registration #0907-421, -422, -423
The chemistry and photographic properties of photographic emulsions and developer solutions at the intermediate level; topics in physical, organic, and analytical chemistry necessary to the continued study of photographic science. (PPHS-312, SCHG-207)
Class 3, Lab 3, Credit 4/Qtr.

PPHS-501, 502, 503 Research
Registration #0907-501, -502, -503
An investigation of a problem in imaging and photographic science of engineering including planning and execution of experiments, statistical data analysis, and reporting results orally and in a written paper. (PPHS-404, 413)
Class 2, Lab 2 (Fall)
Class 2, Lab 6, Credit 4 (Winter and Spring)

PPHS-511, 512, 513 Optical Instrumentation
Registration #0907-511, -512, -513
Principles of geometrical and physical optics, image evaluation, optical instruments, and instrumentation. (SMAM-305, SPSP-313, PPHS-335)
Class 3, Credit 3/Qtr.
PPHS-521, 522, 523  Image Systems and Evaluation
Registration #0907-521, -522, -523
An analytical approach to analysis and evaluation of photo-optical and other images recording systems; objective and subjective evaluation techniques and their correlation. The use of convolution, correlation, autocorrelation, and Fourier methods in the analysis of the imaging recording systems. Laboratory work in the design of photo-optical systems. (PPHS-402, SMAM 305, SPSP-313)
Class 2, Lab 6, Credit 4 (Fall)
Class 2, Credit 2 (Winter and Spring)

PPHS-531, 532, 533  Theory of the Photographic Process
Registration #0907-531, -532, -533
An advanced course in photographic theory; sensitivity, emulsions, latent image, and processing of both black-and-white and color materials; chemistry and physics of selected non-silver and other non-conventional processes. (PPHS-423, SPSP 313)
Class 3, Credit 3/Qtr.

PPHS-551, 552, 553  Special Topics in Imaging and Registration #0907-551, -552, -553
Photographic Science
Topics of special interest, varying from quarter to quarter, selected from the field of photographic science and not currently offered in the division's curriculum. Specific topics are announced in advance. (Not offered each quarter. Consult chairman of the Imaging and Photographic Science Dept.)
Class, Credit: variable

PPHS-599  Independent Study
Registration #0907-599
A student proposed advanced project sponsored by an instructor. Approval required by the department chairperson and the director of the school. Available to upper level students with a G.P.A. of 3.0 or greater.
Class, Credit: variable

Master of Science

PPHS-711, 712, 713  Theory of the Photographic Process
Registration #0907-711, -712, -713
Physical structure and optical properties of the silver halide emulsion and their relations to the characteristic curve; chemistry and preparation of emulsions; treatment of theory of sensitivity and latent image formation; chemistry and kinetics of processing; chemistry and physics of selected non-silver processes.
Class 3, Credit 3/Qtr.

PPHS-721, 722  Mathematics and Statistics for
Registration #0907-721, -722
Photographic Systems
A special graduate course in mathematics and applied statistics involving those areas of direct concern in design, analysis, and evaluation of photographic systems.
Credit 4/Qtr.

PPHS-731, 732, 733  Instrumental and Photographic Optics
Registration #0907-731, -732, -733
The principles of geometrical and physical optics with application to photographic instrumentation systems. First-order imaging, aberrations and geometrical image evaluation, mirror and prism systems, basic instrument systems, electromagnetic waves, polarization, interference and function description of imaging performance.
Class 3, Credit 3/Qtr.

PPHS-741, 742, 743  Analysis and Evaluation of Imaging Systems
Registration #0907-741, -742, -743
Complex variables and Fourier analysis with application to the evaluation of imaging systems; properties of optical images, structure of photographic images; methods of photo-optical system evaluation.
Class 2, Lab 6, Credit 4 (Winter)
Class 3, Credit 3 (Fall and Spring)

PPHS-751, 752, 753  Special Topics in Photographic Science
Registration #0907-751, -752, -753
Advanced topics of current or special interest, varying from quarter to quarter, selected from the field of photographic science. Specific topics announced in advance. (Not offered every quarter. Consult coordinator of the Imaging and Photographic Science Graduate Program)
Credit varies

PPHS-761, 762, 763  Principles of Remote Sensing & Imaging
Registration #0907-761, -762, -763
The principles of electromagnetic imaging, image processing and image analysis as they apply to remotely sensed information. Photogrammetry, aerial photography, aerial photometry, thermography, multispectral image analysis and satellite image analysis are treated. Overall emphasis is on extraction of quantitative information from remotely sensed data.
Class 3, Lab 3, Credit 4

Technical Photography

PPHT-201, 202, 203  Photography I
Registration #0920-201, -202, -203
A study of the fundamentals of photography with emphasis on the development of the necessary creativity, craftsmanship, theory, and visual communications to undertake advanced study in the medium. The theory and technical aspects are taught as they relate to solving photographic problems.
Class 4, Studio 4, Lab 4, Credit 12

PPHT-301  Photographic Sensitometry
Registration #0920-301
Principles of sensitometric methods as applied to the selection and use of photographic emulsions. Problems in exposure, processing, densitometry, and data interpretation will be addressed. The characteristics of commercially available sensitometers and densitometers will also be reviewed. The laboratory work will consist of practical comparisons of currently marketed photographic materials upon which the student is required to prepare written reports.
Class 2, Lab 3, Credit 3

PPHT-302  Technical Photographic Chemistry
Registration #0920-302
Chemical concepts of black-and-white and color processing to control and produce desired effects are presented. The theory and application of the chemistry of developers, stop baths, and fixing baths and washing constitute the basis of investigative laboratory experiments. Proper technical writing of the laboratory projects is required.
Class 2, Lab 3, Credit 3

PPHT-303  Photographic Optics
Registration #0920-303
The principles of optics applied to photographic imaging systems. Object-image geometry and perspective, real and virtual images, using lens formulas, aperture stops and exposure, image quality, depth-of-field and focus, using cameras with other optical instruments, lens testing and evaluation. Field and laboratory work to illustrate principles.
Class 2, Lab 3, Credit 3

PPHT-305  Portrait Retouching
Registration #0920-305
The study of different techniques, materials and processes used in portrait retouching of negative and prints. Projects making use of these techniques, materials and processes will be required.
Class 2, Lab 2, Credit 3

PPHT-306  Commercial Retouching
Registration #0920-306
Study of the techniques, materials and processes used in commercial retouching. Projects making use of these techniques, materials and processes will be required.
Class 2, Lab 2, Credit 3

PPHT-307  Basic Airbrushing
Registration #0920-307
Study of the different types of air brushes and their uses. A series of lessons to develop skill in the handling of the airbrush, when and how the brush is used to retouch photographs.
Class 1, Lab 3, Credit 3

PPHT-311  Color Photography/Design
Registration #0920-311
The exploration of 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 from different materials.
Class 2, Lab 4, Credit 4
PPHT-312 Color Printing/Theory
Registration #0920-312
The theory and practice of color photographic systems including the study of color vision, principles and photographic materials, with practice in printing from separation negatives, color negatives and transparencies. Topics include color analysis and synthesis, additive and subtractive systems, color measurement, the Ostwald, Munsell, and CIE color notation systems, illumination of color, color coupling, dye bleaching, instant color photography, masking, color scanners, color television, metamerism, visual effects, and permanence of color images.
Class 2, Lab 4, Credit 4

PPHT-313 Color Measurement
Registration #0920-313
Study of the principle of the objective measurement of color with particular emphasis on the measurement of colored images for the purpose of evaluating both originals and reproductions. Topics include CIE and Munsell Color Systems, Tristimulus Integration, Uniform Color Spaces, expressions of color differences, color rendering properties of light sources and evaluation of color gamuts.
Class 2, Lab 4, Credit 4

PPHT-410 Architectural Photography
Registration #0920-410
An image-making course for advanced students with a specific interest in architectural exterior and interior photography. Assignments are designed to emphasize the development and exploration of professional attitudes and techniques while providing a comprehensive study of the subject. All required work will be on color transparency materials. Prerequisite: Completion of second year courses in the Applied or Technical Photography programs or permission of the instructor.
Class 9

PPHT-411 Preparation of Visuals
Registration #0920-411
Layout and design techniques necessary for producing art for print (publication), slide visuals and television graphics. Hands-on experience with equipment and materials for producing type, including phototypesetter, Headliner, pressure-sensitive lettering. Black-and-white and color art techniques will be explored in assignments similar to those encountered in work situations. Attention will be given to a variety of photocopying techniques.
Class 2, Lab 4, Credit 3

PPHT-412 High Magnification Photography
Registration #0920-412
Basic principles of photomacography and photomicrography with major emphasis on illumination techniques and image formation, with lectures, demonstrations, and projects.
Class 2, Lab 4, Credit 3

PPHT-421 Basic Holography
Registration #0920-421
This course is intended to be an introduction to holography theory and techniques. Lectures and demonstrations will cover the materials, processes, and applications of fundamental types of holograms and laser photography. Labs will give hands-on experience with the construction and playback of transmission, reflection, and focused image hologram types.

PPHT-431 Reversal Color Printing
Registration #0920-431
A one-quarter course on color reversal printing procedures, printing and processing. The student will gain proficiency in using reversal print material.
Class 1, Lab 4, Credit 3

PPHT-441 Introduction to Dye Transfer
Registration #0920-441
An introduction to the Dye Transfer process with emphasis on the understanding of its theoretical principles, and on the mastery of basic transfer techniques. This includes the preparation of transfer prints from the student’s color negatives. Prerequisite: 0920-312 or equivalent
Class 1, Lab 6, Credit 4

PPHT-442 Advanced Dye Transfer I
Registration #0920-442
A continuation of the Dye Transfer Process with emphasis on the understanding and mastery of masking and color separation (analysis) of a color transparency. The synthesis is accomplished by the making of a Dye Transfer print. Prerequisite: 0920-441, 0920-312 or equivalent
Class 1, Lab 6, Credit 4

PPHT-443 Advanced Dye Transfer II
Registration #0920-443
This quarter of the Dye Transfer program is devoted to variations of standard techniques and further extension of improvement of procedures. Difficulty of procedure will determine number of assignments required. Prerequisite: 0920-442 or equivalent
Class 1, Lab 6, Credit 4

PPHT-444 Reversal Color Printing
Registration #0920-444
A one-quarter course on color reversal printing procedures, printing and processing. The student will gain proficiency in using reversal print material. Prerequisite: PPHT-312, Color Print Theory OR PPHL-207, Introduction to Color OR Faculty Approval
Class 1, Lab, 4, Credit 3

PPHT-502 Introduction to Research
Registration #0920-502
This course leads to a completed Research Proposal in preparation for the Research Project (course #0920-503). It guides the students in preparing formal proposals for their research projects, including selection of topics, searching the literature, and proposal evaluation.
Class 3

PPHT-503 Research Project
Registration #0920-503
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.
Class 1, Lab 4, Credit 3

PPHT-504 Survey of Non-Conventional Imaging
Registration #0920-504
A survey of imaging methods and imaging systems not normally encountered in other technical photography courses, including UV, IR, 3D, holography, electro-photography, x-ray, and non-silver applications.
Class 2, Lab 3, Credit 3

School of Printing
All courses in the School of Printing are offered at least once annually, except as noted.

Management Courses
PPRM-201 Introduction to Technical Writing
Registration #0910-201
Basic approach to fundamentals of modern technical writing; review of English and writing skills; consideration of principles, techniques, form and style.
Class 3, Credit 3

PPRM-210 Financial Controls I
Registration #0910-210
Gives the line manager an understanding of a company’s financial accounting system so that he or she can work with the accounting group to use the system effectively. Includes preparation of balance sheets, income statements, organization of accounts, review of problem areas for management and governmental accounting requirements.
Class 4, Credit 3

PPRM-301 Application of Computers to the Graphic Arts
Registration #0910301
An introduction to basic concepts of the computer, its hardware, and software. Computer programming using BASIC language will be emphasized as a problem-solving technique. Application of computers to the graphic arts industry as well as the impact of computers in society will be stressed.
Class 4, Credit 3
PPRM-302  Personnel Relations I  
Registration #0910-302  
An introductory study of human relations in the printing industry, emphasizing the personnel management aspects of a supervisor’s job. Students study problems of individual behavior and how workers are affected by organizational influences. Case analysis is used extensively.  
Class 3, Credit 3

PPRM-305  Magazine Writing and Design  
Registration #0910-305  
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. One week will be devoted mainly to writing techniques, and the second week to the design techniques.  
Credit 3

PPRM-310  Industrial Organization and Management  
Registration #0910-310  
An introductory level course which includes such main topic headings as management fundamentals, planning, controlling, organizing, the behavioral environment and managerial adaptation to changing circumstances. Although some emphasis is put on newspaper industry applications, the fundamentals apply to all organizations.  
Class 3, Credit 3

PPRM-320  Introduction to Magazine Publishing and Management  
Registration #0910-320  
A survey course designed to give the student insights into the editorial, production, management, fulfillment and distribution processes vital to success of any magazine. Leaders from the magazine publishing industry are invited to present 3-hour guest lectures on a major aspect of their profession. Graduates of the printing program who have attained prominence within the industry are often the guest speakers, encouraging interaction between current and former students.  
Class 3, Credit 3

PPRM-340  Electrostatic and Electronic Printing Technology  
Registration #0910-340  
The course will cover printing methods using electrostatic technology as practiced on high-speed production copier machines. Along with theory of operation, the course will include: how these devices fit in the in-plant, commercial, and quick print installations; cost factors; quality; profitability in comparison to offset. Ink jet printing theory, types of basic equipment, limitations, and quality will also be discussed as well as electronic printing using lasers. A lab training session will also be held using a modern high-speed, high-quality copier.  
Credits 3

PPRM-401  Estimating I  
Registration #0910-401  
Introductory course in current estimating practices; the development of hourly costs and production rate standards; costs of materials and outside services; one-color offset press and flat sheet bindery operations; introduction to flat sheet imposition and pre-planning techniques; overview of cost accounting and pricing theory as they apply to the printing industry. (PPRT-311, PPRM-210)  
Class 4, Credit 4

PPRM-402  Estimating II  
Registration #0910-402  
Continuing study of sheet-fed offset lithography estimating; obtaining and interpreting specifications; design and use of estimating forms; pricing for a profit margin; preparing quotations; multi-color offset presses and signature-related bindery operations; signature imposition; camera, layout, stripping and plate processing production standards; phototypesetting and mechanical artwork costs; the application of the computer to estimating procedures. (PPRM-301, PPRM-401, PPRT-312)  
Class 4, Credit 4 (F, W)

PPRM-403  Printing Production Management I  
Registration #0910-403  
Examines the non-technological functions of production as components of a system, emphasizing organizational alternatives relating to human factors. Includes such topics as organization, systems approach, decision making, production planning and control, purchasing, inventory control, quality control, methods analysis, work measurement. Some simple analytical models based on graphs or elementary algebra are introduced.  
Class 3, Credit 3

PPRM-404  Printing Production Management II  
Registration #0910-404  
Explores certain analytical models which can be used practically in an ordinary printing company. Includes such topics as decision theory, probability concepts, mathematical modeling, break-even and economic-order analysis under conditions of certainty and uncertainty, linear programming using computer, Markov chains, waiting line analysis, game theory, simulation. These topics are considered from conceptual and problem solving viewpoints without emphasis on mathematics beyond college algebra.  
Class 4, Credit 4

PPRM-420  Electronic Communications In the Printing and Publishing Industries  
Registration #0910-420  
Presentation of an overview of electronic communication theory and its application to the publishing industry. The course provides the student with the background necessary to relate publishing requirements to electronic system parameters. Several practical newspaper systems are discussed. (#1016-204, College Algebra and Trigonometry)  
Credit 4

PPRM-450  Expense & Capital Project Budgeting & Control  
Registration #0910-450  
Studies plant accounting systems as a tool for improving production management decisions. Topics include inventory, equipment, job cost, standard cost and analysis of variance, budgeting and control techniques, financial analysis of projects, proposal development.  
Class 4, Credit 4

PPRM-460  Leadership and Conference Management  
Registration #0910-460  
Leadership and leadership skills are considered the foundation stones for good management. This course is designed to examine the principles and apply them. There is a concentration on the priority skills of communications, motivation, and conference management. The course is structured as a “Conference on Leadership” with the details of managing a seminar running in parallel. The “Case Method” of study is followed. A review of three books and a short term paper is required. We guarantee no boredom. Course will be taught by Mr. Warren Daum.  
Credit 4

PPRM-502  Financial Controls II  
Registration #0910-502  
Cost accounting systems; measurement and allocation of manufacturing and non-manufacturing costs; uses of full cost information; differential accounting and alternative choice decisions; budget preparation, standard cost, variance analysis and management control process. (PPRM-210)  
Class 4, Credit 4

PPRM-506  Business Law  
Registration #0910-506  
Elements of the laws of contracts, agency, sales, negotiable instruments, partnerships, corporations, taxes, insurance, libel, copyright, and other laws pertaining to business, printing and publishing.  
Class 3, Credit 3
PPRM-507  Computer Estimating Workshop  
Registration #0910-507  
The design and implementation of computer estimating systems. The class will work as a systems design team with each student required to research, design, code, debug, and document an algorithm for a specific printing operation that will run within the framework of the overall system design. Classroom lectures will focus on the implementation of 1978 ANSI BASIC on business microcomputers, the CP/M operating system, data structures, disk file handling techniques, and the creation of good error handling sub-routines. (PPRM-402, a working knowledge of BASIC, and willingness to undertake a non-trivial programming project)  
Class 4, Open Labs, Credit 4

PPRM-509  Economics of Production Management  
Registration #0910-509  
Microeconomic study of factors in printing production systems. Supply-and-demand theories are applied to printing system inputs and outputs.  
Class 4, Credit 4

PPRM-510  Personnel Relations II  
Registration #0910-510  
Principles of operations discipline, hiring and firing, are studied from the viewpoint of management.  
Class 4, Credit 4

PPRM-511  Labor Relations in Graphic Arts  
Registration #0910-511  
History and background for organized labor movement; make-up and characteristics of the contemporary labor force; collective bargaining and its effects on wages, hours, and conditions of work; the process of negotiating, administering, interpreting, applying, and enforcing the labor-management contract within the graphic arts area of the modern industrial society.  
Class 4, Credit 4

PPRM-513  Sales in the Graphic Arts  
Registration #0910-513  
Explores economic, psychological and sociological bases of selling, with emphasis on customer and salesman interplay as well as techniques and practices of creative salesmanship in graphic arts companies. This course aims at benefiting both students considering a career in sales and those who will otherwise work with salesmen, either by supporting their company’s salesmen in plant action or by buying from outside salesmen.  
Class 4, Credit 4

PPRM-514  Newspaper Management  
Registration #0910-514  
Consideration of personnel, organization, finance, maintenance, advertising, circulation, and other sources of revenue as they pertain to the metropolitan press; problems and practices of plant supervision.  
Class 4, Credit 4

PPRM-515  Legal Problems of Printing  
Registration #0910-515  
Review of United States Supreme Court decisions under the First Amendment to the United States Constitution, plus the limitations of libel, obscenity, privacy and conflicts of rights between citizens, cameras in the courtroom; state and federal relations all as they relate to the graphic arts industry.  
Class 4, Credit 4

PPRM-516  Marketing in the Graphic Arts  
Registration #0910-516  
Emphasizing a printing industry viewpoint, the class explores the marketing concept (finding out what customers want and organizing to produce it profitably). Marketing functions are studied in regard to practical application in the printing industry.  
Class 4, Credit 4

PPRM-518  Purchasing In the Graphic Arts  
Registration #0910-518  
Role of the purchasing agent in the printing plant. Methods of procurement, purchasing policies and sources of supply. Characteristics of graphic arts materials and supplies; quality assurance; inventory control; economic order quantity determination; make or buy decisions; blanket orders, capital investment decisions; and the purchase order as a legal document.  
Class 3, Credit 3

PPRM-551  Special Topics-Printing  
Registration #0910-551  
A management, or management related, course used to present and investigate special topics not normally covered in the curriculum on a “one-time” basis. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Subject to be covered is announced in advance.  
Credit Varies/Qtr.

PPRM-590  Senior Seminar  
Registration #0910-590  
Consideration of related graphic arts areas not normally covered in regular courses; investigation of recent and possible future developments in technology, management, and scientific applications, and their implications and probable effects on the industry.  
Class 2, Credit 2

PPRT-200  Introduction to Printing  
Registration #0911-200  
For packaging science students; study of different printing processes; analysis of process advantages and disadvantages relative to a variety of applications; examination of procedures for each process, from design through finished product; practice of the basic operations necessary for the production of a simple package printing job.  
Class 2, Lab 3, Credit 3

PPRT-201  Typography I  
Registration #0911-201  
Conventional rules of good traditional typography are reviewed through familiarization with basic terminology, type classification and typeface recognition; course includes lectures and laboratory exercises.  
Class 2, Lab 3, Credit 3

PPRT-202  Composition Technology  
Registration #0911-202  
A study of the use, operation, and application of machine principles and mechanisms as related to typesetting, laboratory projects in setting composition photographically and in hot metal; utilization of various input systems.  
Class 2, Lab 3, Credit 3

PPRT-203  Layout and Printing Design  
Registration #0911-203  
Practical application of analyzing original copy and applying design, typographic, and communication concepts to problem solving. Traditional rendering techniques are introduced illustrating reading and non-reading images depicting their interpretation into printing technology. Project discussions demonstrate how design planning and mathematics must agree, also how creative thinking is within individual control of the machine. Emphasis is on the translation of images into various reproduction procedures. Content is to stimulate the creative process giving visual instructions to printing production, copy preparation, estimators, sales and client. Content direction is on offset lithography. Presentation guidelines are presented assisting individual portfolio.  
Class 2, Lab 3, Credit 3
PPRT-204 Flexography  
Registration #0911-204  
A basic course in the principles and practices of the flexographic printing process. Emphasis is placed on the elements of flexographic technology from artwork through plates, inks and presswork. Lab work centers on plate mounting, ink formulation and presswork. Students print on a variety of presses and substrates. Course serves as an introduction into the newest major printing process in the graphic arts.  
Class 2, Lab 3, Credit 3

PPRT-205 Gravure Printing  
Registration #0911-205  
Introductory course designed to survey the gravure printing process and the study of related information regarding applications, techniques, equipment, materials and supplies. The course is conducted by means of lectures, class discussions, demonstrations and supervised laboratory exercises using a 4-color Champlain web press.  
Class 2, Lab 3, Credit 3

PPRT-206 Reproduction Photography  
Registration #0911-206  
A basic course in the fundamental principles, procedures, techniques, and applications of the photographic process as it is related to the production of film negatives or film positives for the major printing processes.  
Class 2, Lab 3, Credit 3

PPRT-207 Printing Plates  
Registration #0911-207  
An introductory course in the principles and practices of platemaking for letterpress, flexographic, planographic, and gravure printing processes. It covers a survey of major printing processes with emphasis on their plate characteristics and platemaking requirements; important physical as well as chemical principles that are applicable to the plate image-forming process; laboratory work that deals with plate processing variables; also an introduction to recent development in printing plate technology.  
Class 2, Lab 3, Credit 3

PPRT-208 Lithographic Press  
Registration #0911-208  
An introductory study of the principles and methods of offset presswork; press functions; operations and care of presses; exercises in running simple jobs.  
Class 2, Lab 3, Credit 3

PPRT-209 Screen Printing  
Registration #0911-209  
Theory and practice of screen printing covering areas such as frames, fabrics, stretching of fabrics, stencil methods, fillers, squeegees, inks, presses, and dryers; a study of some of the economic aspects of screen printing and its place in the total concept of graphic arts.  
Class 2, Lab 3, Credit 3

PPRT-210 Newspaper Presses  
Registration #0911-210  
An introduction to major presses used to produce both weekly and daily newspapers. Letterpress and offset presses will be considered, along with gravure presses used for the production of newspaper supplements.  
Class 2, Lab 3, Credit 3

PPRT-213 Principles of Copy Preparation  
Registration #0911-213  
A basic course involving theory of camera copy requirements through lecture, examples and project work. Includes projects in black and white and color, register, veloxes, silhouettes cropping, "windows," etc. Lectures cover all aspects of copy. Directed to those who do not require the depth of involvement given in PPRT-313.  
Class 2, Lab 3, Credit 3

PPRT-301 Typography II  
Registration #0911-301  
Emphasis is put upon finished typographic problems. Topics included in lectures are typographic movements, design concepts, analysis of current typographic practices, private presses, and bookmarking. The lab work is designed to present interesting and challenging problems to the serious student of typography.  
Class 2, Lab 6, Credit 4

PPRT-302 Composition Systems  
Registration #0911-302  
Detailed study of photocomposition with emphasis on systems approach; introduction to use of computers in composing rooms, and operation of specialized equipment. (PPRT-202)  
Class 2, Lab 3, Credit 3

PPRT-303 Layout and Printing Design II  
Registration #0911-303  
Typical printing design problems with emphasis on typographic arrangements, pictorial arrangement with consideration of production follow through. Includes design of complete booklet dummy and other commercial items for black-and-white and color reproduction from roughs to comprehensive layout.  
Class 2, Lab 6, Credit 4

PPRT-306 Tone Reproduction Photography  
Registration #0911-306  
The photographic process as it relates to the measurement and reproduction of tones for the major printing processes. Emphasis will be on the scientific analysis of a complete system of halftone sensitometry and process control. (PPRT-206)  
Class 2, Lab 6, Credit 4

PPRT-308 Lithographic Press Problems  
Registration #0911-308  
An advanced course in the theory, practice, and problems of offset presswork; development of technical knowledge of materials and equipment; practice in running multicolor work. (PPRT-208)  
Class 2, Lab 6, Credit 4

PPRT-309 Advanced Screen Printing  
Registration #0911-309  
Further study of the theory and practice of screen printing covering areas such as experiments with fabrics or screens; stencil forming materials and the effects these have on finished product. Further study into the inks and substrates that are common to the screen printer. Introduction to and running of screen printing presses, including automatic cylinder screen printing press and container press capable of printing cylindrical, conical and flat objects. (PPRT-209)  
Class 2, Lab 3, Credit 3

PPRT-310 Advanced Image Carriers  
Registration #0911-310  
Advanced study of technological requirements involved in producing letterpress and flexographic plates and gravure cylinders. Extensive laboratory project work is devoted to molded rubber platemaking for flexography, photopolymer plates for both letterpress and flexography and both flat plate and cylinder imaging for gravure. Gravure cylinder imaging is done chemically and with the use of the Helio-Klischograph.  
Class 2, Lab 6, Credit 4

PPRT-311 Planning and Finishing  
Registration #0911-311  
The course is designed to teach the understanding of printing production planning from design to finishing. Topics include preparing production specifications for image assembly, printing and finishing. Laboratory experiments cover the operation of modem, including some computerized, bindery equipment to provide real world experiences. Problem solving projects are followed through with economical and quality considerations. Students learn how to implement modern tools, evaluate materials and test the physical structure of bound products.  
Class 2, Lab 3, Credit 3

PPRT-312 Image Assembly  
Registration #0911-312  
An introductory course covering the basic and specialized procedures of film assembly for black-and-white as well as color work. Room light contact and duplicating films are prepared by students as needed throughout the course. Projects in stripping line, halftone, complementary flats, split-page layout, spreads and chokes, fake color and process color are assigned; also an eight page book layout is to be ruled-out on latest model line-up tables. Electronic and automated pre-press imaging systems and emulation stripping are presented in form of slide lectures.  
Class 2, Lab 3, Credit 3
PPRT-313  Copy Preparation
Registration #0911-313
Preparation of copy for camera, working from layouts, making analysis of requirements; pasteup techniques, methods of pre-separation; "keyline" mechanicals, use of photographic and typographic copy. Relation to production is stressed by shooting copy for camera, stripping and proofing; proper instructional specification writing. Design and production of individual 4-color process pre-separation. (PPRT-203)
Class 2, Lab 6, Credit 4

PPRT-314  Advanced Flexography
Registration #0911-314
An advanced course in the principles and practices of the flexographic printing process. Expanded lab time allows students to get into greater depth in all phases of flexographic technology. Students perform all operations necessary to print a large variety of substrates on all lab presses. (PPRT-204)
Class 2, Lab 6, Credit 4

PPRT-315  Ink and Color
Registration #0911-315
Theory of light and color; basic theory of process color and correction; use of color comparator and spectrophotometer, the study of color systems and color matching systems; theory and application of various ink systems; practice in standard ink mixing and color matching emphasizing offset and letterpress processes; correlation of ink properties with applications; emphasis on relationship of ink to paper and press; study of ink problems and their correction.
Class 2, Lab 3, Credit 4

PPRT-317  Calligraphic Forms
Registration #0911-317
An introduction to the basics of calligraphy, exercises in use of broadedge 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 2, Lab 3, Credit 3

PPRT-319  Newspaper Design
Registration #0911-319
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.
Class 2, Lab 3, Credit 3

PPRT-320  Newspaper Production
Registration #0911-320
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 paper, go to camera, make plates and go to press.
Class 2, Lab 3, Credit 3

PPRT-321  Web Offset
Registration #0911-321
An analytical study of the technological development in web offset; emphasis on the interrelationship of procedures, materials, and equipment; practical laboratory projects on a commercial four-unit perfecting web offset press. (PPRT-208)
Class 2, Lab 3, Credit 3

PPRT-322  Circulation and Mailrooms
Registration #0911-322
A study of the organization and functions of newspaper circulation departments. An overview of equipment and techniques used in modern newspaper mailrooms.
Class 3, Credit 3

PPRT-323  Newspaper Color
Registration #0911-323
A study of the basic theory, materials and methods used in the graphic arts for the reproduction of color for newsprint.
Class 2, Lab 3, Credit 3

PPRT-324  Newspaper Composition
Registration #0911-324
A study of composition techniques used in the publishing of weekly and daily newspapers, with emphasis on the systems approach to newspaper production.
Class 2, Lab 3, Credit 3

PPRT-329  Introduction to Book Design
Registration #0911-329
A course intended to give the student an understanding of how a book designer functions within a book publishing firm. Emphasis is placed upon the many factors involved in book design decisions, including the important relationship between book design and book production in producing a readable, functional book. (PPRT-301, PPRT-303)
Class 2, Lab 3, Credit 3 (Once a year)

PPRT-330  Newspaper Production II
Registration #0911-330
The production of a newspaper by photocomposition methods and the offset process. A continuation of PPRT-320, Newspaper Production I, in more depth, with special emphasis on presswork on the Goss Community offset press. Also, emphasis will be made on the use of color in newspaper production. (PPRT-320)
Class 2, Lab 3, Credit 3

PPRT-331  Bookbinding
Registration #0911-331
An introductory class to the basic skills used in binding books and portfolios. Content will cover methods of binding such as sewing, adhesive double fanning and other structures of bound products. Restoration and library binding, including reinforcing techniques and materials used are studied and practiced. No pre-requisite is required. However, a good coordination of hand and mind is desired. Students should bring several books of their own for rebinding.
Credit 4

PPRT-333  Introduction to Book Production
Registration #0911-333
This course is designed to introduce the student to the many-faceted role of the production manager in a book publishing firm. Production's role throughout the publishing cycle from manuscript to bound books is examined, and detailed emphasis is placed upon determining production and purchasing requirements for producing a variety of books, including trade books, textbooks, juveniles and special editions.
Class 3, Credit 3

PPRT-335  The Printed Book in America
Registration #0911-335
This course 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 own times and their relevance for today. Classes are held in the Melbert B. Cary, Jr., Graphic Arts Collection.
Class 3, Credit 3

PPRT-337  Art of the Printed Book 1455-1955
Registration #0911-337
This course presents masterpieces of the printer's art from the past five centuries. The lives and works of great European printers from Gutenberg to Mardersteig are examined, and their historical impact on Western civilization discussed with a view toward determining new perspectives for today's graphic artisan and book printer. Classes are held in the Melbert B. Cary, Jr., Graphic Arts Collection.
Class 3, Credit 3

PPRT-401  Typographic Workshop
Registration #0911-401
Allows students to create and solve typographic problems of their own choice. Complete freedom is given and experimentation is encouraged, giving the student opportunities to meet his or her own objectives and satisfaction. (PPRT-301)
Class 2, Lab 6, Credit 4
PPRT-402 Applications of Electronics to Graphic Arts
Registration #0911-402
A basic course in the fundamentals of electricity and electronics covering DC, AC and semiconductors. Theory and application are combined as major topics and studied, implicating numerous graphic arts machines and devices. Students will perform laboratory experiments using basic electronic components and instruments.
Class 2, Lab 3, Credit 3

PPRT-403 Layout and Printing Design
Registration #0911-403
A project course with design problems which involves students in converting their designs into the actual camera copy, trying various media, learning to identify art techniques and printing processes; more individualized approaches emphasized, more advanced principles applied. Less structured class sessions and more individual initiative required. (PPRT-313 or -213 and -303 and instructor permission)
Class 2, Lab 6, Credit 4

PPRT-406 Color Separation Photography
Registration #0911-406
Color separation and color correction methods in the graphic arts industry; color theory, masking requirements, tone reproduction for color, color proofing systems, electronic scanner operation.
Class 2, Lab 3, Credit 3

PPRT-410 Introduction to Paper
Registration #0911-410
This course begins with a discussion of papermaking fibers, pulping procedures, papermaking machines, and proceeds to show how they affect paper properties and printing characteristics. Laboratory experiences include stock preparation, making paper, sizing and coating paper, physical and optical testing of paper and paper identification.
Class 3, Lab 2, Credit 3

PPRT-500 Quality Control in the Graphic Arts
Registration #0911-500
A study of the methods and instrumentation necessary to produce a product consistent with the appropriate quality level. Topics will include process variability, waste reduction, problem analysis, material testing, process control, process optimization, and quality assurance. (Students should have completed all required 200-level technical courses in the School of Printing or have consent of the instructor)
Class 3, Lab 2, Credit 3

PPRT-501 Development of Printing Types
Registration #0911-501
A lecture course that investigates the historical development of the type faces that we use in our everyday work as typographers and designers. In addition to the historical development of typeface examples, type face recognition, type face classification, type designers, foundries and manufacturers are also discussed.
Class 3, Credit 3

PPRT-506 Advanced Color Reproduction
Registration #0911-506
Further study of color measurement and color reproduction. The emphasis will be on optimizing of a color reproduction system using such tools as color measurement instrumentation, visual color evaluation, color tone reproduction, and process control. (PPRT-406)
Class 2, Lab 3, Credit 3

PPRT-551 Special Topics - Printing
Registration #0911-551
This course presents and investigates technological topics which normally are not covered in the regular curriculum on a one-time basis. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Topics to be covered are announced in advance.
Credit Varies/Qtr.

PPRT-560 Chemistry Preparation for Graduate Study
Registration #0911-560
Basic principles of chemistry intended for students who have had no previous chemistry and who are making up deficiencies prior to entering the MS program. Not for credit for undergraduates of School of Printing.
Credit 4

PPRT-591 Reproduction Photography
Registration #0911-591
An intensive course designed to enable photography students to gain a basic understanding of the various printing processes, the application of photography to each, with an emphasis on problems involved in obtaining optimum tone and color reproduction of their photographs.
Class 2, Lab 3, Credit 3

PPRT-592 Printing Plates
Registration #0911-592
A specialized course for photography students to develop understanding of various imaging methods and characteristics, processing steps, applications, and major problems of platemaking.
Class 2, Lab 3, Credit 3

PPRT-593 Printing Presses - Lithographic
Registration #0911-593
Course offered for photography students; theory and practice of the methods of planographic processes.
Class 2, Lab 3, Credit 3

PPRT-594 Printing Presses - Screen
Course offered for photography students; theory and practice of the methods of screen processes.
Class 2, Lab 3, Credit 3

Graduate Courses
Master of Science in Printing Technology

PPRM-702 Computers in Management
Registration #0910-702
Discussion of printing requirements in relation to computer system configurations; applications of computers to management and production control problems; investigation of computer-orientated production control techniques. (PPRM-301)
Credit 4

PPRT-701 Research Methods in Graphic Arts
Registration #0911-701
Theory and application of principles of laboratory oriented research in the graphic arts, analysis of research techniques, interdisciplinary relationships, conditions for technology transfer and synergism; status of research and organization of literature including patents, illustrations of techniques and research programs and methods followed in various research situations; systematic study theory of scientific methods including induction, deduction, hypothetico-deduction, hypothesis formation, theory development, etc.
Credit 4

PPRT-702 Graphic Reproduction Theory
Registration #0911-702
Analysis of the basic theories of graphic reproduction and study of the principles underlying prevalent and proposed printing processes; special topics such as classification and description of the various light-sensitive systems as applied to the graphic arts, ink transfer theory, present and proposed systems of printing based on electrophotatics; electrolysis, magnetism and lasers; study of hybrid systems and the significance and application of interdisciplinary methods.
Credit 4

PPRT-703 Statistical Inference
Registration #0911-703
Descriptive statistics, patterns of variability, measures of variability, working with the normal curve, tests of hypotheses for means, tests of hypotheses for variance, internal estimates for means, internal estimates for variance, sample size for variables, introduction to analysis of variance, and applications of applied statistics to graphic arts.
Credit 4

PPRT-704 Design of Experiments
Registration #0911-704
Analysis of variance, components of variance, crossed vs. nested experiments, studying individual effects, introduction to matrix algebra, regression analysis, planning experiments from a statistical point of view, basic experimental designs, factorial experiments, fractional factorials, determination of optimum conditions, introduction to nonparametrics and quality control concepts (as time allows).
Credit 4
College of Liberal Arts

Criminal Justice

GCJC-201 Fundamentals of 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 will also be given to specific problems within the branches of the criminal justice system.
Class 3, Credit 4 (offered annually)

GCJC-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 (offered annually)

GCJC-204 Introduction to Public Administration
This course presents the principles of management and organizational theory as they relate to public agencies in general, and criminal justice agencies in particular. Case studies, as well as descriptive information concerning the classic issues involved in the administration of public institutions, will be offered to the student. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-206 Administrative Concepts in Law Enforcement
The course is intended to provide the student with an overview of the fundamental concepts of organization and administration, and to provide also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively. (GCJC-203) (GCJC-303)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-207 Corrections
This course is designed to introduce the student to the basic organization of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, will be discussed within the context of historical and contemporary philosophy. Attention will also be focused on decision making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness will be surveyed. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-301 Fundamental Concepts of Criminal Law
The subject matter of this course consists of an introduction to the fundamental principles upon which substantive criminal law is based. The basic characteristics and requirements of criminal conduct are examined. Included in the scope of this course are the following topics: the nature of criminal conduct, the meaning of criminal mental state, the requirement of concurrence between action and intent, and the requirement of legal causation. The elements of the principal defenses to criminal liability, such as insanity, entrapment, and self-defense, are also discussed. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-302 Organized Crime
This course provides a critical assessment of the structures of organized crime, its historical development, and the areas in which organized crime operates. Special emphasis will be placed upon how the character of organized crime has changed during the last thirty years, including the movement of organized crime into a variety of legitimate business enterprises. In addition current enforcement strategies will be studied and evaluated. (GCJC-201, 203)
Class 3, Credit 4 (offered on sufficient demand)
GCJC-303 Law Enforcement in Society
Registration #0501-303
The social and historical origins of the various police systems, police culture, role and career, police in the legal system, social and legal restraints on police practices, police discretion in practice; police and the community, police organization and community control mechanisms. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-306 Introduction to Para-Legals
Registration #0501-306
The course deals with criminal and civil law, matrimonial law, legal research, counseling, problem solving techniques, and lawyers' ethics as well as a study of community resources available to assist the client. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-307 Investigative Techniques
Registration #0501-307
The course examines the investigative function and process in the public and private sectors, which would include the history and theory of criminal investigation, crime scene searches, collection and presentation of physical evidence, the obtaining of testimony and confessions, scientific laboratory methods and the admissibility of evidence in a court of law. (GCJC-303)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-309 Juvenile Justice
Registration #0501-309
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. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-401 Scientific Methodology
Registration #0501-401
This course provides a foundation in the uses of quantitative social science research methods with special reference to utilization of data bases and examples from criminal justice, human services and public policy. Stresses will be on the deductive 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 non-parametric methods. Research methods presented range from traditional questionnaires to computer based information and techniques.
Class 3, Credit 4 (offered annually)

GCJC-403, 404 Field Experience I & II
Registration #0501-403, 404
This course is an internship practicum for all preservice criminal justice students. The course is designed to give the student firsthand experience in the field of criminal justice in an appropriate organization which meets the needs of the student's career objectives. Students will be closely supervised at selected organizations developing their pre-professional skills while learning the organization's programs and methods. The student also will be required to attend a seminar which will run concurrently with field work. Field Experience I and II can be taken two consecutive quarters in conjunction with Field Research or students may take Field Experience I and II in one quarter.
Class variable, Credit 4 each (offered annually)

GCJC-405 Major issues in the Criminal Justice System
Registration #0501-405
This course is designed as an advanced seminar which will focus on contemporary issues and topics not otherwise distinctly incorporated in established criminal justice courses. As a seminar the course will concentrate on student discussion and interaction surrounding required readings on topics such as political/official deviance, crime in the streets, issues in the prosecution/court system, deterrence, and female criminality. Topics may vary from offering to offering.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-408 Constitutional Law
Registration #0501-408
This course has been designed to provide the student with a basic understanding of the constitutional principles frequently encountered in the criminal justice profession. Landmark court decisions, relating to due process, equal protection, unlawful arrest, reasonable search and seizure, compulsory self-incrimination, the assignment of counsel and fair trial guarantees are discussed and critically evaluated. (GCJC-201, 301)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-409 Legal Rights of Convicted Offenders
Registration #0501-409
This course is designed to present an in-depth study of the substantive and procedural law as it affects convicted offenders. Considerable attention is devoted to the study of constitutional rights and privileges, how they apply to convicted offenders, and the methods employed to secure these rights. Conviction and its consequences are explored, as is the sentencing process. The rights of prisoners, probationers, and parolees are reviewed. In addition, the various remedies for enforcement of these rights are discussed, including direct appeals, collateral attacks, and a variety of post-conviction remedies. The course is intended for students who wish to pursue a career in law enforcement, corrections, probation, parole or law. However, students interested in some other aspect of criminal justice, which deals with convicted offenders, may find this course useful.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-410 Correctional Administration
Registration #0501-410
This course presents the history and development of the principles of management and organizational theory as they developed the field of corrections. This developmental evaluation is followed by a presentation of certain principles and philosophies concerning agency administration which have proved effective in business, industry, and many elements of government, with the intention of discussing their applicability to prisons, probation, parole, and other community correctional programs. (GCJC-201, 207)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-411 Seminar in Corrections
Registration #0501-411
This course is a sequel to Corrections. It presents a critical evaluation of the contemporary correctional programs in the United States. Programs discussed include: jails, prisons, probation, parole, halfway houses, study release, work release, prison furloughs and various community-based correctional techniques. Emphasis is placed upon the theories of penology and rehabilitation, which provide direction to the correction system today, and the theoretical positions which may affect the future corrections. (GCJC-201, 207)
Class 3, Credit 4 (offered annually)

GCJC-412 Social Control of Deviant Behavior
Registration #0501-412
Designed as a professional elective for criminal justice majors interested in studying the major themes explaining the phenomena of deviance; how it is created and labeled through the process of definition and social sanction. Emphasis will be on that type of behavior which elicits societal response in the form of criminal or civil action and on deviance from the perspective of the deviant who may be placed under some form of legalized social control. (GCJC-201, 203)
Class 3, Credit 4 (offered annually)

GCJC-413 Civil Disobedience and Criminal Justice
Registration #0501-413
A survey of the philosophy and history of civil disobedience, civil disobedience as a political tactic, differentiation between civil disobedience and "ordinary crime," civil disobedience and "non-criminals," civil disobedience within the criminal justice system, and the role of riot commissions. (GCJC-201, 203)
Class 3, Credit 4 (offered on sufficient demand)
This course is designed for social work students, criminal justice students, and professionals who are interested in examining the problems related to domestic conflict and violence. Included will be a study of the dynamics of violence as reflected in child abuse, incest, marital rape, spouse and parental abuse, and violence among siblings.

Credit 4 (usually offered summers for one week)

Class 3, Credit 4 (offered on sufficient demand)

This course is designed to provide the student with an awareness of what types of evidence are admissible in a criminal trial. The course includes a comprehensive analysis of the most frequently used rules of evidence. There are readings and discussions pertaining to the nature of real, testimonial, hearsay, and circumstantial evidence. The course rules concerning the cross-examination of witnesses, exceptions to the exclusion of hearsay evidence, the burden of proof, the provinces of the judge and of the jury, legal presumptions, and the exclusion of illegally obtained evidence. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

This course is designed to instruct the student in the various accepted contemporary dynamics of interviewing and counseling criminal justice and related human service agencies. Issues to be discussed will revolve around counseling and supervision strategies and conflicts among agencies, between administrators and staff, and between staff and clients. This course will present both the practical and theoretical aspects of these issues as well as devote attention to surveying prospective counseling strategies for accomplishing desired behavioral change. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

The course analyzes possible sentencing options available to the criminal courts as well as pre-adjudicatory alternatives for both adults and juvenile offenders. The variety of dispositions evaluated include: probation, parole, half-way houses, work-release, study-release, prison furloughs, pre-trial release, pre-probation alternatives (fine, suspended sentence, 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 programs. Field trips and guest lecturers from non-traditional programs are typically included in the course. (GCJC-207)

Class 3, Credit 4 (offered on sufficient demand)

The course will examine the role traditionally attributed to the members of minority groups as criminals and analyze their interaction with the criminal justice system. Heavily relying on the conflict perspective, the course will review the literature on the creation of laws, the breaking of laws, and the processing of minority members in the criminal justice system. (GCJC-201, 203)

Class 3, Credit 4 (offered on sufficient demand)

It is the objective of this offering to expose the student to issues of planning within the criminal justice system. Police, courts and corrections will be discussed, in view of current and proposed changes. The planning of change will be emphasized with regard to organizational issues. In addition, attention will be given to surveying various strategies for accomplishing change. This course is designed to give the advanced student the opportunity to intensely scrutinize the prospective shape of the criminal justice system. (GCJC-203)

Class 3, Credit 4 (offered annually)

A course designed to explore the management aspects of the court and court process. There is a focus on the structure of the several levels of court that typically exist in modern urban America. Related to this structure are the various other criminal justice agencies that interact with the court at various stages of the process. In addition, operational problems such as the bail process, record keeping, jury service and selection methods, and calendar management will receive significant attention.

Class 3, Credit 4 (offered on sufficient demand)

The course examines, in a comparative analysis, the criminal system and the penal methods of Europe and the United States. Major emphasis will be given to the issues of intent, criminal responsibility, individual and public interests, purposes and modes of prevention, repression and punishment, methods of trial, punishment and pardon. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

Police-public contact; uses of the communications media in projecting the police image; responsibilities of police in dealing effectively with minority groups, civil rights, civil disorder, and public protection. An exploration of the role and function of the police in intergroup relations. (GCJC-303)

Class 3, Credit 4 (offered on sufficient demand)

This course is intended to provide the student with a broad overview of the law of sentencing and the alternatives presently available in this area. Emphasis will be placed on the traditional methods of punishment now available in the courts, including, but not necessarily restricted to: fines, imprisonment, probation and suspended sentences. The course will also look to the power of the court in exercising its discretion in the sentencing process. (GCJC-201, 207, 304)

Class 3, Credit 4 (offered on sufficient demand)

The course is designed to familiarize the student with many of the implications and ramifications of efforts to control "victimless" crimes. Course discussions concentrate on the illegal activity associated with prostitution, gambling, homosexuality, drug use and pornography. In this course the social, moral, legal and practical consequences of legalizing such activities are examined and evaluated. (GCJC-201, 203, 301)

Class 3, Credit 4 (offered on sufficient demand)

The course will analyze the causes of the outbreak and rapid increase of violent crimes in America; the interdependence between socioeconomic instability and crime, underdevelopment and crime, urban crisis and social mobility, unequal opportunities and racial strife. The course will transcend the national boundaries of America and will focus on crime, violence, and urban crisis in other parts of the world. The course will be a comparative study of America's and the world's problems of violence, crime and urban crisis. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

This course focuses on the special security problems of such public and private institutions, such as hospitals, nursing homes, hotels, airports and banks. The development and implementation of appropriate security controls and safety measures for employees, clients, and the public are examined. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)
GCJC-526 Seminar in Law Enforcement
Registration #0501-526
A critical analysis of some of the current issues, problems and concerns in the arena of law enforcement; emphasis on basic police functions as it relates to the courts, corrections and the community. Conflicts between theory and practice are examined and analyzed, and future trends in law enforcement will be explored. (GCJC-303)
Class 3, Credit 4 (offered annually)

GCJC-527 Advanced Criminal Law
Registration #0501-527
The course will investigate assumptions and concepts of criminal law. The course will emphasize major crimes against the person and major crimes relating to property. (GCJC-201, 203, 301)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-528 Etiology of Crime
Registration #0501-528
This course is a comprehensive survey of the sociological, psychological, and psychiatric views of the etiology of crime and other forms of deviant behavior. With major emphasis on the sociological forms of explanation, the course will undertake a historical review of criminality theory and progress to present-day concerns of both etiological origins. (GCJC-201, 203)
Class 3, Credit 4 (offered annually)

GCJC-529 Physical Security and Safety
Registration #0501-529
The course examines, through survey techniques, the complex problems confronting business and industry in the protection of assets. The use of electronic and non-electronic anti-intrusion systems and other hardware is examined and evaluated. Safety and accident prevention, health hazard prevention methods, and fire prevention and control, also are examined. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-530 Women and Crime
Registration #0501-530
This course will deal with women as criminal offenders and as victims of crime, focusing upon theories about women in crime, types of crimes committed, patterns of criminality, and the treatment of women offenders. The course, also, will examine the role of women as law enforcement officers, judges, lawyers, and correctional officers in the criminal justice system.
Class 3, Credit 4 (offered annually)

GCJC-531 Emergency and Disaster Planning
Registration #0501-531
The course is designed to define the role of security in natural and man-made disasters. Flood, earthquakes, fires, labor disturbances, sabotage, bomb and bomb threats, extortion, executive protection, civil strife, war and terrorism will be examined, with emphasis upon formulating plans and methods to effectively deal with these events.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-532 Retail Security
Registration #0501-532
This course provides an analysis of major security problems found within retail operations. Subjects examined include internal and external theft prevention and detection, shoplifting techniques, the use of undercover personnel and shopping services, security audit, and training of security and non-security personnel. Warehousing and cargo controls are examined. Emphasis will be placed upon methods, techniques and programs to protect assets.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-535 Security Management
Registration #0501-535
This course will focus on the management skills required in the security function and the corresponding administrative, legal and technical problems. Emphasis will be given to purchasing, cost benefit analysis, proprietary versus contract guard forces, personnel management and the relationship between security and non-security employees, and security awareness training programs.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-536 Seminar in Security
Registration #0501-536
This course, designed for seniors completing criminal justice degree requirements with a concentration in security, will focus on critical issues, problems, and concerns in the arena of security that are not otherwise covered directly or in depth in established security courses. Topics are expected to vary from offering to offering.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-537 Legal Aspects of Security
Registration #0501-537
An examination of the federal and state case law and statutory provisions that regulate the private security field. The distinction between public and private enforcement; as well as the possible criminal and civil liabilities of private security personnel under the law of Wilful Torts including: false arrest and imprisonment; nuisance; defamation; and invasion of privacy.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-541 Field Research
Registration #0501-541
Through lecture, discussion, and activities associated with a field research project, the techniques and methods of data collection and analysis are presented. Students will acquire the skills necessary to conduct criminal justice research in field settings and the ability to prepare a formal research/evaluation report. The required research projects typically include data gathering and coding procedures, entry and the data to a file on the VAX/VMS, the use of application software (e.g. SPSS, MINITAB, DATAPLOT), and preparation of a final report. (GCJC-401)
Class variable, Credit 4 (offered annually)

GCJC-542 Field Research Techniques
Registration #0501-542
The course combines the use of both qualitative and quantitative research methods and applies them to the collection and analysis of data from field settings. Emphasis is placed on the use of multiple samples and the techniques of multivariate analysis. Students will draw upon social science theory to develop a research design, analyze data and prepare a report on a topic from Human Services, Criminal Justice or Public Policy. (GCJC-401)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-599 Independent Study
Registration #0501-599
A combined student/faculty member effort on a chosen topic beyond the normal sequence of course selections. It provides the qualified self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.
Class variable, Credit variable (offered annually)

Social Work
Core Courses

GSWS-210 The Professional Social Work Role
Registration #0516-210
Designed to assist students in making decisions regarding their careers in social work. The course covers basic exercises for developing self-awareness and professional self-assessment, explores various fields of social work and helps students begin to build their concepts of social work as a profession.
Class 3, Credit 4

GSWS-211 Social Welfare: Structure and Function
Registration #0516-211
Examines the provision of social services in four major fields of social welfare: public welfare, traditional voluntary agencies, voluntary social movements and the legal system. Course will also explore organization theory as it applies to the structure of these services, as well as major patterns and sources of funding. *(Introduction to Economics; GSWS-302, or concurrent)
Class 3, Credit 4
GSWS-215  The Family From a Social Work Perspective
Registration #0516-215
This course is designed to give the social work student a basic understanding of the family. The course will emphasize the various approaches to intervention with the contemporary American family, including its structure, functions and the interaction and roles of family members both within the family and between family and society. (GSSS-210, 203)
Class 3, Credit 4

GSWS-302  Social Welfare: History
Registration #0516-302
Designed to explore social welfare institutions and processes and their history, philosophy and relationship to other social institutions in the United States. Emphasis is on the role of social work in various interrelated social work institutions.
Focus is on the gradual modification of social policy in order to provide the student with a basic understanding of the evolution of programs and services to meet the changing needs of people. Traces the development of the social work profession and its response to the changing needs of society. (GSWS-210 or concurrent)
Class 3, Credit 4

GSWS-315  Assessing Community Needs
Registration #0516-315
A study of assessment techniques for identifying the strengths and weaknesses of services provided within a community. Attention will be given to programs for minority groups, the disabled, the elderly, youth, persons with mental health problems, and other special populations. (Second year standing)
Class 3, Credit 4

GSWS-356  Group Theory in Social Work
Registration #0516-356
This course covers the theoretical foundations of group dynamics and group behavior within the context of social work. Such concepts as types of groups (prevention, rehabilitation), group development, composition, group processes (problem solving, decision-making, affection), programming, leadership, communication, structure, and modes of intervention are covered. The course provides the knowledge base for the later development of practice skills in working with groups. (Second year standing)
Class 3, Credit 4

GSWS-411  Interviewing and the Helping Relationship
Registration #0516-411 (Methods I)
Methods of Social Work is a three-course sequence offered concurrently with laboratory or field experience. Methods of Social Work stresses the basic principles and skills of a generic approach to social work practice, emphasizing the differential use of social work techniques (e.g., interviewing skills, assessment, problem-solving) and interventive skills in a variety of client systems.
Through lectures, discussions, reading, lab simulations and case analysis, it is the overall objective of the sequence to provide the student with the knowledge, skill and self-awareness for beginning professional social work practice. The development of this knowledge, skill and awareness is seen as a progressive process underlying and underpinning the three-course sequence. (GSWS-210,211, 302, 315, 356 or concurrent)
Class 4, Lab, 4, Credit 4

GSWS-412  Assessment and Problem Solving
Registration #0516-412 (Methods II)
See GSWS-411 (GSWS-411. concurrent with GSWS-421 and GSWS-433)
Class 3, Credit 4

GSWS-413  Intervention Strategies
Registration #0516-413 (Methods III)
See GSWS-411 (GSWS-412, 421 and 433; concurrent with GSWS-422 and 434)
Class 3, Credit 4

GSWS-421  Field Instruction I
Registration #0516-421
Field instruction I and II comprise a 20-week, 30 hr./week supervised field placement. Under the guidance of an instructor, the student is placed in a cooperating social, governmental or education agency in order that he or she may gain firsthand experience with its organization, programs and client assignments. Closely supervised work at the agency is supplemented by seminars designed to integrate theoretical knowledge with practice. (GSWS-411, concurrent with GSWS-412 and 433)
Field 300, Credit 5

GSWS-422  Field Instruction II
Registration #0516-422
See GSWS-421. (GSWS-412, 421 and 433; concurrent with GSWS-413 and 434).
Field 300, Credit 5

GSWS-433  The Supervisory Process
Registration #0516-433
A seminar taken during the first term of field placement. Topics include staff structure, work distribution, the responsibilities of supervisor and supervisee, the ethics of supervision, and professional growth. Students will focus on the supervisory processes within their field placement agencies. (GSWS-411, concurrent with GSWS-412, 421)
Class 2, Credit 4

GSWS-434  Managing Community Services
Registration #0516-434
A seminar taken during the second term of field placement. Topics include special administration concerns of public and private non-profit organizations, the relationship of management to effective service delivery, and the relationship of the individual social worker to management and decision making. Students will discuss these issues by exploring the management procedures of their field placement agencies. (GSWS-412, 421 and 433; concurrent with GSWS-413, 422)
Class 2, Credit 4

GSWS-532  Professional Issues
Registration #0516-532
For social work students who have completed field experience. Examines the profession of social work and the values in social work practice, as stated in the Code of Ethics. Current practice issues of the profession such as licensure, third-party payments and other topics will also be examined. (GSWS-413,422 and 434)
Class 3, Credit 4

GSWS-533  Social Welfare: Policy & Planning
Registration #0516-533
For social work students who have completed field experience. Course will explore the development of social welfare services as it proceeds from the determination of social need through program design to implementation. Concepts of policy process, large system change, and grant and proposal writing are considered. (GSWS-413, 422 and 434)
Class 3, Credit 4

GSWS-534  Research Methods
Registration #0516-534
Introduction to the methodology of research in behavioral and social sciences. Stress will be on the use of theoretical concepts, formulation of hypotheses, collection of data, measurements, statistics, tests and evaluation, Instruction and practical demonstration are provided in techniques ranging from simple case studies to computer utilization. (GSWS-210) (Usually taken after Field Placement)
Class 3, Credit 4

GSWS-535  Senior Research
Registration #0516-535
For social work students who have completed field experience. The seminar is directly related to the projects that students are working on and consists of weekly presentations developed around individual student's needs for help and supervision. Students will present current data on their projects' process, as well as participate in a helping process with other class members. (GSWS-312, 413, 422, and 434)
Class 3, Credit 4
### Social Work Electives

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<td>GSWS-431</td>
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GSWS-432 Supervision In Social Work
Registration #0516-432
This course identifies and teaches the supervisory skills required in social work and related agencies. Different methods and techniques are explored. Role play and video tape are used.
Class 3, Credit 4

GSWS-455 Contemporary Issues in Social Work
Registration #0516-455
This course is designed to offer students an opportunity to examine and discuss contemporary issues in the field of social work. Course content will vary from quarter to quarter dependent on current issues and student interest. Areas related to expressed student interest, faculty expertise and developments in the field will be examined. Specific readings will be assigned with classroom discussions, speaker, films, field trips or role plays included depending on the nature of the issues being addressed.
Class 3, Credit 4

GSWS-509 Services for Children and Their Families
Registration #0516-509
This course is designed to give social-work students a beginning knowledge of social-work services to children and their families. The development of each type of service will be discussed as well as the reasons why each service is needed and for what type of situation. The social worker's role in each area will also be considered.
Class 3, Credit 4

GSWS-512 Advanced Intervention with Individuals
Registration #0516-512
This course builds upon the methods sequence knowledge base and develops students' understanding of the specific ways in which these concepts and theories are applied in social casework intervention with individuals and families. Use will be made of case studies and role-play situations to further develop the students' skills in this area. (GSWS-413, 422, and 434)
Class 3, Credit 4

GSWS-513 Advanced Intervention with Families
Registration #0516-513
This course is for students who have completed Field Placement where it is assumed that they have learned the theories and concepts of generic social work intervention. This course builds on that knowledge base and develops the students' understanding of the specific ways in which these concepts and theories are applied. (GSWS-413, 422, 434)
Class 3, Credit 4

GSWS-522 Advanced Intervention in Communities
Registration #0516-522
This course examines community intervention as a social work method. The roles and functions of the community intervention practitioner and alternative models of practice are analyzed. Activities include analysis of the work of the student in his/her community, analysis of the work of the agency setting.
Class 3, Credit 4

GSWS-523 Advanced Intervention with Groups
Registration #0516-523
This course examines social treatment as one form of group work practice. There are different service procedures and approaches which center on the use of client groups, and each may have utility in pursuing distinct service objectives. The course will investigate specific applications of community intervention theory to political influence processes, coalition, neighborhood associations and regionalization. (GSWS-413, 422, and 434)
Class 3, Credit 4

GSWS-525 Grantwriting
Registration #0516-525
This course introduces the student to guidelines and procedures employed in grant writing. Grantwriting is designed to provide the student with a series of readings and experiential exercises necessary for writing a grant proposal.
Class 3, Credit 4

GSWS-599 Independent Study
Registration #0516-599
A combined student/faculty effort on a chosen topic beyond the normal sequence of course selections. It provides the self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement. Independent Study may include independent work in an agency setting.
Credit variable

Liberal Arts Courses

Language and Literature

GLLC-220 English Composition
Registration #0502-220
This course develops the language skills needed to write effectively. It should be taken in the freshman year.
Class 3, Credit 4 (offered quarterly)

GLLC-440 Human Communication
Registration #0502-440
Human Communication is an overview of the field of communications including the contexts of interpersonal, group, mass, and public communication. This course is part of the Language Concentration and may also be taken as an elective. (0502-220 or equivalent)
Class 3, Credit 4 (offered annually)

GLLC-441 Small Group Communication
Registration #0502-441
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. This course is part of the Language Concentration and may also be taken as an elective. (0502-220 or equivalent)
Class 4, Credit 4 (offered annually)

GLLC-442 Persuasion
Registration #0502-442
A study in depth of the theories, practices, effects and ethics of persuasion. Persuasion is defined as human communication designed to influence one's beliefs, values, attitudes, and actions. This course is part of the Language Concentration and may also be taken as an elective. (0502-220 or equivalent)
Class 3, Credit 4 (offered annually)

GLLC-443 Writing and Thinking
Registration #0502-443
This course develops the reasoning and advanced language skills needed to carry out applied logic and applied problem-solving writing processes. This course is part of the Language Concentration and may also be taken as an elective. (0502-220 or equivalent)
Class 3, Credit 4 (offered annually)

GLLC-501 Effective Speaking
Registration #0502-501
The development of the techniques of formal public speaking as an aid to self-confidence in modern social and business situations. Weekly practice talks with emphasis on organization, clarity, vocal expression, poise.
Class 3, Credit 4 (offered annually)

GLLC-514 Mass Communication
Registration #0502-514
An introduction to the study of the mass media. The focus of the course is on the history, development, and law and regulation of the mass media in the United States.
Class 3, Credit 4 (offered annually)

GLLC-515 Uses and Effects of the Mass Media
Registration #0502-515
An analysis of the "effects" and the "uses and gratifications" of mass communication research with focus on building mass communication theory. (Note: Students may find GLLC-514 a useful introduction to this course)
Class 3, Credit 4 (offered annually)
GLLC-517
Registration #0502-517
Newswriting
Practicum in basic techniques of news writing and gathering for the daily press. Emphasis will be primarily on writing for the print media. Emphasis on frequent writing against a deadline.
Class 3, Credit 4 (offered annually)

GLLC-518
Registration #0502-518
Creative Writing
Students are introduced to the craft of writing poems, stories, scripts, and personal essays.
Class 3, Credit 4 (offered annually)

GLLC-519
Registration #0502-519
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 will be given an opportunity to explore in depth a literary genre, subject or theme chosen by the individual student in conference with the instructor. The acceptability of the student's project will be determined on the basis of its intrinsic literary merit and its potential value to the student's development as a writer.
Class 3, Credit 4 (offered occasionally)

GLLC-520
Registration #0502-520
College Vocabulary Skills
Application to the process of vocabulary building of the various disciplines of language study will be provided. Included among these will be application of dictionary study, etymology, semantics, and structural linguistics. In addition, literary works, periodicals, and newspapers will be examined to strengthen the student's awareness of the contextual variation in the meaning of words. Ineffective and faulty devices of language usage will also be discussed.
Class 3, Credit 4 (offered annually)

GLLC-521
Registration #0502-521
Intercultural Communication
This course is an examination of the role of culture in face-to-face interaction. There are no prerequisites, but students may find a basic background in communication, anthropology, or psychology useful.
Class 3, Credit 4 (offered annually)

GLLC-522
Registration #0502-522
Rhetoric of Social Change
Readings 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.
Class 3, Credit 4 (offered occasionally)

GLLC-530
Registration #0502-530
German I
This course will introduce students with no prior exposure to the language to some control of modern German. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the German-speaking countries. Although this is the first course of a three-course sequence, the course may be taken separately.
Class 4, Credit 4 (offered annually)

GLLC-531
Registration #0502-531
German II
This course is designed to give students further control of natural, modern German. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the German-speaking countries. Although this is the second course of a three-course sequence, the course may be taken separately.
Class 4, Credit 4 (offered annually)

GLLC-532
Registration #0502-532
German III
This course is designed to give students more advanced control of natural, modern German. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the German-speaking countries. Although this is the last course of a three-course sequence, the course may be taken separately.
Class 4, Credit 4 (offered annually)

GLLC-533
Registration #0502-533
This course will introduce students with no prior exposure to the language to some control of modern Spanish. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in Spanish-speaking countries.
Class 3, Credit 4 (offered annually)

GLLC-534
Registration #0502-534
This course is designed to give students further control of modern Spanish. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in Spanish-speaking countries. Although this is the second course of a three-course sequence, the course may be taken separately.
Class 3, Credit 4 (offered annually)

GLLC-535
Registration #0502-535
This course is designed to give students more advanced control of modern Spanish. Besides language, students will also study contemporary life and culture in Spanish-speaking countries. Although this is the last course of a three-course sequence, the course may be taken separately.
Class 3, Credit 4 (offered annually)

GLLC-536
Registration #0502-536
American Sign Language I
This course presents a study of the origins, nature, and development of American Sign Language (ASL), and its variants, as used by the deaf population of North America. Integral to the course is the linguistic structure of ASL and the nature of signing as a linguistic modality.
Class 3, Credit 4 (offered annually)

GLLC-558
Registration #0502-558
Technical Writing
An exploration of technical writing skills with emphasis on regular writing assignments. Class periods will be devoted to discussions of the requirements of technical writing and to analysis and evaluation by students of their writing. The aim of the course is to enable students to fulfill technical writing demands with prose that is unified, coherent, and accurate. Students enrolling in this course should have a command of written English and the ability to write clear and logical prose. The course is primarily intended for students who have written at work or with some other experience in practical or technical writing.
Class 3, Credit 4 (offered annually)

GLLC-537
Registration #0504-337
Literature: Poetry & Drama
The students study some of the great literary works of our culture to enrich their lives and reinforce their analytical abilities. The students read representative poems, dramas, and narratives drawn from the Ancient, Medieval-Renaissance, and Modern Periods. This two credit course and the companion two credit course 0504-338 are the only required literature courses in the student's career.
Class 2, Credit 2 (offered fall)
GLLL-338 Literature: Prose Fiction
Registration #0504-338
The students study some of the great literary works of our culture to
enrich their lives and reinforce their analytical abilities. The students
read representative prose fiction drawn from the Ancient, Medieval-
Renaissance, and Modern Periods. This two credit course and the
companion two credit course 0504-337 are the only required litera-
ture courses in the student's career.
Class 2, Credit 2 (offered winter)

GLLL-440 Western Drama/Theatre
Registration #0504-440
The Western Drama/Theatre course studies Drama as a genre and
Theatre as a performing art. Intensive study of at least one major
playwright or period complements a general survey of Drama/The-
atre from Ancient Greece to Modern Broadway. This course is part of
the Literature Concentration and may also be taken as an elective.
(0504-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-441 The Art of Poetry
Registration #0504-441
This course emphasizes the enjoyment and study of poetry with
primary attention to major poetry in English. This course is part of
the Literature Concentration and may also be taken as an elective. (0504-
332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-442 The Short Story
Registration #0504-442
The course is study of a collection of short stories with critical
commentary in order to provide source materials on the nature and
development of this genre. This course is part of the Literature
Concentration and may also be taken as an elective. (0504-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-443 The Novel
Registration #0504-443
The Novel course provides a close reading and analysis of several
novels selected to show the range of narrative techniques, methods
of characterization and plot construction, and styles representative
of the genre. This course is part of the Literature Concentration and
may also be taken as an elective. (0504-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-444 Film as Literature
Registration #0504-444
The course examines the nature of narrative in both film and litera-
ture, the various aspects of adaptation of literature into film, and the
relationship between social reality and storytelling in documentary
film. The course is a non-technical, non-chronological study of film
with a balance of roughly 50% literature and 50% film. This course
is part of the Literature Concentration and may not be taken as an elective. (0504-332 or equivalent)
Class 3, Credit 4 (offered annually)

GLLL-480 Women In Literature
Registration #0504-480
The course concentrates on literature by women and about women
primarily from the early nineteenth century to the present. The
course considers the aspiration, frustrations, and achievements of
women as documented by themselves, as well as the perceptions and
representations of women in literature by male writers. Works are
examined for their literary value as well as their documentation of
broader feminist issues. This course is part of the Women's Studies
Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GLLL-483 Hinduism and Buddhism
Registration #0504-483
This course presents the religious experience from the viewpoints of
two major Eastern Religions: Hinduism and Buddhism. Drawing
upon these traditions, the course examines the psychological and
philosophical dimensions of the religious experience. This course is
part of the Perspectives on Religion Concentration and may also be
taken as an elective.
Class 3, Credit 4 (offered annually)

GLLL-484 Religion and Literature
Registration #0504-484
A literature course which explores the complexity and variety of
man's personal religious quest and its conflicts as these are por-
trayed by writers from biblical times to our own day. The literature
will be supplemented by readings from such disciplines as psychol-
ogy, philosophy, history and theology. This course is part of the
Perspectives on Religion Concentration and may also be taken as an
elective.
Class 3, Credit 4 (offered annually)

GLLL-501 Speculative Fiction
Registration #0504-501
Speculative fiction is a survey course in contemporary literature
presenting conjectural views of man, his world, his society and his
beliefs. Some attention is given to the historical development of
the genre but the major areas of concern are the ideas presented by
writers publishing in the last ten years.
Class 3, Credit 4 (offered annually)

GLLL-502 Modern Latin American Literature
Registration #0504-502
Reading short stories, novels, and poetry of modern Mexico, Central
and South America reveals a literature and culture wherein the
mythic functions as an integral part of the modern world view and the
poetic functions as a potent 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.
Class 3, Credit 4 (offered occasionally)

GLLL-503 Great World Drama
Registration #0504-503
A chronological survey of the major periods of theatrical evolution,
with emphasis on the physical theatre and production techniques
which influenced the playwright's works within respective periods.
Class 3, Credit 4 (offered annually)

GLLL-504 Shakespeare: Comedy and History
Registration #0504-504
Shakespeare's comedy and history plays are read and
analyzed to reveal their literary excellence and their theatrical power.
Class 3, Credit 4 (offered annually)

GLLL-505 The American Spirit in Literature
Registration #0504-505
This is a survey of the development of American philosophy through
the study of the 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.
Class 3, Credit 4 (offered annually)

GLLL-506 Literary Symbolism In Short Fiction
Registration #0504-506
Emphasis is on defining literary symbolism and in recognizing this
device when it is employed in literary works, with special attention
given to the accurate interpretation of symbolic works.
Class 3, Credit 4 (offered annually)

GLLL-515 Contemporary American Novel
Registration #0504-515
The course will cover American fiction written after World War II. Works by contemporary American writers will be examined, with
special emphasis being placed on these writers' relation to contem-
porary American culture.
Class 3, Credit 4 (offered annually)

GLLL-516 Literature and Society
Registration #0504-516
Selected works by writers such as Sophocles, Dante, Dickens,
Camus and Vonnegut as important works of art that reflect the
human condition and implicitly prophesy against particular evils in
attitudes or institutions of their times.
Class 3, Credit 4 (offered annually)
A study of 19th century European prose and poetry (primarily British) with particular attention paid to the collapse of the Romantic vision, and its gradual absorption into the aesthetic and decadent literary traditions of late nineteenth century European literature.

Class 3, Credit 4 (offered occasionally)
Science and Humanities

GSHF-422 Music in the United States
Registration #0505-422
A survey of music in the United States from the time of European colonization to the present. Particular emphasis will be placed upon
the question of what makes music distinctively "American." This
course is part of the American Artistic Experience Concentration and
may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-443 Images of American Life
Registration #0505-443
This course examines 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. This course is part of the Ameri-
can Artistic Experience Concentration and may also be taken as an
elective.
Class 3, Credit 4 (offered annually)

GSHF-444 American Painting
Registration #0505-444
A survey of the style and meaning in American paintings from the
colonial limners to contemporary artists. It will center on what distin-
guishes painting of the colonies and of the United States from its
European counterpart. This course is part of the American Artistic
Experience Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-445 Issues in American Art
Registration #0505-445
The purpose of this course is to offer the student a comprehensive
overview of American attitudes and philosophies as they have
shaped and been embodied in our artistic heritage. Emphasis will be
placed on American art from 1850 to the present. This course is part
of the American Artistic Experience Concentration and may also be
taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-480 Women and the Visual Arts
Registration #0505-480
This course examines the image of women in the visual arts and the
role of women as image makers. Major topics to be covered include:
the variety of images of women, the evolution and change of these
images over time, media images (as differentiated from fine art
images) of women, images of women by women and 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 their period, current issues and status of women artists. This
course is part of the Women's Studies Concentration and may also
be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHF-501 Craftsmanship In Gothic Art
Registration #0505-501
A survey of religious and secular art in Europe from about 1100 to
1500 A.D. and its antecedents. Media to be studied include manu-
script illumination, sumptuous objects, and church architecture
(including associated sculpture, mosaics, paintings and stained
glass).
Class 3, Credit 4 (offered occasionally)

GSHF-509 Impressionism to Analytical Cubism
Registration #0505-509
This course deals with the historical and stylistic aspects of the
avant-garde painters of the second half of the nineteenth century and
the first decade of the twentieth century. It traces the struggles of
these artists to break away from the traditional forms of expression
and to attain a new vision of reality.
Class 3, Credit 4 (offered annually)
GSHF-512 Master Drawings Since the Renaissance
Registration #0505-512
A study of drawings from the 15th to the 20th century, including the work by Leonardo da Vinci, Michaelangelo, Durer, Rembrandt and Picasso.
Class 3, Credit 4 (offered occasionally)

GSHF-513 Oriental Art
Registration #0505-513
A survey outlining the development of art in India, China, Japan and examining the philosophical circumstances that distinguish Eastern artistic traditions. There will be opportunity for each student to pursue special interests in depth.
Class 3, Credit 4 (offered occasionally)

GSHF-514 Cubism to the Present
Registration #0505-514
An investigation into modern man’s struggle to preserve his identity in our fast developing technological world as reflected in the vitality and diversity of today’s visual arts. Differences and similarities with art forms of earlier eras and other cultures will also be discussed.
Class 3, Credit 4 (offered occasionally)

GSHF-515 Semiotics of Computer-Aided Human Activity
Registration #0505-515
Computer technology is only part of what is called “computer civilization.” Actually, the essential component is the man-machine relation. Semiotics deals with every interface activity and is perfectly suited to considering the various aspects of computer-aided human activity. The course will focus on a generalized concept of interfacing and also address topics related to artificial intelligence. To enroll in this course, students must receive permission from the professor.
Class 3, Credit 4 (offered annually)

GSHF-519 Rembrandt Van Rijn: His Art and Times
Registration #0505-519
A study of the life, art and times of the Baroque master. Emphasis will be placed on his stylistic evolution, his relation to his society and to the Baroque style, and on his humanistic world view.
Class 3, Credit 4 (offered annually)

GSHF-520 Picasso
Registration #0505-520
The life and work of one of the most influential artists of our century.
Class 3, Credit 4 (offered annually)

GSHF-524 Music Theory I
Registration #0505-524
This course is designed for the student who has basic musical literacy (ability to read music notation). In addition to the writing of melody, two-part counterpoint and four-part harmony, some attention will be given to the analysis of form and style.
Class 3, Credit 4 (offered occasionally)

GSHF-526 Twentieth Century Music
Registration #0505-526
A survey of major 20th century composers and their works. Emphasis will be placed on the development of music in the classical tradition, experimental music and jazz.
Class 3, Credit 4 (offered annually)

GSHF-528 Romanticism in Music
Registration #0505-528
A survey of music written during the Romantic Period (19th century), including later trends—Impressionism (Debussy, Ravel) and Neo-classicism (Satie, Stravinsky). Genres include orchestral music, chamber music, piano, song, ballet, and opera. Representative composers are Chopin, Brahms, Wagner, and Tchaikovsky.
Class 3, Credit 4 (offered occasionally)

GSHF-530 Art and Human Values
Registration #0505-530
This course investigates the nature and value of the arts and their relation to other areas of human activity such as religion, economics, science and technology and personal freedom.
Class 3, Credit 4 (offered annually)

GSHF-532 African Tribal Art
Registration #0505-532
After an investigation of the world of “primitive” man and the function of art in a tribal environment, this course will focus on preliterate societies of sub-Saharan Africa.
Class 3, Credit 4 (offered occasionally)

GSHF-534 Renaissance and Baroque Art
Registration #0505-534
This course examines the stylistic development of painting in Europe from 1420 to 1650. The Renaissance style will be analyzed and studied through the works of painters, with emphasis placed on stylistic evolution through the 15th century and the classical synthesis created in the high Renaissance. Mannenst and Early Baroque paintings will be discussed from the point of view of the Renaissance style to investigate concepts of stylistic continuity, evolution, and change. Paintings will also be discussed within their cultural and political contexts.
Class 3, Credit 4 (offered occasionally)

GSHF-536 Bach and the Baroque
Registration #0505-536
This course will survey the development of opera and the American musical theatre, highlighting representative works, composers, librettists, and performers.
Class 3, Credit 4 (offered occasionally)

GSHF-537 Beethoven
Registration #0505-537
This course introduces the music of Beethoven in the psychological, political and philosophical contexts that gave it shape and force. Using the classical style of Haydn and Mozart as background, it focuses on the development of the “Dionysian” personality in Beethoven’s compositions and the creation of the sublime in music.
Class 3, Credit 4 (offered occasionally)

GSHH-301 History: Modern American
Registration #0507-301
This course examines the political, social, cultural, and economic development of the American people in the modern period. Studies the United States in its foreign relations.
Class 3, Credit 4 (offered quarterly)

GSHH-302 History: Modern European
Registration #0507-302
An examination of social, economic, political and intellectual movements of Europe from the Modern Period to the Twentieth Century, which played major roles in shaping our contemporary world.
Class 3, Credit 4 (offered quarterly)

GSHH-440 United States: Its People and Its Institution
Registration #0507-440
This course will examine the American people, their society and their culture, in relation to the nation’s institutions: government, courts, business, labor and political and private associations. The interplay between the American people and the institutions which structure their lives sheds light on the dynamic forces which shape American history and help to explain the present. Instead of detailing day-to-day chronology, this study will highlight the sweep of major trends and movements over longer periods of the American experience. This course is part of the History Concentration and may also be taken as an elective. (0507-301 or 0507-302 or equivalent)
Class 3, Credit 4 (offered annually)
GSHH-441 20th Century American Diplomatic History Registration #0507-441
An examination of the major events and forces which shaped American diplomacy from the opening years of the twentieth century to the immediate post World War II era. This course is part of the History Concentration and may also be taken as an elective. (0507-301 or 0507-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-442 The Contemporary Middle East Registration #0507-442
This course analyzes the making of the contemporary Middle East from the rise of Islam to the present with special emphasis on the patterns of political development in the twentieth century. This course is part of the History Concentration and also the International Relations Concentration and may also be taken as an elective. (0507-301 or 0507-302 or equivalent for the History Concentration; 0513-211 or 0513-215 or equivalent for the International Relations Concentration)
Class 3, Credit 4 (offered annually)

GSHH-443 European Social and Intellectual History Since 1600 Registration #0507-443
An analysis of social events and intellectual movements in Europe since 1600. This course is part of the History Concentration and may also be taken as an elective. (0507-301 or 0507-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-444 European Diplomatic History, 1871-1945 Registration #0507-444
The course seeks to investigate the origins of the First and Second World Wars with special emphasis on the diplomacy of the European Great Powers. This course is part of the History Concentration and may also be taken as an elective. (0507-301 or 0507-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-445 Modern Latin America Registration #0507-445
This course surveys the historical development of the Hispanic and Portuguese areas of the Americas from independence to the mid-twentieth century. The movement towards independence, the problems that emerged during the nineteenth century of forming unified nations, and the problems of modernization in the twentieth century are all covered. The histories of selected countries are used to illustrate these issues. This course is part of the History Concentration and may also be taken as an elective. (0507-301 or 0507-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-480 History of American Women Registration #0507-480
A history of women in North America from the colonial period to the present. Concentrates on the social, political, cultural, diplomatic and economic history of women in the United States and Canada. This course is part of the Women’s Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHH-483 Christianity in the West Registration #0507-483
This course traces the development of Christian thought in the broad historical context of Western Civilization. It concentrates on major movements and outstanding personalities. The 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. This course is part of the Perspectives on Religion concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHH-501 United States Community History Registration #0507-501
Students will study how people lived 1850-present in different kinds of local communities in the United States, such as working associations, private organizations and political communities.
Class 3, Credit 4 (offered occasionally)

GSHH-502 Europe Since 1918 Registration #0507-502
A study of the European states and peoples in the inter-war period, the diplomatic and military history of World War II, the reconstruction of Europe, the Cold War, Detente, and contemporary Europe.
Class 3, Credit 4 (offered occasionally)

GSHH-503 The History of Russia Registration #0507-503
A study of the historical context and development of Russian society and the factors leading to the emergence of the Soviet regime.
Class 3, Credit 4 (offered occasionally)

GSHH-504 Foundations of Asian Civilizations Registration #0507-504
This course is primarily a study of the Confucian/Buddhist world in East Asia with the focus on China and Japan, their origins, their peoples, and their cultural characteristics.
Class 3, Credit 4 (offered occasionally)

GSHH-505 Japan In the Modern World Registration #0507-505
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.
Class 3, Credit 4 (offered occasionally)

GSHH-506 History of Chinese Communism Registration #0507-506
An analysis of the main characteristics of Chinese Communism, its native roots, Marxist/Leninist elements, and Maoist innovations. The course will also examine the causes for the rise of Communism in modern China, the context and process of its development, as well as contributions and problems Communism brought forth to the Chinese people. In addition, China and the world will be examined.
Class 3, Credit 4 (offered occasionally)

GSHH-507 The World, 1914-1945 Registration #0507-507
This course aims to give continuity (interpretation of cause and effect relationships) to the major developments of the period 1914-1945. The course notes the impact of classical liberal economic theories in a period of rapid mechanization and industrialization. Rising social expectations in the period of exploding democratic and later social liberalism are observed in their relationship to revolution and reaction. This course considers the causes of World War I and examines the military operations in some detail.
Class 3, Credit 4 (offered occasionally)

GSHH-508 History of England Registration #0507-508
A political and constitutional history of England from the Anglo-Saxon period to the present.
Class 3, Credit 4 (offered on sufficient demand)

GSHH-514 Race and Society Registration #0507-514
A social, historical, political, religious and anthropological appraisal of the factors which have produced the differences between social appearances and social attainments of the world’s population.
Class 3, Credit 4 (offered occasionally)

GSHH-516 The Middle Ages and the Rise of Europe Registration #0507-516
The Medieval society and its political, religious, economic, and social problems and achievements will be analyzed as the foundation and the cradle of our modern society.
Class 3, Credit 4 (offered annually)

GSHH-519 United States-Latin America Relations Registration #0507-519
The emphasis in this course will be on analyzing the United States relations with Latin America from independence to the present.
Class 3, Credit 4 (offered annually)
GSHH-520
Crime, Violence, and Urban Crisis
Registration #0507-520
The course will analyze the causes of the outbreak and rapid increase of violent and criminal trends in the world as the most serious realities of the 20th century. The course will be a comparative study on America's and the world's problems of violence, crime, and urban crisis.
Class 3, Credit 4 (offered annually)

GSHH-524
The Italian American Experience
Registration #0507-524
Examines the history 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.
Class 3, Credit 4 (offered annually)

GSHH-526
The United States and The Third World
Registration #0507-526
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. This course will study the underlying causes of these revolutions and the reaction of the United States government to this revolutionary ferment in Latin America, Asia, and Africa.
Class 3, Credit 4 (offered annually)

GSHH-528
The History of Popular Culture in America
Registration #0507-528
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.
Class 3, Credit 4 (offered annually)

GSHH-529
Military History
Registration #0507-529
An analysis of the causes and nature of war.
Class 3, Credit 4 (offered on sufficient demand)

GSHH-530
19th Century American Diplomatic History
Registration #0507-530
An examination of American diplomacy from the early years of American independence to the emergence of the United States as a world power. The War of 1812, Monroe Doctrine, and Manifest Destiny are among the topics considered.
Class 3, Credit 4 (offered annually)

GSHH-531
Black Experience in America
Registration #0507-531
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.
Class 3, Credit 4 (offered annually)

GSHH-532
Civil Liberties in American History
Registration #0507-532
The course will teach the history of civil liberties in America. Emphasis will be placed on the current state of civil liberties. Students will make philosophical as well as historical analyses of cases.
Class 3, Credit 4 (offered annually)

GSHH-536
History of Mexico
Registration #0507-536
The historical development of Mexico including the colonial period, independence movement, the liberal-conservative class, and the revolution of 1910.
Class 3, Credit 4 (offered alternate years)

GSHH-538
Social Justice and the Constitution
Registration #0507-538
Social Justice in American History
The course will analyze how the constitution has met the social and political expectations of citizens. Emphasis will be placed on analyzing Supreme Court cases that explain the current state of social justice. This is a companion course to GSHH-532, Civil Liberties in American History.
Class 3, Credit 4 (offered annually)

GSHH-540
Selected Problems in Black History
Registration #0507-540
A seminar approach to the thought of key black leaders (Washington, Garvey, King) and the study of the civil rights and black power movements.
Class 3, Credit 4 (offered occasionally)

GSHH-541
Modern Germany
Registration #0507-541
A study of Germany in the 19th and 20th centuries. This course will begin with the unification of Germany in 1871 and trace the political evolution of the nation to the present. Special emphasis will be placed on the rise of Nazism. Pertinent social and cultural factors will be considered as well.
Class 3, Credit 4 (offered annually)

GSHH-545
Revolutionary Leaders in Latin America
Registration #0507-545
In this course three movements will be studied; the rise of Juan Peron in Argentina in the 1940's; Fidel Castro's revolution in Cuba; and Salvador Allende's electoral victory in Chile in 1970. By studying these three "revolutionary" movements, it is hoped that the student will come to an understanding of the historical perspective and nature of the social discontent in Latin America.
Class 3, Credit 4 (offered annually)

GSHH-547
History of Social Discrimination
Registration #0507-547
A study of the discriminatory practices, present and historical, found in the United States. To include the cultural values and problems of acculturation for the American Indian, Black, Puerto Rican, Chicano, Asian, women, and religious groups, with emphasis on its implications to social work.
Class 3, Credit 4 (offered annually)

GSHH-550
The Ascent of Man
Registration #0507-550
The course is a multi-disciplinary study in societal, historical, intellectual, technological and scientific perspectives of man's development from prehistoric times to the present. The course is partially based on the television series The Ascent of Man created and narrated by J. Bronowski.
Class 3, Credit 4 (offered annually)

GSHH-551
Social History of 18th Century England
Registration #0507-551
Students will study the emergence of the modern English society in the 18th century and the conflict this caused with the pre-existing traditional culture.
Class 3, Credit 4 (offered occasionally)

GSHH-552
History of the World Since 1945
Registration #0507-552
World backdrop for American foreign policy and relations from 1945 to the present, dealing with the Greek Civil War, the Chinese Civil War, the Korean War, the American assumption of Western leadership in the Cold War, economic warfare, the Cuban crisis, war in Southeast Asia, the roles of Presidents from Truman to Reagan, detente, multinational business, the press, and crises in the Middle East. Background is developed for decisions of the 1980's.
Class 3, Credit 4 (offered occasionally)

GSHH-553
The United States Since World War II: Patterns in Recent American History
Registration #0507-553
An analysis of the major themes characterizing post World War II United States history. The course aims to investigate the specific characteristics of America as a modern state. Selected themes will have an intellectual, cultural and political history focus.
Class 3, Credit 4 (offered annually)

GSHH-554
China and Japan in the 20th Century
Registration #0507-554
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.
Class 3, Credit 4 (offered annually)
the positive and negative effects of technology on the social structure.

A study in depth of the Bolshevik revolution, the rise of Stalin, industrialization and collectivization, the terror and purges, the process of de-stalinization under Khroushchev and his successors, and current developments in the Soviet Union.

Class 3, Credit 4 (offered annually)

The Renaissance World

A thematic study of the Renaissance in Europe from 1300 to 1600. The course explores the art, literature, philosophy, society and institutions of the Renaissance which have contributed to the revival of the western culture and heritage.

Class 3, Credit 4 (offered annually)

Communism, Fascism & 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 Values

This course explores the concepts and effects of science and technology in society, analyzes the relationship between science and technology, examines how each has come to play a major role today, and looks at how science and technology have been affected by our values. Science and technology are often assumed to be value free, yet people, guided by individual and societal values, develop the science and technology. In turn, the choices people make among the opportunities provided by science and technology are guided by their individual values.

Class 3, Credit 4 (offered quarterly)

History of Science

This course presents a study of the origins, nature, and development of Western science, and its social, economic, and cultural context. This course is part of the Social Impacts of Science and Technology Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

Science and Technology Policy

This course will examine how local, state, Federal, and international policies are developed to influence innovation, the transfer of technology, and industrial productivity in the United States and other selected nations. This course is part of the Social Impacts of Science and Technology Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

History of American Technology

This course presents an examination of the cultural context of American technology and its influence on American social, economic, political, and cultural institutions. This course is part of the Social Impacts of Science and Technology Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

Face of the Land

This course is a case study in the relationship of technology and society, focusing on the interaction of land, people and technology. By considering the natural landforms of the United States and other countries as appropriate, students will see how the nature of land determines its value. As technological innovations are made and introduced, old relationships with the land are altered, sometimes irrevocably. Through this study students have a concrete example of the positive and negative effects of technology on the social structure. This course is part of the Social Impacts of Science and Technology Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

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 will study several interactions between technology and the world in which we live. We will investigate how various technologies developed and compare the expected effects of the new technologies with the actual results. This course is part of the Social Impacts of Science and Technology and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

Man, Nature and Technology

This course seeks to make students aware of the environmental consequences of modern technology by investigating to what degree various technological systems conflict with the basic ecological principles. This course is part of the Environmental Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

Energy and the Environment

In this course we will look at the current situation, its environmental implications, and try to determine how we got here, why we got here, and where we may be able to go in the next 20-50 years. We will look at the nature, uses, and relative importance of our sources of energy system; high technology and low or appropriate technology, hard energy paths and soft energy paths. We will look especially at the role of government policy in the energy area. This course is part of the Environmental Studies Concentration and may not be taken as an elective.

Class 3, Credit 4 (offered annually)

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 for the environment is not a new concept; its history reaches to ancient times, but the values related to this concern have drastically changed. Understanding environmental values helps one become a better prepared participant in the environmental decision making. This course is part of the Environmental Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

Environmental Legislation, Regulation, and Enforcement

Public compliance with environmental regulations has become increasingly complicated as a result of many laws and regulations instituted since the mid-1960's. The purpose of this course is to study the consequences of major environmental legislation and regulations and to examine the actions of both citizens and the corporate sector as they comply with these laws. The course will also focus on the value, economic, and social implications of environmental regulation, enforcement, and will identify current developments in the area. This is a concentration course in the Environmental Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

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)

Space, Time and Reality

In this course we learn the conceptual development of the 20th century theories of time and space with major emphasis on their applications in the present decade. These views, which grew out of the rigorous, mathematical logic of relativity theory and quantum theory, represent one of the most profound revisions of intellectual thought in human history. We learn how any vestige of an absolute frame of reference in space and time, and how cause and effect and strict deterministic were demolished and how probability was introduced by means of these theories.

Class 3, Credit 4 (offered occasionally)
GSHN-S07 Community Energy Planning
Registration #0508-507
This course is designed to allow the student to understand the concepts underlying community energy self-reliance, how to analyze a community’s energy supply and consumption, and how to evaluate possible energy futures for a community based as much as possible on conservation and alternative energy strategies.
Class 3, Credit 4 (offered occasionally)

GSHP-210 Philosophy: Selected Issues
Registration #0509-210
An introduction to some of the major problems, methods and insights of philosophy with readings from both classical and contemporary sources.
Class 3, Credit 4 (offered quarterly)

GSHP-211 Philosophy: Ethics
Registration #0509-211
An introduction to moral philosophy through an analysis, comparison and evaluation of some main theories that have been offered as systematic ways of making moral decisions, and through discussions of contemporary moral problems.
Class 3, Credit 4 (offered quarterly)

GSHP-213 Philosophy: Critical Thinking
Registration #0509-213
An introduction to philosophical analysis, especially as it may be applied in contexts other than professional philosophy.
Class 3, Credit 4 (offered quarterly)

GSHP-440 Philosophy of Religion
Registration #0509-440
A critical examination of a number of important issues connected with religion. These include the nature of religion itself, the existence of God, the problem of evil, and questions about the language we use when we talk and write about religion. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-441 Logic
Registration #0509-441
An introduction to the basic principles of logic. The main emphasis will be on symbolic, or formal logic, but some attention may be paid to informal logic as well. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-442 Aesthetics
Registration #0509-442
This course will introduce students to thinking philosophically about the nature of art and its relation to other human experiences. Among the topics considered will be: the aesthetic experience, the relation between morality and art, ugliness in art, and truth in art. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-443 Philosophy of Science
Registration #0509-443
An examination of the nature of the scientific enterprise; possible discussion topics include the presuppositions of science, its logic, its claims to reliability, and its relationships to society and to problems of human values. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-444 The Great Thinkers
Registration #0509-444
This course will introduce the student to the thought of some of those philosophers who have been most influential in the history of ideas. An attempt will be made to cover in some depth the works of one or more of those “great thinkers.” It is hoped that 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. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSA-210 Cultural Anthropology
Registration #0510-210
This course is designed to provide students with a basic understanding of how religion operates as an integral part of any society. In order to demonstrate this, the institution of religion will be studied from a cross-cultural, anthropological perspective. Emphasis will be on primitive and peasant societies. This course is part of the Perspectives of Religion Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSA-483 The Anthropology of Religion
Registration #0510-483
This course is designed to provide students with a basic understanding of how religion operates as an integral part of any society. In order to demonstrate this, the institution of religion will be studied from a cross-cultural, anthropological perspective. Emphasis will be on primitive and peasant societies. This course is part of the Perspectives of Religion Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSA-501 Anthropological Research Methods: Explorations in Subcultural Diversity
Registration #0510-501
This course is designed to expose students from a variety of backgrounds to an alternative means of understanding human behavior through the methods of the cultural anthropologist and to demonstrate that variations in cultural patterning exist in our presumably homogenous society. The primary emphasis in the course will be involvement of students in the actual observation of human behavior and collection of data in a subculture of their own selection in the Rochester area.
Class 3, Credit 4 (offered occasionally)

GSSA-502 American Culture: The Archaeology of Us
Registration #0510-502
American history and contemporary American society are examined through the only unexpurgated record of our behavior, the material remains. This course illustrates how the techniques of archaeology can throw new light on the lives of our Pilgrim forbears, the founding fathers, on slaves and free blacks, on the American industrial revolution, and even on the contemporary middle-class of a city like Tucson, Arizona.
Class 3, Credit 4 (offered annually)

GSSA-503 Culture in Crisis
Registration #0510-503
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.
Class 3, Credit 4 (offered annually)
GSSE-504 American Culture: The Anthropology of Us Registration #0510-504
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. (0510-210 or permission of instructor)
Class 3, Credit 4 (offered annually)

GSSE-210 Introduction to Economics Registration #0511-210
This course is designed to introduce the student to basic economic concepts and methods of analysis. Application of these concepts and methods of analysis to the contemporary economic issues of the U.S. and other countries will be emphasized. Topics of primary interest will include: economic methodology, the economizing problem, economic foundations of American capitalism, the marginal principle and efficient choice, supply and demand, national income accounting, models of income determination, the role of government in the economy, money and the banking system, unemployment, and inflation.
Class 3, Credit 4 (offered annually)

GSSE-440 Urban Economics and Public Policy Registration #0511-440
Urban economics is the application of economic analysis to spatial relationships in densely populated (urban) areas. The first part of the course deals with basic economic models which explain the location behavior of consumers and businesses in cities. The second part of the course is issue-oriented, applying the insights gained in the first part to a number of urban problems. This course is part of the Economic Concentration and may also be taken as an elective. (0511-210 or 0511-301 & 0511-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-441 Economics of Human Resources Registration #0511-441
The microeconomic study of human resources encompasses aspects of human involvement in the production and distribution of goods and services. Potential topics are labor force participation, economics of employment discrimination, primary and secondary education, higher education, distribution of income and wealth, poverty and income maintenance, manpower planning, and microeconomic analysis of the work/leisure decision. This course is part of the Economics Concentration and may also be taken as an elective. (0511-210 or 0511-301 & 0511-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-442 Contemporary international Economic Problems Registration #0511-442
This course aims to prepare the student to deal with foreign exchange market, international trade decisions, the macroeconomics effects of trade on domestic economics, and the effects of international business fluctuations on international trade and finance of each country. Though the course is basically a theory course in economics, the applied aspects of international trade and finance are emphasized. This course is part of the Economics Concentration and may also be taken as an elective. (0511-210 or 0511-301 & 0511-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-443 Current American Macroeconomic Problems Registration #0511-443
This course is an in-depth analysis of selected macroeconomic problems such as economic growth, inflation, and business cycles. The primary focus is on the operation of current macroeconomic theory and policy application in the context of the U.S. economic problems, e.g., tax-based incomes policies, wage-price controls. This course is part of the Economics Concentration and may also be taken as an elective. (0511-210 or 0511-301 & 0511-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-444 Public Finance Registration #0511-444
This course is a study of the economics of the public sector. Topics include but are not limited to: taxation and public expenditures and their effect on the allocation of resources, distribution of income, and employment; market failure; public goods; the economics of public choice, and the application of public finance principles and normative questions to public economic issues. This course is part of the Economics Concentration and may also be taken as an elective. (0511-210 or 0511-301 & 0511-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-445 Survey of Economic Thought Registration #0511-445
This course is a survey of the various schools of thought which have developed in economics from the late eighteenth century up to the present. Representative economists from each of the major schools (Classical, Marxian, Neo-Classical, Keynesian, Monetarist, etc.) are studied. This course is part of the Economics Concentration and may also be taken as an elective. (0511-201 or 0511-301 & 0511-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-480 The Economic Role of Women Registration #0511-480
This course is intended to analyze the economic role of women in today’s society. This analysis includes the economic role of women in labor force, as owners of other factors of production, and in business decision making process. The impact of 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. This course is part of the Women’s Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSE-481 Environmental Economics Registration #0511-481
The course will examine the relationship and apparent conflict between economic growth and environmental quality, the economics of environmental issues and policy, the environment as a resource and a public good, and the ability and lack of ability of free markets and the government to deal adequately with pollution and other environmental problems. This course is part of the Environmental Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSE-520 Intermediate Price Theory Registration #0511-520
Intermediate Price Theory develops the tools of analysis utilized in contemporary economics to study the process of price formation in a capitalist society. Topics covered in the course include the theories of consumer behavior, cost and production, alternative market structures, and the pricing of factors of production. (0511-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSE-521 Intermediate Macroeconomic Theory Registration #0511-521
The central question of macroeconomics is the determination of output, employment and prices. This course develops models which incorporate behavioral assumptions concerning consumption, investment, and the role of money and their relationship to macroeconomic variables. (0511-301 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSE-522 International Trade and Finance Registration #0511-522
This course introduces the students to the theory and the practical issues of the export-import markets, the international flow of capital, and international investment decisions. In addition, the students study the foreign-exchange and the Eurodollar markets and the investment opportunities in them. The role of multi-national corporations in international trade and finance is also discussed. (0511-210 or 0511-301 & 0511-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSE-523 Monetary Analysis and Policy Registration #0511-523
Monetary Analysis and Policy is the study of monetary behavior and the role of monetary institutions in the modern economy. The course includes considerations of monetary theory, the development and current characteristics of monetary institutions in the American economy, and the use of the tools of monetary analysis to evaluate alternative monetary policies. The course will conclude with an evaluation of the neo-Keynesian and Monetarist positions. (0511-210 or 0511-301 or equivalent).
Class 3, Credit 4 (offered occasionally)
### GSSM-443 Foreign Policy of the Soviet Union
**Course Code:** #0513-443
This course critically examines fundamental elements of Soviet foreign policy since its inception. Special emphasis will be given to geopolitical and ideological aspects of Soviet national interests as well as analyses of the mechanics of foreign policy formulation and its implementation with respect to the United States, Western and Eastern Europe, China, the Third World and the Middle East. This course is part of the International Relations Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)
Class 3, Credit 4 (offered annually)

### GSSM-444 The Cold War
**Course Code:** #0513-444
This course is an examination of the origins and evolution of the Cold War with the major emphasis upon the Soviet-American rivalry in the post World War II era. This course is part of the International Relations Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)
Class 3, Credit 4 (offered annually)

### GSSM-450 State and Local Politics
**Course Code:** #0513-450
This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. It will illustrate differences in state governments by comparing other states to New York, and will use the Rochester area for comparisons with local governments found elsewhere. This course is part of the American Politics Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)
Class 3, Credit 4 (offered annually)

### GSSSM-451 The Legislative Process
**Course Code:** #0513-451
This course examines the role of the legislature in the U.S. political process. The primary emphasis will be the study of the U.S. Congress, but some attention will also be directed to state legislatures. Topics to be studied include elections, party organization, committees, interest group activities, and executive-legislative relations. This course is part of the American Politics Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)
Class 3, Credit 4 (offered annually)

### GSSM-452 The American Presidency
**Course Code:** #0513-452
This course is a study of the role of the presidency in the American Political System. Among the topics to be considered are: the nomination and election process, evolution and limitation of presidential powers, factors in decision making, and the various leadership functions performed by the American Presidency. This course is part of the American Politics Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)
Class 3, Credit 4 (offered annually)

### GSSM-453 American Foreign Policy
**Course Code:** #0513-453
A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures and philosophies shaping the development and implementation of foreign policy. This course is part of the American Politics Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)
Class 3, Credit 4 (offered annually)

### GSSM-504 Twentieth Century America
**Course Code:** #0513-504
An examination of the major political, social, and economic developments affecting the United States in the 20th century. Emphasis will be placed upon the reactions of the various presidential administrations to conditions in both the domestic and foreign fields.
Class 3, Credit 4 (offered annually)

### GSSM-510 Comparative Politics
**Course Code:** #0513-510
This course provides a mode of analysis for the study of political systems. Basic concepts of political science are utilized to present a descriptive and analytical examination of various political systems that can be classified as Western Democracies, Communist or Third World. Particular attention is paid to the governmental structure, current leadership, and major issues of public policy of those selected political systems under review.
Class 3, Credit 4 (offered annually)
GSSM-514  Theories of Political Systems
Registration #0513-514
An examination of the basic questions in political theory, a survey of the major political philosophers, and an inquiry into the major political ideologies.
Class 3, Credit 4 (offered annually)

GSSM-523  Political Parties & Voting
Registration #0513-523
Political parties are a crucial part of the Democratic process. Parties serve as a crucial link between citizens and their Government, as parties promote policies favored by their voters. This course studies parties; their history, their future and their role in the Democratic process. Its overall emphasis is on the degree to which parties perform, or fail to perform, as links between citizens and Government.
Class 3, Credit 4 (offered annually)

GSSM-524  The Judicial Process
Registration #0513-524
This course examines the structure and function of the state and federal courts in the American political system.
Class 3, Credit 4 (offered annually)

GSSM-525  Politics and Public Policy
Registration #0513-525
This is a course in the politics of the policy process. The basic questions of the course are: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government evaluate public policy? How does government implement public policy? How does government evaluate public policy?
Class 3, Credit 4 (offered occasionally)

GSSP-210  Introduction to Psychology
Registration #0514-210
This course is designed to introduce the student to the scope and methodology of psychology. Topics will include: aims and methods, sensation and perception, learning and memory, emotion and motivation, normal and abnormal personality, and social psychology.
Class 3, Credit 4 (offered quarterly)

GSSP-440  Human Growth and Development
Registration #0514-440
This course explores human development from conception through adolescence. The developmental approach provides the opportunity to integrate many areas of psychological research such as cognition, personality, perception, social interaction and moral development as they apply to human development. This course is part of the Human Growth and Development Concentration and may also be taken as an elective. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-441  Growth Psychology
Registration #0514-441
This course examines the major assumptions, theories and implications of "growth" or humanistic psychology. In the course, students will study human beings as dynamic, complex creatures who shape themselves and their world through the choices they make each day and whose best hope for realizing their individual and collective potential is an accurate understanding of what human persons need to grow psychologically and what societal conditions seem to foster such growth. This course is part of the Human Growth and Development Concentration and may also be taken as an elective. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-442  Psychology of Adult Life
Registration #0514-442
This course encompasses the psychology of the span of life from young adulthood through the middle years. The developmental approach, presented in an interdisciplinary framework, provides a systematic orientation to the study of the individual during early adulthood. This course is part of the Human Growth and Development Concentration and may also be taken as an elective. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-443  Learning and Memory
Registration #0514-443
This course focuses on the environmental forces that are responsible for the outcome of human development. It studies how learning shapes and changes individuals almost from the moment they are born and how it continues to be all pervasive throughout their lives. It examines the complexity of memory process, which is an essential element of learning and learning theories and their applications in real-life situations. This course is part of the Human Growth and Development Concentration and may also be taken as an elective. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-480  Psychology of Women
Registration #0514-480
This course 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. This course is part of the Women's Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSP-483  Social Psychology of Religion
Registration #0514-483
This course examines religions as cultures which, like other "ways of life," face the task of attracting or creating new members, maintaining their loyalty, providing them with a coherent world view and satisfying their basic needs. It will examine the ways religions use education, ritual, rewards, punishment, symbols and other mechanisms of social control and cohesion formation to build and nurture their flocks. In addition it will examine the ways in which religious organizations and their individual members reconcile conflicts between religious and secular norms, world views, loyalties and problem solving strategies. Finally, it will suggest how psychological processes such as identity information, attribution, self-actualization, brainwashing, conflict, denial, projection, and repression may be applied and misapplied in efforts to understand religious belief and behavior. This course is part of the Perspectives on Religion Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSP-501  Industrial Psychology
Registration #0514-501
Consideration of principles, application and current research in industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership and communication. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-503  Abnormal Personality
Registration #0514-503
This course examines the major categories of mental disorder not only from the descriptive point of view, but, also in terms of the major theoretical explanations of the causes of disorder. The major treatment modalities are also covered. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-504  Attitude Formation and Persuasion Techniques
Registration #0514-504
The course will focus on current theories of attitude formation, and seek to apply them to contemporary events to achieve an understanding of how those who wish to shape or change attitudes do so. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-509  Psychology of Perception
Registration #0514-509
The course covers topics of all sense modalities with emphasis on visual perception. It traces what happens to the physical stimulus as 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. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)
GSSP-510  Social Psychology
Registration #0514-510
The course will attempt to give a general overview of those areas of social psychology currently under the most intensive investigation, and likely to be of most interest to the student, including nonverbal communication, attraction, aggression and group effects. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-512  Psychology of Personality
Registration #0514-512
This course examines the strengths and weaknesses of the major psychological theories of personality. Methods of assessing personality, research, and applications of theory to real-life situations are included in the evaluation of each theory. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-513  Psychology of Motivation
Registration #0514-513
The course surveys basic motivational concepts and provides a fair representation of many different areas of motivational research, relating these to each other where possible. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-514  Behavior Modification
Registration #0514-514
This course will teach you the skills of changing your behavior by controlling your environment and the consequences of your behavior. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-515  Psychology of Human Adjustment
Registration #0514-515
This course will teach you the skills of coping with a variety of everyday experiences. Particular attention will be given to the areas of self validation, interpersonal tactics, and interpersonal relations. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-517  Death & Dying
Registration #0514-517
This course will view 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, it will focus on such questions as how people can better cope with their own mortality and that of loved ones, and how people can help others face death, and help themselves and others during periods of bereavement. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-518  Psychology of Aging
Registration #0514-518
The Psychology of Aging course will present a psychological overview of human aging with some study of the dynamic problems of the elderly in contemporary society. Psychological aspects of adulthood and aging will be emphasized within the perspectives of an interdisciplinary approach. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-519  Psychology of Altered States of Consciousness
Registration #0514-519
This course will cover such topic areas as the specialized consciousness in the two halves of the brain, dreaming, hypnosis, meditation, systematic relaxation, and parapsychology. The course format will be discussion/demonstration. (0514-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-520  Psychology of Creativity
Registration #0514-520
A psychological investigation of the creative process and creative individuals with a focus on techniques which stimulate creativity. (0514-210 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSP-521  Psychology and Politics
Registration #0514-521
This course 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)

GSSS-210  General Sociology
Registration #0515-210
This course 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 3, Credit 4 (offered quarterly)

GSSS-440  Contemporary American Social System
Registration #0515-440
Capitalizing on sociological theory and research, this course focuses on the contemporary U.S. social system, American culture, and the motivating forces and values of the people. Such institutions as the family, economic life, political system, education, religion, recreation, health and welfare systems are analyzed. This course is part of the American Society in Transition Concentration and may also be taken as an elective. (0515-210 or 0510-210 or instructor's permission)
Class 3, Credit 4 (offered annually)

GSSS-441  The Changing American Family
Registration #0515-441
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. This course is part of the American Society in the Transition Concentration and may also be taken as an elective. (0515-210 or 0510-210)
Class 3, Credit 4 (offered annually)

GSSS-442  The Urban Experience
Registration #0515-442
This sociology course analyzes social and spatial characteristics of cities and considers reasons for urban development, ecological factors, types and networks of settlements, and urbanism as a way of life. It also examines the issues of neighborhoods, subareas, "ghetto" enclaves, metropolitan regions, urban social and political structures, problems, services, and regions, urban social and political structures, problems, services and planning. This course is part of the American Society in Transition Concentration and may also be taken as an elective. (0515-210 or 0510-210)
Class 3, Credit 4 (offered annually)

GSSS-443  Work and Society
Registration #0515-443
This sociology course analyzes the essential properties of work, its structure, the group processes involved in it, and its social meaning. The course treats work as emerging, like other social realities, out of social relationships between individuals and groups. It looks at ways in which people can develop a positive self-regard or a sense of alienation in their occupations and professions and various types of work organizations. It also considers leisure as a complement to work. This course is part of the American Society in Transition Concentration and may also be taken as an elective. (0515-210 or 0510-210 or instructor's permission)
Class 3, Credit 4 (offered annually)
College of Science

Biology

SBIB-201 General Biology
Characteristics and origin of life; basic principles of modern cellular biology including cell organelle structure; physiological processes of gas exchange, internal transport, and osmoregulation and excretion.
Class 3, Credit 3 (F)

SBIB-202 General Biology
Chemical basis and functions of life including enzyme systems, respiration and photosynthesis; nutrient procurement in plants and animals, hormones and behavior.
Class 3, Credit 3 (W)

SBIB-203 General Biology
A study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology.
Class 3, Credit 3 (S)

SBIB-205, 206, 207 General Biology Laboratory
Laboratory work to complement the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve ability to make, record and interpret observations. (Corequisite SBIB-201, 202, 203)
Lab. 3, Credit 1 (F-205, W-206, S-207)

SBIB-250 Introduction to Biotechnology
An introduction to the nature and scope of the science of biotechnology, the employment environment and opportunities, and the literature of the field (One quarter of general biology).
Class 1, Credit 1 (W)

SBIB-301 Invertebrate Zoology
Biological of invertebrate animals with reference to classification, structure, function, and ecology. (One year of general biology or permission of instructor)
Class 3, Lab. 3, Credit 4 (offered upon sufficient request)

SBIB-302 Vertebrate Zoology
Morphology, physiology, behavior, classification, and ecology of chordates. (One year of general biology)
Class 3, Lab. 3, Credit 4 (offered upon sufficient request)

SBIB-303 Comparative Vertebrate Anatomy
A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)
Class 3, Lab. 3, Credit 4 (offered upon sufficient request)

SBIB-304 Botany
Distribution of the major groups of plants and their adaptations to their particular environment. (One year of general biology or permission of the instructor)
Class 3, Lab. 3, Credit 4 (F)

SBIB-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. (One year of general biology, SCHG-217 or permission of instructor)
Class 3, Lab. 3, Credit 4 (W)
SBIB-404 Introductory Microbiology
Registration #1001-404
Principles of anatomy, biochemistry, genetics, taxonomy, ecology of viruses, bacteria, molds, algae and protozoa. Useful and harmful activities, Basic laboratory techniques, microscopy, staining, counting, identifying. (One year of general biology, one year of organic chemistry)
Class 3, Lab. 4, Credit 5 (F, W)

SBIB-406 Virology
Registration #1001-406
Molecular biology, chemistry, epidemiology and clinical aspects of viruses; morphology, genetics, immunology, environmental effects; methods of isolation, cultivation, identification; assays. Human virus diseases. (One year of general biology)
Class 4, Credit 4 (F) (offered upon sufficient request)

SBIB-407 Microbial and Viral Genetics
Registration #1001-407
The study of the molecular genetics of bacteria, bacteriophages, fungi, and eucaryotic viruses. (SBIB-350, SBIB-421, SCHO-334)
Class 3, Lab. 3, Credit 4 (F)

SBIB-412 Parasitology
Registration #1001-412
Class 3, Lab. 3, Credit 4 (S) (offered upon sufficient request)

SBIB-413 Comparative Animal Physiology
Registration #1001-413
A comparative study of the physiological mechanisms of the animal kingdom. An interpretation of the physiological variations in terms of evolutionary significance, morphological variation and ecological conditions. (One year of general biology, one year of organic chemistry)
Class 3, Lab. 3, Credit 4 (offered upon sufficient request)

SBIB-417 Industrial Microbiology
Registration #1001-417
Use of yeasts, molds, and bacteria for fermentations of economic importance. Industrial aspects of strain selection, cultivation, assay, production and recovery of fermentation products. Microbiology, biochemistry, chemistry and engineering aspects. (SBIB-404, SCHO-334)
Class 3, Lab. 3, Credit 4 (W)

SBIB-420 Plant Ecology
Registration #1001-420
A consideration of the nature and variation of plant communities with a discussion of factors which limit, maintain, and modify communities both locally and regionally. Field studies of various plant communities will be conducted. (SBIB-340)
Class 3, Lab. 3, Credit 4 (offered upon sufficient request)

SBIB-421 Genetics
Registration #1001-421
Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (SBIB-404)
Class 3, Lab. 3, Credit 4 (S)

SBIB-422 Developmental Biology
Registration #1001-422
Study of the processes of growth, differentiation and development which lead to the mature form of an organism. Emphasis is placed on descriptive and experimental embryology. (One year of general biology)
Class 2, Lab. 3*. Credit 4 (offered upon sufficient request)

SBIB-430 Radiation Biology
Registration #1001-430
Effects of radiation upon living tissue, both harmful and beneficial. Morphological changes, genetic effects, and pathological changes in both plant and animal tissues. Use of radioisotopes in plant and animal research. (Minimum of 20 credits in biological science)
Class 2, Lab. 6, Credit 4 (F)

SBIB-431 Histological Techniques
Registration #1001-431
Preparation of plant and animal tissues of slide mounts. Techniques in paraffin and frozen sectioning. Sectioning on the rotary and sliding microtomes and multiple staining techniques. (One year of general biology)
Class 1, Lab. 4, Credit 3 (offered upon sufficient request)

SBIB-442 Hybridoma Techniques
Registration #1001-442
Authorized to acquaint each student with the basic methods employed in the production of hybridoma cell lines and monoclonal antibodies. To include preparation of viable cell suspensions, cell culture fusion techniques, cloning, and monoclonal antibody production and characterization. (SBIB-445, one quarter of organic chemistry) Corequisite SBIB-402
Lab. 3, Credit 1 (W)

SBIB-445 Tissue Culture
Registration #1001-445
Study of the techniques and applications of culturing cells, tissues, and organs in vitro. Emphasis on mammalian systems. (One year of general biology)
Class 2, Lab. 3, Credit 3 (F)

SBIB-446 Plant Tissue and Cell Culture
Registration #1001-446
Study of the techniques and applications of plant organ, tissues, and cell culture in vitro, with emphasis on plant regeneration. (One year of general biology)
Class 2, Lab. 3, Credit 3 (W)

SBIB-450 Genetic Engineering
Registration #1001-450
Introduction to the theoretical basis, laboratory techniques, and applications of gene manipulation. (SBIB-350, SBIB-421, SBIB-407)
Class 3, Lab. 3, Credit 4 (W)

SBIB-471 Limnology
Registration #1001-471
An introduction to the study of the world ocean, with emphasis on fundamental principles, concepts and processes of biological, geological, chemical and physical oceanography. (SBIB-340 or permission of instructor)
Class 3, Lab. 3, Credit 4 (offered upon sufficient request)

SBIB-472 Introduction to Oceanography
Registration #1001-472
An introduction to the study of the world ocean, with emphasis on fundamental principles, concepts and processes of biological, geological, chemical and physical oceanography. (SBIB-340 or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request)

SBIB-490 Transmission Electron Microscopy
Registration #1001-490
A lecture/laboratory course covering operation, maintenance and calibration of transmission electron microscopes; preparation of biological, chemical and physical specimens for the transmission electron microscope; black-and-white photographic darkroom techniques. (3rd, 4th or 5th year status)
Class 1, Lab 6, Credit 3 (F)

SBIB-491 Scanning Electron Microscopy
Registration #1001-491
A lecture/laboratory course covering operation, maintenance and calibration of scanning electron microscopes; preparation of biological, chemical and physical specimens for the scanning electron microscope; black-and-white photographic darkroom techniques. (3rd, 4th or 5th year status)
Class 1, Lab 6, Credit 3 (S)
SBIB-541, 542, 543  
Biology Research  
Registration #1001-541, 542, 543  
Faculty directed projects of research usually involving original field or laboratory work encompassing a period of at least two quarters. Final results are presented in written and oral formats. (Third-year status with a GPA of 2.5 in science and mathematics courses, and consent of faculty)  
Class variable, Credit variable (F, W, S, SR)

SBIB-550  
Biology Seminar  
Registration #1001-550  
Written and oral reports and their discussion by class members covering topics of current interest in the biological sciences. (40 quarter hours in biology and successful completion of the department writing requirement)  
Class 2, Credit 2, (W, S)

SBIB-559  
Special Topics - Biology  
Registration #1001-559  
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary course and have specified prerequisites, contact hours and examination procedures.  
Class variable, Credit variable (offered upon sufficient request)

SBIB-561  
Biotechnology Senior Project  
Registration #1001-561  
Completion of a laboratory project in biotechnology using a team approach; preparation of laboratory notebook and research report. (4th or 5th year biotechnology major status)  
Lab. 6, Credit 2 (F)

SBIB-579  
Topics in Biotechnology  
Registration #1001-579  
An in-depth study of one or more aspects of the field of biotechnology, with emphasis on current areas of research. (4th or 5th biotechnology major status)  
Class 3, Credit 3 (S)

SBIB-599  
Independent Study-Biology  
Registration #1001-599  
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (One year of general biology)  
Class variable, Credit variable (offered every quarter)

SBIB-710  
Antibiotics & Chemotherapy  
Registration #1001-710  
Antibiotics and therapeutic chemicals used clinically against microbial infections. Chemotheraphy of cancer. Discovery, production, sale and usage of antibiotics. Impact of antibiotics on viruses, bacteria, fungi, protozoa and on the patient. Medical consequences. Assay procedures, fermentation technology (SBIB-404, one year of organic chemistry)  
Class 3, Lab. 2, Credit 4 (offered upon sufficient request)

SBIB-740  
General Toxicology  
Registration #1001-740  
The study of the science of poisons (the harmful actions of chemicals on biologic tissue) through the examination of biological and chemical mechanisms, their implications for biological systems, and detection. (Physiology, Anatomy, Organic Chemistry or permission of the instructor. Genetics recommended. Laboratory a corequisite for biology majors)  
Class 3, Credit 3 (offered upon sufficient request)

SBIB-741  
General Toxicology Laboratory  
Registration #1001-741  
Laboratory work to accompany the lectures in General Toxicology. (Corequisite SBIB-740)  
Lab. 3, Credit 1 (offered upon sufficient request)

NOTE: The following courses may not be taken for biology credit by biology or biotechnology majors.

SBIG-210  
Microbiology in Health and Disease  
Registration #1004-210  
An introduction to microorganisms, their relationship to the environment and human health, and the causes, prevention and treatment of infectious diseases. (One year of high school biology or equivalent)  
Class 3, Credit 3 or Class 3, Rec. 1, Credit 4 (F, S)

SBIG-211  
Human Biology I  
Registration #1004-211  
A general study of human anatomy and physiology. This course includes discussions of cellular biology, histology and the skeletal system. Recitations for social work students emphasize common disease states and their treatments. Recitations for industrial engineering students include discussions of biodynamic and biomechanical characteristics of organ systems as well as cardiovascular and respiratory physiology.  
Class 3, Credit 3, or class 3, Rec. 1, Credit 4 (W)

SBIG-212  
Human Biology II  
Registration #1004-212  
A general study of human anatomy and physiology with emphasis on mechanisms by which the nervous and endocrine systems coordinate and integrate body functions. This second course includes discussions of nutrition, metabolism and respiratory, circulatory, lymphatic, urinary and reproductive systems. Recitation for the social work students emphasize common disease states and their treatments.  
Class 3, Credit 3 or Class 3, Rec. 1, Credit 4 (S)

SBIG-220  
Microbiology in Health & Disease Laboratory  
Registration #1004-220  
Laboratory cultivating, handling and identification of microorganisms with special emphasis on the relationship of bacteria to food handling and preservation, the production of food products by bacteria, and the prevention of food-borne diseases. (Corequisite SBIG-210)  
Lab. 3, Credit 1 (F)

SBIG-231  
Human Biology Laboratory  
Registration #1004-231  
Laboratory for dietetic and medical illustration students complements the lecture materials of SBIG-211. Experiments are designed to illustrate the dynamic characteristics of cells, tissues and organ systems.  
Lab. 3, Credit 1 (W)

SBIG-232  
Human Biology Laboratory  
Registration #1004-232  
Laboratory for dietetic and medical illustration students complements the lecture material of SBIG-212. Experiments are designed to illustrate the dynamic anatomy and physiology of major organ systems.  
Lab. 3, Credit 1 (S)

SBIG-289  
Contemporary Science-Biology  
Registration #1004-289  
A study in various biological topics relevant to contemporary problems of society. Topics may include population biology, pollution, disease control, human heredity, contagious diseases, marine biology, bioethics.  
Class 4, Credit 4 (F, W, S)

SBIG-315  
Medical Genetics  
Registration #1004-315  
A survey of selected human variations and disease of medical importance, with emphasis on the underlying genetic principles. (SBIB-203 or equivalent)  
Class 2, Credit 2 (W)
Chemistry

SCHA-261 Introduction to Chemical Analysis I
Registration #1008-261
An introduction to quantitative analysis: solubility of ionic compounds and the equilibria involved; activity concepts; statistical treatment of data. Laboratory experiments include gravimetric and precipitation methods. SCHA-251 is a corequisite.
Class 2, Lab. 5, Credit 3 (offered every year) (F)

SCHA-262 Introduction to Chemical Analysis II
Registration #1008-262
Systematic treatment of acid-base equilibria, titrations, analytical oxidation-reduction processes; complexometric methods. SCHA-252 is a corequisite. (SCHA-261)
Class 2, Lab. 5, Credit 3 (offered every year) (W)

SCHA-263 Introduction to Chemical Analysis III
Registration #1008-263
Introduction to electrochemical and spectrometric methods, potentiometric and spectrometric titrations. Electrodeposition and pH measurements included in lab. SCHA-253 is a corequisite. (SCHA-262)
Class 2, Lab. 5, Credit 3 (offered every year) (S)

SCHA-311 Analytical Chemistry-Instrumental Analysis
Registration #1008-311
Elementary treatment of instrumental theory and techniques; properties of light, ultraviolet, visible, and infrared spectrophotometry; atomic and molecular fluorescence, emission spectroscopy; flame photometry. SCHA-318 is a corequisite. (SCHC-253)
Class 3, Credit 3 (offered every year) (F, W)

SCHA-312 Analytical Chemistry-Separations
Registration #1008-312
Inorganic and organic separations; Raoult's and Henry Laws; phase rules; distillation; extraction; absorption and surface effects; chromatography including gas, liquid, column, paper, thin layer, and ion exchange. SCHA-319 is a corequisite. (SCHA-253)
Class 3, Credit 3 (offered every year) (S, SR)

SCHA-318 Instrumental Analysis Lab
Registration #1008-318
Lab accompanying SCHA-311. Quantitative and qualitative experiments in ultraviolet, visible, and infrared spectrophotometry, molecular fluorescence and flame atomic absorption spectrophotometry. Laboratory report writing is emphasized. SCHA-311 is a corequisite. (SCHA-253)
Lab. 4, Credit 1 (offered every year) (F, W)

SCHA-319 Separations Lab
Registration #1008-319
Lab accompanying SCHA-312. Experiments with chemical separation techniques including distillations, extractions and a variety of chromatographic methods (HPLC, thin layer, paper, ion exchange, gas, gel filtration). Laboratory report writing is emphasized. SCHA-312 is a corequisite. (SCHA-253)
Lab. 4, Credit 1 (offered every year) (S, SR)

SCHB-334 Biochemistry
Registration #1009-334
Introduction to biological chemistry. An in-depth survey of the molecular organization, physiological functions and bio-energetics principles of the molecular components of cells; amino acids, proteins, enzymes, carbohydrates, lipids, and nucleic acids. Emphasis is on the structure-function relationships, solution behavior, and metabolism of biomolecules. (SCHO-233)
Class 4, Credit 4 (offered every year) (F)

SCHC-200 Chemical Safety
Registration #1010-200
Discussion and demonstration of protective devices and equipment techniques for safely handling chemicals, glassware, and performing chemical reactions. Emphasis on flammable solvents, explosives, cryogens and toxic materials, radiation hazards; storage of chemicals; waste disposal.
Class 1, Credit 1 (offered every year) (F)

SCHC-230 Introduction to Co-op Seminar
Registration #1010-230
Exploration of co-operative education opportunities; practice in writing letters of application; resume writing, and interviewing procedures.
Class 1, Credit 1 (offered every year) (F, W)

SCHC-251 General Chemistry I
Registration #1010-251
A detailed study of fundamental tools of chemistry; atomic theory and nuclear chemistry; stoichiometry (elements, compounds, reactions); properties of gases and thermochemistry (First Law). SCHA-261 is a corequisite.
Class 3, Credit 3 (offered every year) (F)

SCHC-252 General Chemistry II
Registration #1010-252
Structure and properties of the atom; periodic relationships; basic concepts of chemical bonding, kinetics, and equilibrium; thermodynamics (free energy, Second and Third Laws). SCHA-262 is a corequisite. (SCHC-251)
Class 3, Credit 3 (offered every year) (W)

SCHC-253 General Chemistry III
Registration #1010-253
Oxidation-reduction and electrochemistry; descriptive chemistry of selected elements; properties of liquids and solids; chemical bonding theories; transition elements and coordination chemistry; introduction to organic chemistry, biochemistry and polymers; introduction to the use of chemical literature. SCHA-263 is a corequisite. (SCHC-252)
Class 3, Credit 3 (offered every year) (S)

SCHC-401 Chemical Literature
Registration #1010-401
Instruction will be given on the use of chemical literature resources such as Chemical Abstracts, Science Citation Index, Beilstein, etc., as well as an introduction to computer-based information retrieval. Research presentations will be given by faculty; students will be expected to prepare written and oral documentation regarding the use of chemical literature. (SCHO-433, SCHP-442; may be taken concurrently).
Class 2, Credit 2 (offered every year) (F, W)

SCHC-402 Introduction to Research
Registration #1010-402
Introduction to laboratory research projects of interest to chemistry faculty members. Students desiring to pursue active undergraduate research will investigate research opportunities with faculty members. Preparation and presentation of a research proposal in this course is a prerequisite to participation in research. (SCHO-431, SCHP-441)
Class 1, Credit 0 (offered every year) (F, W)

SCHC-541, 542, 543 Chemistry Research
Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHC-599 Independent Study-Chemistry
Registration #1010-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.
Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHG-201 General Chemistry
Registration #1011-201
One-quarter survey of general chemistry for non-science 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. SCHG-221 is a corequisite.
Class 3, Credit 3 (offered every year) (F)
SCHG-202 Organic Chemistry
Registration #1011-202
One quarter survey of the fundamentals of organic chemistry that are essential for an understanding of biological molecules, biochemistry, and the basics of polymer chemistry. Topics covered include alkanes, alkenes, aromatics, alcohols, ethers, aldehydes, ketones, carboxylic acids and derivatives, amines, and addition and condensation polymers. SCHG-222 is a corequisite. (SCHG-201 or equivalent)
Class 3, Credit 3 (offered every year) (W)

SCHG-203 Biochemistry
Registration #1011-203
Structure and reactions of the major classes of biomolecules are studied. Topics include amino acids and proteins, lipids, carbohydrates and nucleic acids. (SCHG-202 or equivalent)
Class 4, Credit 4 (offered every year) (S)

SCHG-204 Biochemistry
Registration #1011-204
The fundamentals of the metabolism of major classes of biomolecules are covered. Topics include biochemical energetics, the metabolism of carbohydrates, lipids and proteins, and the functions of nucleic acids. (SCHG-203 or equivalent)
Class 4, Credit 4 (offered every year) (F)

SCHG-205, 206, 207 Chemical Principles Laboratory
Registration #1011-205, -206, -207
A laboratory course for photoscience and science majors and others who are taking General Chemistry (SCHG-211, 212) and introduction to Organic Chemistry (SCHG-213) concurrently. Laboratory experiments are designed to complement the lecture material in these courses.
Lab. 3, Credit 1 (offered every year) (205-F, 206-W, 207-S)

SCHG-208 College Chemistry I
Registration #1011-208
Primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stoichiometry, first law of thermodynamics, thermochemistry, electronic theory of composition and structure, chemical bonding.
Class 4, Credit 4 (offered every year) (F, W)

SCHG-209 College Chemistry II
Registration #1011-209
A continuation of SCHG-208. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry and the chemistry of metals. (SCHG-208)
Class 4, Credit 4 (offered every year) (W, S)

SCHG-211, 212 General Chemistry
Registration #1011-211, 212
For science and photoscience majors and others who desire an in-depth study of general chemistry. Atomic structure and chemical bonding, thermodynamics and equilibrium; chemical equations and chemical analysis; gases; acids and bases; oxidation-reduction; chemical kinetics. Course stresses problem solving applications of chemical principles. SCHG-205, -206 laboratory is a corequisite.
Class 3, Credit 3 (offered every year) (211-F, 212-W)

SCHG-213 Introduction to Organic Chemistry
Registration #1011-213
Introduction to the structure and reactivities of organic molecules for physical science majors. An overview of the structure, nomenclature, bonding, and reactivities of major functional groups. Special topics will include spectroscopy, organometallics, polymers, and biomolecules. SCHG-207 is a corequisite. (SCHG-212)
Class 3, Credit 3 (offered every year) (S)

SCHG-221 General Chemistry Laboratory
Registration #1011-221
Laboratory course to accompany SCHG-201. Emphasis on introduction to methods of chemical analysis, qualitative and quantitative techniques.
Lab. 3, Credit 1 (offered every year) (F)

SCHG-222 Organic Chemistry Laboratory
Registration #1011-222
Laboratory course to accompany SCHG-202. Emphasis is on representative examples of typical organic techniques and synthesis. (SCHG-221 or equivalent)
Lab. 3 Credit 1 (offered every year) (W)

SCHG-215 General & Analytical Chemistry
Registration #1011-215
General chemistry for students in biology, medical technology and the life sciences. Introduction to chemical symbols, formulas, equations, stoichiometry, atomic structure, chemical periodicity and bonding. Emphasis is on an early introduction to solutions, concentrations, acid-base and precipitation reactions; analytical chemistry problem-solving applications are stressed. (SCHG-225 is a corequisite.
Class 3, Credit 3 (offered every year) (F)

SCHG-216 General & Analytical Chemistry
Registration #1011-216
Introduction to quantitative gravimetric analysis, oxidation-reduction, nomenclature, chemical equilibrium and equilibria in aqueous solutions. Particular emphasis on solution equilibria including weak acids, bases, buffers, hydrolysis, pH titrations and heterogeneous equilibria. SCHG-226 is a corequisite. (SCHG-215)
Class 3, Credit 3 (offered every year) (W)

SCHG-217 General & Analytical Chemistry
Registration #1011-217
The concepts of polyprotic equilibria, spectrophotometry instrumentation and analyses; electrochemistry, nuclear chemistry and chemical kinetics are presented with an emphasis on the analytical applications of these principles to the life sciences. SCHG-227 is a corequisite. (SCHG-216)
Class 3, Credit 3 (offered every year) (S)

SCHG-225, -226, -227 General & Analytical Chemistry
Registration #1011-225, -226, -227 Laboratory
Laboratory sequence to accompany SCHG-215, -216, -217. Experiments in inorganic chemistry, separation techniques, classical titration and gravimetric analysis, and quantitative instrumental analysis including UV-visible spectrophotometry, atomic absorption, gas chromatography, and potentiometry.
Lab. 3 Credit 1 (offered every year)
(F)

SCHG-271 Chemistry of Water
Registration #1011-271
Basic training in general chemistry assuming no prior experience, concentrating on those aspects important to the field of water conservation. SCHG-275 should be taken concurrently.
Class 3, Credit 3 (offered every year) (F, W)

SCHG-272 Chemistry of Water
Registration #1011-272
Chemistry of organics, metals, construction materials, radioactive and other environmental pollutants, and other substances related to waste analysis. SCHG-276 should be taken concurrently. (SCHG-271)
Class 2, Credit 2 (offered every year) (S, SR)

SCHG-275 Chemistry of Water Lab
Registration #1011-275
Laboratory to be taken concurrently with SCHG-217. General chemistry and volumetric techniques will be covered.
Lab. 3, Credit 1 (offered every year) (F, W)

SCHG-276 Chemistry of Water Lab
Registration #1011-276
Laboratory to be taken concurrently with SCHG-272. Techniques used in water and waste water analysis will be covered. (SCHG-271 or equivalent)
Lab. 3, Credit 1 (offered every year) (S, SR)
SCHG-281, 282, 283  General Chemistry Registration #1011-281, 282, 283
For printing students. Aspects of general chemistry of widest applicability to graphic arts technology; first quarter includes definitions of terms, basic concepts and laws; second quarter devoted to properties of solutions and organic materials; third quarter deals with applications in ink, paper, photolithography processes and other topics as time allows. SCHG-285, -286, -287 should be taken concurrently.
Class 3, Credit 3 (offered every year) (281-F, 282-W, 283-S)

SCHG-285, 286, 287  Chemistry for Printers Lab Registration #1011-285, 286, 287
SCHG-285 and -286 will consist of laboratory techniques in general chemistry experiments. SCHG-287 will have experiments directly related to the printing career area.
Lab. 2, Credit 1 (offered every year) (285-F, -286-W, -287-S)

SCHG-289  Contemporary Science—Chemistry Registration #1011-289*
This course examines a broad range of contemporary scientific topics with a chemical basis. These include nuclear power, alternative energy sources, nuclear wastes and nuclear safety. The biological effects of radiation, nuclear medicine, recombinant DNA, and medicinal drugs are also covered.
Class 4, Credit 4 (F, W, S)

SCHO-231, 232  Organic Chemistry Registration #1013-231, -232
Survey of the structure names, reactions, and synthesis of the major functional groups. Mechanisms of main classes of reactions are discussed. (SCHG-216, or SCHG-212, or SCHG-209)
Class 3, Credit 3 (offered every year) (231-F, 232-W)

SCHO-233  Organic Chemistry Registration #1013-233
Structure, nomenclature, reactions, and properties of the important classes of bio-organic molecules (carbohydrates, lipids, amino acids, proteins, and nucleic acids) are covered in depth. Emphasis is on structure and reactivity in relation to biochemical processes. (SCHO-232)
Class 3, Credit 3 (offered every year) (S)

SCHO-235, 236, 237  Organic Chemistry Lab Registration #1013-235, -236, -237
Laboratory work emphasizes techniques, preparations, and analyses. SCHO-237 emphasizes reactions and properties of biomonomers and polymers. To be taken concurrently with SCHO-231, -232, -233.
Lab. 3, Credit 1 (offered every year) (235-F, 236-W, 237-S)

SCHO-431  Organic Chemistry I Registration #1013-431
A rigorous survey of the reactions of major organic functional groups, emphasizing alkanes, alkenes, alkyl halides, and alkenes. Stereochemistry is also included. SCHO-435 is a corequisite. (SCHC-253)
Class 3, Credit 3 (offered every year) (S, SR)

SCHO-432  Organic Chemistry II Registration #1013-432
A continued survey of reactions of major organic functional groups, including aromatic compounds, alcohols, ethers, aldehydes, and ketones. Organometallics and spectral analysis (IR, UV, NMR) are also included. SCHO-436 is a corequisite. (SCHG-433)
Class 3, Credit 3 (offered every year) (F, W)

SCHO-433  Organic Chemistry III Registration #1013-433
A continued survey of reactions of major organic functional groups, including carboxylic acids, carboxylic acid derivatives, amines, and enolate anions. Structure, nomenclature, reactions, and properties of important classes of bio-organic molecules are also included. SCHO-437 is a corequisite. (SCHO-432)
Class 3, Credit 3 (offered every year) (S, SR)

SCHO-435, 436  Preparative Organic Chemistry Registration #1013-435, -436
Synthesis of organic compounds utilizing a variety of laboratory techniques. Purification techniques and spectral characterization will be routinely used. (SCHC-253) SCHO-431 should be taken concurrently with SCHO-435 and SCHO-432 with SCHC-253.
Lab. 6, Credit 2 (offered every year) (435-S, SR, 436-F, W)

SCHO-437  Systematic Identification of Organic Compounds Registration #1013-437
A laboratory course utilizing chemical and spectral (largely IR and NMR) techniques to identify and characterize organic compounds. (SCHO-432, 436) (SCHO-433 should be taken concurrently)
Lab. 6, Credit 2 (offered every year) (437-S, SR)

SCHP-430  Introduction to Physical Chemistry Registration #1014-430
Properties of gases, kinetic theory of gases, energy and the first law; thermodynamics; entropy and the second and third laws; introduction to Helmholz and Gibbs free energy, gas equilibrium (SCHC-253, SMAM-252, SPSP-311 concurrent)
Class 3, Credit 3 (offered every year) (F, W)

SCHP-441  Physical Chemistry I Registration #1014-441
Review of the thermodynamic laws; criteria for equilibrium and spontaneity; chemical equilibrium; phase rule; equilibrium in ideal and non-ideal solutions; electrochemistry. SCHP-445 should be taken concurrently. (SCHP-340)
Class 3, Credit 3 (offered every year) (S, SR)

SCHP-442  Physical Chemistry II Registration #1014-442
Introduction to quantum mechanics and spectroscopy, radioactivity; Planck’s law; photoelectric effect; the Bohr atom; DeBroglie, Schrodinger, and Heisenberg theories; eigenvalue/eigenfunction equations; variation and perturbation theory; quantum stationary states; Heilter-London theory of covalent bonds; selection rules and spectroscopy. SCHP-446 should be taken concurrently (SMAM-306 and SCHP-441)
Class 3, Credit 3 (offered every year) (F, W)

SCHP-443  Physical Chemistry III Registration #1014-443
Kinetic molecular theory; transport properties of gases; chemical kinetics; surface chemistry; photochemical kinetics; irreversible processes in solution. SCHP-447 should be taken concurrently. (SCHP-441)
Class 3, Credit 3 (offered every year) (S, SR)

SCHP-445  Physical Chemistry Laboratory I Registration #1014-445
Introduction to physical chemistry laboratory; chemical thermodynamics and equilibrium (SCHP-441 should be taken concurrently)
Lab. 3, Credit 1 (offered every year) (S, SR)

SCHP-446  Physical Chemistry Laboratory II Registration #1014-446
Experiments in the application of quantum chemistry; atomic and molecular spectroscopy, and in radioactivity measurements. (SCHP-442 should be taken concurrently)
Lab. 3, Credit 1 (offered every year) (F, W)

SCHP-447  Physical Chemistry Laboratory III Registration #1014-447
Laboratory experiments in chemical dynamics. (SCHP-443 should be taken concurrently)
Lab. 3, Credit 1 (offered every year) (S, SR)

SCHP-448  Physical Chemistry Laboratory IV Registration #1014-448
Experiments in chemical reactions of organic compounds. (SCHP-445 should be taken concurrently)
Lab. 3, Credit 1 (offered every year) (S, SR)

SCHT-243  Chem Tec III (Organic) Registration #1015-243
Techniques of handling organic compounds; recrystallization and melting points, distillation, extraction. Refractive index and optical activity. Reactions of functional group classes. Infra-red spectrophotometry. (SCHT-242)
Class 3, Lab. 9, Credit 6 (offered every year) (SR, F)

SCHT-244  Chem Tec IV (Organic) Registration #1015-244
Continuation of classes and reactions of organic compounds, synthetic techniques, vacuum distillation, gas chromatography, and NMR spectroscopy. (SCHT-243)
Class 3, Lab. 9, Credit 6 (offered every year) (W, S)

*Not acceptable for science credit for College of Science major.
SCHT-305  Chemical Specialty (Spectrometry)  
Registration #1015-305  
Quantitative analysis including trace analysis by spectroscopic methods involving visible, ultra-violet, atomic absorption, flame photometric and luminescent instrumentation. Techniques of sample preparation, instrument construction and operation, spectral measurement and interpretation are utilized. (SCHT-244)  
Class 2, Lab. 6, Credit 4 (offered every year) (SR, F)

SCHT-306  Chemistry Specialty  
Registration #1015-306  
The final academic quarter of the Chem Tec curriculum is designed so that students are given the opportunity to develop more definite options as to their own individual goals. The student may elect to branch-off into one of three areas of specialization; advanced instrumental techniques, the development of synthetic techniques in organic chemistry and polymer technology. (SCHT-305)  
Class 2, Lab. 6, Credit 4 (offered every year) (W, S)

SCHT-307,308  Research Familiarization  
Registration #1015-307, -308  
A chemical technician does exploratory work following general directions with little or no formal supervision and is often encouraged to innovate after consultation with his or her supervising chemist or engineer. In this context each student will have the opportunity to work alongside one of our faculty or graduate students and perform a number of tasks related to the progress of a research operation. The choice of a faculty supervisor is left to the student. (SCHC-402)  
Credit variable (offered every year) (307-F, SR), (308-W, S)

SCHT-309  Glass blowing Techniques  
Registration #1015-309  
This course is designed to introduce and train each student in small scale scientific glassblowing techniques. Proficiency will be developed in rod manipulation, ring seals, construction of apparatus, annealing, use of a simple lathe and hand-torch work.  
Lab. 4, Credit 2 (offered every year) (W, S)
SCHO-736 Spectrometric Chemical Identification Registration #1013-736
Theory and application of proton and carbon nuclear magnetic resonance, infrared, mass spectrometry, and ultraviolet spectra as applied to organic structure determination. (SCHP-443)
Class 3, Credit 3 (offered every year)

SCHO-737 Advanced Organic Chemistry Registration #1013-737
Several of the following advanced topics in organic chemistry are covered: polyfunctional compounds, modern synthetic methods, stereochemistry, conformational analysis, free radical reactions, natural products, new synthetic reagents. (SCHO-433)
Class 3, Credit 3 (offered every year)

SCHO-739 Advanced Organic Chemistry Registration #1013-739
Selected topics in physical organic chemistry including techniques for elucidation of mechanism (kinetic, linear free energy relationships, isotope effects), molecular orbital theory, electronic transitions. (SCHO-433 and SCHP-443)
Class 3, Credit 3 (offered every year)

SCHP-746 Physical Chemistry of Polymers Registration #1014-746
Study of the theoretical and experimental aspects of polymer characterization. In addition, theoretical considerations of the configuration of polymer chains and statistical thermodynamics of polymer solutions will be related to experimental results. (SCHP-443)
Class 3, Credit 3 (offered upon sufficient request)

SCHP-747 Principles of Magnetic Resonance Registration #1014-747
A development of the principal ideas of magnetic resonance including the theory of resonance line shapes, magnetic interactions, experimental considerations, and spectral analysis. These concepts are discussed in terms of nuclear magnetic, nuclear quadrupole, and electron spin resonance spectroscopy. (SCHP-443)
Class 3, Credit 3 (offered upon sufficient request)

Mathematics

SMAM-201, 202, 203 Algebra, Trigonometry and Analytic Geometry
A sequence of courses covering essential skills and concepts in such topics as solutions of equations, graphing, exponents and radicals, logarithmic functions and applications, vectors, determinants, inequalities and conic sections. (High school algebra and geometry)
Class 3, Credit 3 (offered every year) (201-F; 202-W; 203-S)

SMAM-204 College Algebra and Trigonometry Registration #1016-204
Topics include a review of the fundamentals of algebra: solution of linear, fractional and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic and trigonometric functions; systems of linear equations. (2 years of high school algebra)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-205, 206, 207 Introduction to Mathematics for Computing I, II, III Registration #1016-205, -206, -207
Topics in discrete mathematics, including logic, sets, relations, functions, combinatorics, graphs and trees, probability and queuing theory, applications to computer technology.
Class 4, Credit 4 (F, S-205; W-206; S-207)

SMAM-210, 211 Freshman Seminar Registration #1016-210, -211
210: Orientation program for entering applied mathematics and computational mathematics majors. Several 2-3 week modules introducing students to various non-traditional areas of mathematics: brief orientation to co-op; 211: Several 2-3 week modules introducing students to various types of technical writing, including resume preparation, technical description and technical report writing.
Class 1, Credit 1 (offered every year) (210-F; 211-W)

SMAM-214, 215 Introduction to Calculus I, II Registration #1016-214, -215
214: A non-rigorous introduction to the study of differential calculus. The following topics will be covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, maxima and minima. (SMAM-204 or equivalent)
215: A continuation of SMAM-214, dealing with an introduction to integral calculus. The following topics will be covered: definite integral, area, work and distance problems, volumes, fundamental theorem of calculus, approximation techniques, exponential and logarithmic functions, applications, introduction of differential equations. (SMAM-214)
Class 3, Credit 3 (offered every year) (214-F, W, S; 215-W, S)
SMAM-216, 217  
Mathematics of Business and Finance I, II  
Registration #1016-216, -217  
A non-rigorous introduction to selected topics in matrix algebra, finite mathematics, and calculus used extensively in business and finance applications.  
216: Demand, revenue and cost functions, breakeven analysis, matrix and vector operations and applications, solutions of systems of linear equations and inequalities, the simplex method of solving linear programming problems (with and without a computer). (SMAM-204 or equivalent)  
217: Compound interest, annuities, depreciation, differentiation-techniques, marginal cost and marginal revenue, elasticity of demand, applied max-min problems. (SMAM-216)  
Class 3, Credit 3 (offered every year) (216-W, S; 217-S)

SMAM-225  
Algebra for Management Sciences  
Registration #1016-225  
Introduction to functions including linear, quadratic, exponential, and logarithmic functions with applications to supply and demand, cost, revenue, and profit functions. Additional topics include matrices, solution of simultaneous linear equations, and mathematics of finance. (3 years of high school mathematics)  
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-226  
Calculus for Management Science  
Registration #1016-226  
A course stressing applications of calculus concepts to solving problems in business and economics. Topics include the limit concept, differentiation, partial differentiation and, as time permits, integration. (SMAM-216)  
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-251, 252, 253  
Calculus I, II, III  
Registration #1016-251, -252,-253  
A standard first course in calculus intended for students majoring in mathematics, science, or engineering with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter is divided as follows:  
251: Two-dimensional analytic geometry, functions, limits, continuity, the derivative and its formulas, and applications of the derivative. (3 years of high school mathematics)  
252: Anti-derivatives by various methods, the definite integral with applications to calculation of area, arc length, volumes of revolution, etc., transcendental functions, numerical integration. (SMAM-251)  
253: Improper integrals, formal limits of sequences, infinite series, Taylor series, polar coordinates, conic sections. (SMAM-252)  
Class 4, Credit 4 (offered every year) (251-F, W, S, SR;252-F, W, S, SR; 253-F, W, S, SR)

SMAM-265  
Foundations of Discrete Mathematics  
Registration #1016-265  
A study of several discrete mathematics topics with careful attention given to the underlying concepts and development. Topics include: logic, proofs, switching circuits, sets, mathematical induction theorem, relations, equivalence classes, functions, one-to-one, onto, discrete functions, counting principles, graphs (trees, networks). (3 years of high school mathematics)  
Class 4, Credit 4 (offered every year) (S)

SMAM-289*  
Contemporary Science-Mathematics  
Registration #1016-289  
A basic survey of mathematical structures as well as an introduction to problem solving. Topics will be chosen from foundations of mathematics, algebra, topology, number theory, graph theory and probability theory. These structures will be examined as they occur naturally in modern settings.  
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-300  
Transfer Math  
Registration #1016-300  
Course content includes material from both SMAM-253 and SMAM-305. (SMAM-252)  
Class 8, Credit 8 (offered every year) (SR)

SMAM-305  
Calculus IV  
Registration #1016-305  
A continuation of SMAM-253 treating 3-dimensional analytic geometry and vector algebra, partial derivatives, multiple integrals and applications. (SMAM-253)  
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-306  
Differential Equations I  
Registration #1016-306  
This course provides an introduction to the study of ordinary differential equations and their application. Common first order equations and linear second order equations are solved. Method of undetermined coefficients, variation of parameters, linear independence and the Wronskian, numerical solution techniques - Runge Kutta, vibrating systems, LaPlace Transforms. (SMAM-305)  
Class 4, Credit 4 (offered every year) (F, S, S, SR)

SMAM-307  
Differential Equations II  
Registration #1016-307  
Second quarter course in ordinary differential equations which includes power series solution to ordinary differential equations about ordinary and regular singular points; Legendre’s equation; Bessel’s equations; hypergeometric equation; Picard’s theorem; solution of systems of linear differential equations; phase plane analysis and stability.  
Class 4, Credit 4 (offered every year) (S)

SMAM-309  
Elementary Statistics  
Registration #1016-309  
Handling of statistical data; measures of central tendency and dispersion; sample space; events; probability and its basic laws; conditional probability; basic rules of counting; binomial, geometric, Poisson and normal distributions; sampling distributions; estimation of population mean; T-distributions, testing of hypotheses concerning the mean and difference between means; use of chi-square in testing statistical independence and in estimating variance. (SMAM-203)  
NOTE: This course may not be taken for credit if credit is to be earned in SMAM-319.  
Class 4, Credit 4 (offered every year) (W, S)

SMAM-318  
Boundary Value Problems  
Registration #1016-318  
This course will study the statistical principles of presenting and interpreting data. Topics to be covered will include: patterns of variability; histograms; populations and samples; the normal distribution; confidence intervals; hypothesis testing; and correlations. (SMAM-204)  
NOTE: This course may not be taken for credit if credit is to be earned in SMAM-309.  
Class 4, Credit 4 (offered every year) (F, W)

SMAM-328  
Engineering Mathematics  
Registration #1016-328  
This course provides introduction to matrix algebra and vector calculus. Topics include: matrix operations with applications to the solution of linear systems of algebraic equations; gradient, divergence and curl; line and surface integrals; independence of path and the divergence theorem and Stoke’s theorem with discussion of engineering applications. (SMAM-306)  
NOTE: This course may not be taken for credit if credit is to be earned in SMAM-410 or SMAM-431.  
Class 4, Credit 4 (offered every year)(S,SR)

SMAM-351  
Probability  
Registration #1016-351  
Discrete and continuous probability models; random variables; probability density and distribution functions; mathematical expectation; measures of central tendency and dispersion; central limit theorem. (SMAM-253; co-requisite SMAM-305)  
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-352  
Applied Statistics I  
Registration #1016-352  
Basic statistical concepts, sampling theory, hypothesis testing, confidence intervals and non-parametric methods. (SMAM-351)  
Class 4, Credit 4 (offered every year) (W, S)
SMAM-353 Applied Statistics II
Registration #1016-353
Topics in simple linear regression, an introduction to analysis of variance and the use of statistical software packages. (SMAM-352)
Class 4, Credit 4 (offered every year) (S, SR)

SMAM-354 Introduction to Regression Analysis
Registration #1016-354
A study of regression techniques with applications to the type of problems encountered in real-world situations. Includes extensive use of statistical software. Topics include review of simple linear regression; residual analysis; multiple regression; matrix approach to regression; model selection procedures; various other models as time permits. (SMAM-353 and SMAM-431 (or SMAM-328)).
Class 4, Credit 4 (offered every year) (F, W)

SMAM-355 Design of Experiments
Registration #1016-355
A study of the design and analysis of experiments. Includes extensive use of statistical software. Topics include: single-factor analysis of variance; multiple comparisons and model validation; multifactor factorial designs; fixed, random, and mixed models; expected mean-square calculations; confounding; randomized blade designs; Latin-square designs; other designs and topics as time permits. (SMAM-353)
Class 4, Credit 4 (offered every year) (S, SR)

SMAM-361 Mathematical Modeling
Registration #1016-361
The course will emphasize problem solving, formulation of the mathematical model from physical considerations, solution of the mathematical problem, testing the model and interpretation of results. Problems will be selected from the physical sciences, engineering and economics. (SMAM-352, SMAM-306, SMAM-431)
Class 4, Credit 4 (offered every year) (S, SR)

SMAM-365 Combinatorial Mathematics
Registration #1016-365
An introduction to the mathematical theory of combination, arrangement and enumeration of discrete structures. Topics include: enumeration; recursion; inclusion-exclusion; block design; general functions. (SMAM-265 or permission of instructor)
Class 4, Credit 4 (offered every year) (F, W)

SMAM-410 Advanced Calculus
Registration #1016-410
In-depth study of vector calculus. Topics will include: scalar and vector fields; the gradient; divergence and curl vectors and their applications to field theories; integration along a path; Green's theorem in the plane; line integrals independent of path; surface integrals; the divergence theorem and Stoke's theorem interpretations and applications. (SMAM-306)
Class 4, Credit 4 (offered every year) (S, SR)

SMAM-411, 412 Real Variables
Registration #1016-411, 412
411: An investigation and extension of the theoretical aspects of elementary calculus. Topics include: mathematical induction, real numbers, functions, limits, continuity, differentiation, l'Hopital's Rule, Taylor's Theorem. (SMAM-305 and either SMAM-265 or permission of the instructor)
412: A continuation of SMAM-411 which concentrates on integration; definition of the integral—its existence and its properties, improper integrals, infinite series and sequences and power and series. (SMAM-411)
Class 4, Credit 4 (offered every year) (SMAM-411-F, W; 412-S, SR)

SMAM-420 Complex Variables
Registration #1016-420
Class 4, Credit 4 (offered every year) (F, W)
SMAM-521, -522  Probability Theory
Registration #1016-521, -522
Selected topics in applied probability and statistics to meet the needs and interest of the students (SMAM-305, SMAM-352 or permission of instructor).
Class 4, Credit 4 (521-S)

SMAM-531, -532  Abstract Algebra
Registration #1016-531, -532
531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange’s theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265, SMAM-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, to scientific problems. (SMAM-531)
Class 4, Credit 4 (offered every year) (531-F, W; 532-S, SR)

SMAM-551  Topics in Algebra
Registration #1016-551
Topics in abstract algebra to be chosen by the instructor either to give the student an introduction to topics not taught in SMAM-531, -532 or to explore further the theory of groups, rings or fields. (Permission of instructor).
Class 4, Credit 4 (offered upon sufficient request)

SMAM-552  Topics in Analysis
Registration #1016-552
Topics in analysis to be chosen by the instructor, either to introduce the student to topics not covered in SMAM-441, -412 or to explore further the topics covered there. (SMAM-265, SMAM-412)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-559  Special Topics-Mathematics
Registration #1016-559
Course in which topics of special interest to a sufficiently large group of students, and not covered in other courses, may be offered upon request.
Class variable, Credit variable (offered upon sufficient request)

SMAM-561, 562  Complex Variables
Registration #1016-561, -562
Introduction to the theory of functions of one complex variable. Limits, continuity, differentiability; analytic functions; complex integration; Cauchy integral theorem and formula; sequences and series; Taylor and Laurent series; singularities; residues; analytic continuation; conformal mapping. A more in-depth study of analytic function theory than SMAM-420. (SMAM-305)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-565  Game Theory
Registration #1016-565
Introduction to the theory of games with solution techniques and applications. Topics include: game trees; matrix games; linear inequalities and programming; convex sets; the minimax theorem; n-per games; and Pareto optimality. (SMAM-431 or permission of instructor)
Class 4, Credit 4 (offered every year) (F, W)

SMAM-566  Non-Linear Optimization Theory
Registration #1016-566
The theory of optimization of non-linear functions of several real variables. Topics include: unconstrained optimization (Newton-Raphson, steepest ascent and gradient methods); constrained optimization (LaGrange multipliers, Kuhn-Tucker theorem, penalty concept, dynamic programming); and computational aspects (rates of convergence, computational complexity). (SMAM-305 and SMAM-432)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-571, 572  Topology
Registration #1016-571, -572
Metric spaces, topological spaces, separation axioms, compactness, connectedness, product spaces. (SMAM-412 or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-599  Independent Study-Math
Registration #1016-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.
Class variable, Credit variable (offered every year)

SMAM-620  The Fourier Transform
Registration #1016-620
This course provides an introduction to an important mathematical tool for the analysis of linear systems. Topics covered are: a Fourier integral theorem; the Fourier transform and its inverse; an introduction to generalized functions; the Dirac delta functions; evaluating transforms; convolution, serial products; the sampling theorem; Rayleigh, power convolution, and auto-correlation theorems; the discrete Fourier transform; the fast Fourier transform. (SMAM-420)
Class 4, Credit 4 (offered every year) (S)

SMAT-420  Calculus for Technologists I
Registration #1019-420
The first course in a calculus sequence covering essential concepts and manipulations. Topics include: limits, derivative, indefinite and definite integrals, and numerical approximation. Applications to physical problems are stressed. (SMAM-204)
Class 4, Credit 4 (offered every year) (F, W, SR)

SMAT-421  Calculus for Technologists II
Registration #1019-421
A continuation of SMAT-420. Topics covered in this course are applications of the integral calculus; differential and integral calculus of the transcendental functions; and basic techniques of integration with emphasis on applications to engineering technology problems. (SMAM-420 or equivalent)
Class 4, Credit 4 (offered every year) (F, W, SR)

SMAT-422  Solutions of Engineering Problems
Registration #1019-422
A continuation of SMAT-421. Course covers selected applied mathematics topics including: differential equations through second order linear, Laplace transforms, Taylor series, and other appropriate topics. Emphasis is on the application of these topics to engineering technology problems (SMAT-421 or equivalent)
Class 4, Credit 4 (offered every year) (F, W, SR)

Physics
SPSP-200  Physics Orientation
Registration #1017-200
An introduction to the nature and scope of physics for freshmen interested in physics as a profession. Topics include: (a) what is physics? (b) professional opportunities in physics; (c) the physics profession; (d) the literature of physics; (e) communicating in physics. Laboratory includes safety instruction; measurement and record- ing techniques; graphical analysis; error analysis and report writing. Each student will present a formal written or oral report on some topic of interest at the end of the course.
Class 1, Lab. 2 Credit 2 (offered every year) (F)

SPSP-201, 202  Physics in the Arts
Registration #1017-201, -202
A study of topics from the world of art in which the underlying physical laws have influenced the art form and its development. A weekly laboratory will allow study of the relation of an art form to basic optical, mechanical, and electrical physics and in addition will provide time for the development of student projects.
Class 2, Lab. 2. Credit 3 (offered upon sufficient request) (W, S)

SPSP-211  College Physics I
Registration #1017-211
An elementary course in college physics. Mechanics: Newton’s laws of motion, momentum, rotational motion, energy. (SMAM-233 or SMAM-223) (See SPSP-271 for laboratory)
Class 3, Credit 3 (offered every year) (F, W)

SPSP-212  Heat and thermodynamics, fluids, wave motion, sound. (SPSP-211) (See SPSP-272 for laboratory)
Class 3, Credit 3 (offered every year) (W, S)
SPSP-213 Registration #1017-213
College Physics III
Geometrical and wave optics, electricity and circuits, magnetism, some elements of modern physics. (SPSP-211) (See SPSP-273 for laboratory)
Class 3, Credit 3 (offered every year) (F, S)

SPSP-271 Registration #1017-271
College Physics Lab I
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture, (coregistration or credit in SPSP-211)
Lab. 2, Credit 1 (offered every year) (F, W)

SPSP-289* Registration #1017-289
Contemporary Science—Physics
Introductory science for non-science students. One or more topics such as astronomy, space exploration, relativity, nuclear energy, and lasers are discussed and explained simply, 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 reinforce the material given in demonstration lectures and audiovisual presentations.
Class 4, Credit 4 (F, W, S)

SPSP-311 Registration #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, gravitation. (Coregistration or credit in SMAM-252) (See SPSP-371 for three-hour lab, SPSP-375 for two-hour lab)
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-314 Registration #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. (SMAM-305; SPSP-313)
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-319 Registration #1017-319
Electrical Processes in Solids
Introduction to intensity mechanics; Planck's formula; transport equation; electronic properties of conductors and semiconductors; characteristics of metal-metal, metal-semiconductor, and p-n junctions; operating principles of solid-state devices; theory and applications. (SPSP-315 and permission of instructor)
Class 4, Credit 4 (offered upon sufficient request) (S)

SPSP-321 Registration #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. (SPSP-313, SPSP-373)
Class 3, Lab. 3, Credit 4 (offered every year) (W)

SPSP-331 Registration #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 introductory physics).
Class 3, Lab. 3, Credit 4 (offered every year) (F, W, S)

SPSP-341 Registration #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)

SPSP-351 Registration #1017-351
Introduction to Semiconductor Physics
Principles of radiation protection. Radiation protection instrumentation, internal and external dose calculations. Practical radiation health physics. Introduction to electronics, including laboratory. (SPSP-352)
Class 4, Lab. 3, Credit 5 (offered every year) (F)

SPSP-352 Registration #1017-352
Introduction to Semiconductor Physics
Principles of radiation protection. Radiation protection instrumentation, internal and external dose calculations. Practical radiation health physics. Introduction to electronics, including laboratory. (SPSP-352)
Class 4, Lab. 3, Credit 5 (offered every year) (S)

SPSP-355 Registration #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 (offered every year) (S)
SPSP-361 Ultrasound Physics
Registration #1017-361
A course in the basic physics of ultrasound, covering ultrasonic wave generation and propagation, transducers, Doppler effect, reflection and refraction, biological effects, and applications of ultrasonic physics in medicine. (Permission of instructor and one year of college level physics)
Class 4, Lab. 3, Credit 5 (offered every year) (F)

SPSP-371 University Physics Lab I
Registration #1017-371
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (See SPSP-375 for a 2-hr lab for University Physics)
Lab. 3, Credit 1 (offered every year) (F, W, S)

SPSP-372 University Physics Lab II
Registration #1017-372
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (See SPSP-376 for a 2-hr lab for University Physics)
Lab. 3, Credit 1 (offered every year) (F, W, S)

SPSP-373 University Physics Lab III
Registration #1017-373
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (See SPSP-377 for a 2-hr lab for University Physics)
Lab. 3, Credit 1 (offered every year) (F, W, S)

SPSP-374 Modern Physics Laboratory
Registration #1017-374
Basic experiments representative of the experimental foundations of modern quantum physics, such as: photoelectric effect, Franck-Hertz experiment X-ray diffraction; optical diffraction and interference; atomic spectroscopy; electron microscopy; nuclear spectroscopy; radioactive half-life; Millikan oil drop; black-body radiation. Students enrolled in SPSP-315 may include experiments in semiconductor solid state physics. (SPSP-314)
Lab. 3, Credit 1 (offered every year) (S)

SPSP-375 University Physics Lab I
Registration #1017-375
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr lab)
Lab. 2, Credit 1 (offered every year) (F, W, S)

SPSP-376 University Physics Lab II
Registration #1017-376
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr lab)
Lab. 2, Credit 1 (offered every year) (F, W, S)

SPSP-377 University Physics Lab III
Registration #1017-377
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr lab)
Lab. 2, Credit 1 (offered every year) (F, W, S)

SPSP-401 Intermediate Mechanics
Registration #1017-401, -402
Particle dynamics, systems of particles, motion of a rigid body, gravitational fields and potential, moving coordinate systems, generalized coordinates, Lagrange’s equations, mechanics of continuous media. (SMAM-307, SPSP-313)
Class 4, Credit 4 (offered every year) (401-F; 402-S)

Class 4, Lab. 3, Credit 5 (offered every year) (F)

SPSP-411,412 Electricity and Magnetism
Registration #1017-411,412
Electric and magnetic fields using vector methods, Gauss’s law, theory of dielectrics, Ampere and Faraday laws, vector potential, displacement current, Maxwell’s equations. (SMAM-307, SPSP-313)
Class 4, Credit 4 (offered every year) (411-F; 412-S)

SPSP-415 Thermal Physics
Registration #1017-415
Introduction to the principles of classical thermodynamics and kinetic theory. Equations of state, the First and Second Laws of Thermodynamics, entropy, thermodynamic potentials, applications of thermodynamics, and kinetic theory of gases. (SMAM-307, SPSP-313)
Class 4, Credit 4 (offered alternate years) (F)

SPSP-421,422 Experimental Physics
Registration #1017-421, 422
Advanced laboratory work in physics, with experiments selected from one or more of the following branches of physics: mechanics, acoustics, heat, electromagnetism, and the physical optics. (SPSP-314, 321 plus co-registration or credit in any one of these: SPSP-401, 411, 415, 455)
Class I, Lab. 5, Credit 3 (offered every year) (421-F, 422-S)

SPSP-431,432 Electronic Measurements
Registration #1017-431, -432
Laboratory course in electronic measurements and instrumentation, with theory and applications of discrete and integrated circuits in analog and digital electronics. (SPSP-313, SPSP-321)
Class 3, Lab. 3, Credit 4 (offered every year) (431-S, 432-F)

SPSP-455 Optical Physics
Registration #1017-455
Physical optics including interference, diffraction, and polarization. Brief introduction to modern optics. (SMAM-305, SPSP-313)
Class 4, Credit 4 (offered alternate years) (F)

SPSP-480 Theoretical Physics I
Registration #1017-480
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 an introduction to Fourier integrals. Applications of these concepts to physics are presented. (SMAM-307, SPSP-313)
Class 4, Credit 4 (offered every year) (S)

SPSP-501 Theoretical Physics II
Registration #1017-501
Application of advanced mathematical methods of physics. (SMAM-307, SPSP-480, plus co-registration or credit in SPSP-401 and SPSP-411)
Class 4, Credit 4 (offered every year) (F)

SPSP-521 Advanced Experimental Physics
Registration #1017-521
Advanced laboratory experiments and projects in atomic physics, nuclear physics, or solid state physics. Special emphasis on experimental research techniques. (SMAM-307, SPSP-421)
Lab. 6, Credit 2 (offered every year) (F)

SPSP-522 Introduction to Quantum Mechanics
Registration #1017-522
A study of the concepts and mathematical structure of non-relativistic quantum mechanics. Exact and approximate techniques for solving the Schroedinger equation are presented for various systems. (SPSP-314, SPSP-480, SPSP-315 and SPSP-501 are recommended)
Class 4, Credit 4 (offered every year) (S)

SPSP-531 Solid State Physics
Registration #1017-531
The structure of solids and their thermal, mechanical, electrical and magnetic properties. (SPSP-315, SPSP-480, and SPSP-522; SPSP-501 is recommended)
Class 4, Credit 4 (offered every year) (F)
Clinical Sciences

SCLG-289 Contemporary Science—Health Sciences
Registration #1025-289
This course will examine areas within the health field, including evolutionary structural development and future projections, with emphasis on methods of diagnostic testing, selected disease conditions and the utilization of computers.

Class 4, Credit 4 (W)

SCLG-301 Medical Terminology
Registration #1025-301
Emphasizes etymology, definition, pronunciation and correct utilization of medical terms which enables students to develop a vocabulary essential to the understanding of and communication with the various health areas in which allied health professionals will serve. (SBIB-306 or instructor's permission)

Class 3, Credit 3 (offered every year) (F) (S)

SCLG-415 Pathophysiology
Registration #1025-415
The concepts and terminology of the pathophysiological nature of human disease are reviewed with particular emphasis on specific organ systems. The physiologic interaction of the various organs, in disease states, will be examined to demonstrate pathologic profiles. (SBIB-306)

Credit 4 (S)

SCLG-559 Special Topics—Clinical Sciences
Registration #1025-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures.

Class variable, Credit variable (offered every quarter)
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the central nervous system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth year standing in the NMT program)

Credit 1 (F)

SCLN-501 Nuclear Medicine Procedures- Reticuloendothelial System
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the reticuloendothelial system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth year standing in NMT program)

Credit 1 (F)

SCLN-502 Nuclear Medicine Procedures- Skeletal System
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the skeletal system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth year standing in NMT program)

Credit 1 (F)

SCLN-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 standing in NMT program)

Credit 1 (F)

SCLN-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 standing in NMT program)

Credit 1 (F)

SCLN-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 standing in NMT program)

Credit 2 (W)

SCLN-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 standing in NMT program)

Credit 2 (W)

SCLN-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 standing in the NMT program)

Credit 1 (S)

SCLN-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 standing in the NMT program)

Credit 1 (S)

SCLN-515 Nuclear Medicine Procedures- Hematological and In Vitro Studies
This course covers the basic procedures utilized in nuclear medicine for the evaluation of patients with hematologic disorders. Medical indications, fundamental principles, technique data calculations and test interpretation are covered for each procedure discussed. (Fourth year standing in the NMT program)

Credit 1 (S)

SCLN-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, quality control, computer systems and data processing are covered. (Fourth year standing in NMT program)

Credit 2 (W)

SCLN-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 radio-pharmaceuticals are covered. (Fourth year standing in NMT program)

Credit 2 (W)

SCLN-518 Radionuclide Therapy and Radiation Biology
A study of the application of radionuclides in the treatment of disease and the study of the biologic changes which occur following irradiation. (Fourth year standing in NMT program)

Credit 1 (W)

SCLN-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 (S)

SCLN-520 Radioimmunoassay
A combination lecture/practicum course in RIA. Topics include theory and basic principles, instrumentation, specific assays, and quality control. Commonly encountered pitfalls, current RIA developments and the diagnostic meaning of each test are covered. (Fourth year standing in NMT program)

Credit 4 (S)

SCLN-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 standing in NMT program)

Credit 2 (S)
SCLN-522  Clinical Nuclear Medicine I  
Registration #1025-522  
A clinical practicum which gives the student the opportunity to learn and master nuclear medicine procedures through technical and practical experience. Each student is assigned a particular combination of three hospitals and trains approximately four 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 R.I.T. nuclear medicine technology clinical coordinator who makes periodic visits to the hospital department. (Fourth year standing in NMT program)  
Credit 6 (F)

SCLN-523  Clinical Nuclear Medicine II  
Registration #1025-523  
Continuation of Clinical Nuclear Medicine I. (Fourth year standing in NMT program)  
Credit 7 (W)

SCLN-524  Clinical Nuclear Medicine III  
Registration #1025-524  
Continuation of Clinical Nuclear Medicine II (Fourth year standing in NMT program)  
Credit 7 (S)

SCLS-411  Intro, to Diagnostic Ultrasound  
Registration #1030-411  
A course which surveys the historical development of medical ultrasound technology, the professional and occupational development of sonography and the current major diagnostic uses of ultrasound. Registry certification will also be discussed.  
Class 2, Credit 2 (F)

SCLS-412  Ultrasonic Cross-Section Anatomy  
Registration #1030-412  
Basic cross-sectional anatomy of the head, neck, abdomen, and pelvis with emphasis placed on sonoanatomic correlation of anatomical structures. (Permission of instructor)  
Class 3, Rec. 1, Credit 4 (W)

SCLS-544  Advanced Obstetrical Ultrasound  
Registration #1030-544  
A continuation of Intro, to Obstetrical Ultrasound with refinement of skills and knowledge necessary to perform and evaluate complex obstetrical scans. (SCLS-552 and fourth year standing in the ultrasound program)  
Credit 5 (F, W, S)

SCLS-555  Advanced Gynecologic Ultrasound  
Registration #1030-555  
A continuation of Intro, to Gynecologic Ultrasound with refinement of skills and knowledge necessary to perform and evaluate complex gynecologic scans. (SCLS-553 and fourth year standing in the ultrasound program)  
Credit 5 (F, W, S)

SCLS-556  Intro, to Abdominal Ultrasound I  
Registration #1030-556  
This course will equip the student with the practical skills and clinical knowledge necessary to perform competent abdominal ultrasound scans. Image production, recognition, and acceptability are stressed; examination protocols are outlined. Instruction also includes review of teaching files and discussion of new techniques and research trends. (SCLS-551 and fourth year standing in the ultrasound program)  
Credit 6 (F, W, S)

SCLS-557  Intro, to Abdominal Ultrasound II  
Registration #1030-557  
This course will equip the student with the practical skills and clinical knowledge necessary to perform competent abdominal ultrasound scans. Image production, recognition, and acceptability are stressed; examination protocols are outlined. Instruction also includes review of teaching files and discussion of new techniques and research trends. (SCLS-556 and fourth year standing in the ultrasound program)  
Credit 7 (F, W, S)

SCLS-558  Advanced Abdominal Ultrasound  
Registration #1030-558  
A continuation of Intro, to Abdominal Ultrasound I and II with refinement of skills and knowledge of pathological processes necessary to perform and evaluate complex abdominal scans. (SCLS-557 and fourth year standing in the ultrasound program)  
Credit 7 (F, W, S)

SCLS-560  Seminar in Ultrasound  
Registration #1030-560  
A survey of current ultrasound topics and areas of ultrasound usage peripheral to the major specialties. Diagnostic imaging topics of interest to sonography will also be presented. (SCLS-551 and fourth year standing in the ultrasound program)  
Class 1, Credit variable (offered W, S)

Graduate Courses

Master of Science in Clinical Chemistry

SCLC-820  Advanced Clinical Chemistry I  
Registration #1023-820  
Toxicology, therapeutic drug monitoring, electrolytes acid-base, vitamins, oncology, hepatitis, coagulation, and various standard methods. (Permission of instructor)  
2 hr. lecture, 2 hr. seminar, Credit 3 (S 1984)

On a rotating basis Ad Clin. Chem. I, II, III will be offered two courses per year: one in the fall, another in the spring, and the third the following fall. They are independent courses that may be taken in any sequence.

SCLC-810  Advanced Clinical Chemistry Laboratory I  
Registration #1023-810  
Comparison of current methods for analysis of toxicity samples—gas-liquid chromatography, radioimmunoassay, enzyme multiplied immunoassay. (Permission of instructor, class size limited to 12)  
Lab. 4, Credit 1 (offered concurrently with SHPC-820)
National Technical Institute for the Deaf

Department of Educational Support Services Training

Interpreting

NITP-203 Principles of American Sign Language for Interpreters
Registration #0850-203
Students will be able to generate and accurately produce ASL classifiers and ASL idioms, recognize and accurately produce non-manual grammatical markers, use appropriate body/facial expressions, apply grammatical features of ASL, and manipulate sign utilization to vary meaning. (CHGD-0234-211 & 212)
Class 2, Lab. 2, Credit 3 (any quarter)

NITP-204 American Sign Language Interpreting I
Registration #0850-204
Students apply the skills and principles learned in Principles of American Sign Language. The student will practice interpreting from English to American Sign Language (ASL). Practice will include interpreting both live talent and audiotapes. The speed of the spoken message will be between 80-111 words per minute. (0850-203)
Class 3, Lab 2, Credit 3 (Fall, Winter, Spring, Summer)

NITP-205 American Sign Language Interpreting II
Registration #0850-205
The course is built around a series of advanced vocabularies necessary for interpreting in the community and in educational environments. Materials are structured so that students progressively increase transmission skills from 80 to 120 words per minute. Students skills in American Sign Language (ASL) will be enhanced with ongoing critiques. (0850-204)
Class 3, Credit 3 (Winter, Spring)

NITP-211 Voice Interpreting I
Registration #0850-211
This course will increase the student’s ability to receive the spoken and signed messages of hearing-impaired people. It also refines student’s ability to use vocal modulatio to prepare for the voice interpreting task. This is a self-paced lab course. Students learn by viewing videotapes and completing a series of exercises. The videotapes contain hearing impaired people communicating orally, in Signed English or in ASL. (NITP-214)
Class 3, Credit 3 (Winter, Spring)

NITP-212 Voice Interpreting II
Registration #0850-212
This course develops the student’s ability to generate a spoken English equivalent while viewing/listening to a hearing-impaired person’s signed/spoken message. This is a self-paced lab course. (NITP-211)
Class 3, Credit 3 (Fall, Spring)

NITP-213 Voice Interpreting III
Registration #0850-213
This course continues development of the voicing task. More complex videotaped samples of signed/spoken messages of hearing-impaired persons are delivered at a faster rate than those in Voice I and II. This is a self-paced lab course. (NITP-212)
Class 3, Credit 3 (Fall, Winter)

NITP-214 Fingerspelling and Number Comprehension
Registration #0850-214
Students improve their ability to comprehend fingerspelled words and manually signed numbers within messages signed at a conversational rate of speed. Instructional activities include games, drills, and voice interpreting in a lecture/lab format. (CHGD 0234-211 & 212)
Lab. 6, Credit 3 (Fall, Winter, Spring)
NITP-251, 252 Aspects and Issues of Deafness I, II Registration #0850-251, -252
The student learns the communication and psycho-social/cultural aspects of deafness through panels, discussions, readings and field trips.
Class 3, Credit 3 (offered annually)

NITP-261 Theory and Practice of Interpreting I Registration #0850-261
This course addresses the current theory and practice of the profession of interpreting. Topic areas include: (1) general communication principles of their application to the interpreting task; (2) the history of the profession of interpreting; (3) different types of interpreting and related terminology; (4) general skills required in interpreting and current applications by professional interpreters; (5) overview of the professional code of ethics and its rationale; (6) populations served by interpreters, e.g. hearing-impaired speech readers, deaf-blind individuals, multiply-handicapped individuals, etc.; (7) resources available to students related to interpreting and mainstreaming; (8) current issues facing the profession, i.e. multiple roles, mainstreaming specialists.
Class 3, Credit 3 (offered annually)

NITP-262 Theory & Practice of Interpreting II Registration #0850-262
Students use a communication process model to acquire a theoretical base for the interpreting task. Addressed are: the linguistic principles associated with sign language and the interpreting task, and skills in positioning and lighting. These courses include lectures and student participation in small and large group activities.
Class 3, Credit 3 (offered annually)

NITP-271, 372 The Professional Interpreter I, II Registration #0850-271, -372
Students develop a broad understanding of interpreting as a profession, national standards for certification, and the concepts contained in the RID Code of Ethics. Other areas of concentration are: interpersonal skills, self-critique, professional development, and resume writing. Course work includes panels, role plays, discussions, reading and lectures.
Class 3, Credit 3 (offered annually)

NITP-281, 382 Interpreting Practicum I, II Registration #0850-281, -382
These field experiences provide an opportunity to practice and integrate skills acquired in the classroom and laboratories. They include instructional and non-instructional activities on the RIT campus and in the Rochester community, under the supervision of the interpreter manager on site and the instructor responsible for the course. (For 281: NITP-202, 202, 271, 211, 331; For 382: 212, 213, 332, 281.)
Class 15, Credit 5 (available any quarter)

NITP-283, 384 Interpreting Seminar I, II Registration #0850-283, -384
Designed as part of the field experience, students share their experiences and concerns as practicing interpreters. Panels of interpreters and consumers of interpreting services are used. (co-requisite 281,382)
Class 1, Credit 1 (available any quarter)

NITP-331, 332 Expressive Transliterating I & II Registration #0850-331, 332
These two courses concentrate on expressive trans literation as it relates to conceptually accurate English. Students develop the skills required to present a spoken message which is in a signed English mode. Emphasis is placed on conceptual accuracy, accuracy of fingerspelling, vocabulary development, facial expression and body movement, and self critiquing skills. (NITP-0850-202)
Class 2, Lab. 2, Credit 3 (Spring, Fall)

NITP-342 Deaf-Blind Interpreting Registration #0850-342
Students are prepared to interpret for deaf-blind consumers. These topics, concerning deaf-blindness are included: causes and effects, aspects and issues of deaf-blindness, information and resources, interpreting modes and methods of communication. Practice with deaf-blind consumers is included where possible. (NITP-0850-202, 0850-212, 0850-271, 0850-331)
Class 3, Credit 3 (Fall, Winter, Spring)

NITP-343 Expressive Oral Interpreting/Transliteration Registration #0850-343
This course concentrates on the skill of expressive oral transliteration. Students develop the skill of receiving an auditory message and reproducing it in a highly visual modality by applying the principles of clear speech production and support techniques. Emphasis will be placed on speech production principles, natural gestures, body language, facial expression, and speed of transmission. (NITP-0850-252)
Class 2, Lab. 2, Credit 3 (Fall, Winter)

NITP-391 Principles of Tutoring/Notetaking Registration #0850-391
This course prepares personnel to provide tutoring and notetaking support services for the hearing-impaired in mainstreamed educational settings. The methodology is appropriate for elementary, secondary, and postsecondary educational levels.
Class 3, Credit 3 (offered annually)

NITP-392 Tutoring/Notetaking Practicum Registration #0850-392
Students provide tutoring and notetaking services to hearing-impaired students. A minimum of 10 hours per week is committed to taking notes in class and tutoring outside of class. Practicum sites include the Rochester City School District, the Monroe County Board of Cooperative Educational Services (BOCES) program, colleges of RIT, and other Rochester area universities and colleges. Supervision is provided. (NITP-391)
Class 10, Credit 3 (available any quarter)

NITP-395 Mainstreaming: Education Programs Registration #0850-395 and Alternatives
Explores the goals and processes of education of the hearing-impaired and covers current demographic, legal, economic and social trends affecting education of the hearing-impaired; identifies criteria and processes for the establishment of quality support services for deaf students. (NITP-252)
Class 3, Credit 3 (offered annually)

NITP-396 The Support Service Professional Registration #0850-396
This course addresses the knowledge and skills necessary for functioning in a variety of educational and/or non-educational settings where the support service provider will have more than one major responsibility. Case studies and practical experience in the field will be used to enhance student's awareness of what it means to be a support service professional. (NITP-0850-281, 0850-391)
Class 3, Credit 3 (Spring)

NITP-397 Contemporary Studies in Support Services Registration #0850-397
This course addresses the dynamic nature of support services and special education. As changes and growth happen in the field, this course will address "state of the art" issues. Some examples are: court decisions; state or federal legislation; research findings; developments of new techniques or technology; in-service training programs for faculty and/or service providers; management of support services. The course will be offered as new topics arise, or if a lecturer with specific expertise is available to conduct the course. (NITP-0850-281)
Class 1-3, Credit variable 1-3 (Fall, Winter, Spring)

NITP-399 Independent Study Registration #0850-399
This course provides the student with the opportunity for supervised exploration of special topics related to interpreting, deafness, tutoring, notetaking, and/or mainstreaming. (NITP-0850-202, 0850-252, 0850-271, 0850-262, 0850-331, 0850-391)
Credit variable 1-3 (Winter, Spring, Summer)

Course descriptions for A.A.S. Diploma, and Certificate programs for deaf students may be found in the NITP catalog.
Military Science and Reserve Officer's Training Corps

All courses are offered annually. AH labs are conducted weekly and are required.

**First Year**

**MMSM—201** Introduction to Military Science and Basic Registration #0701-201 Map Reading

This course is designed to introduce the student to the ROTC program and military map reading techniques. Topics of primary interest will include: the organization and purpose of ROTC program, the organization of the U.S. Army, and basic military land navigation techniques with emphasis on the U.S. Army grid system; leadership laboratory; map reading exercise.

(The Physical Education course—Orienteering Course, XPEF—may be taken in lieu of this course.)

Class 1, Lab. 1, Credit 2

**MMSM—202** Applied Health Dynamics Registration #0701-202

This course is designed to give the student a basic understanding of the Army medical system and emergency first aid techniques used in the military. Special emphasis is given to CPR, prevention of injuries, and supervision of preventive medicine activities; leadership lab.

(The Physical Education course—Military Preventive Medicine and First Aid, XPEH—may be taken in lieu of this course.)

Class 1, Lab. 1, Credit 2

**MMSM—203** Military Heritage Registration #0701-203

This course is designed to provide a practical introduction to the basic military organization and rank structure; the historical basis for customs and traditions found in the military and current discussions on the military and its impact upon society; leadership laboratory.

(The Physical Education course—Drill and Ceremonies, XPEH—may be taken in lieu of this course.)

Class 1, Lab. 1, Credit 2

**Second Year**

**MMSM—301** Military Geography Registration #0701-301

A continuation of studies in military land navigation (MMSM—201) with special emphasis given to navigation using a map and compass. Geographic concepts and realities are studied as they apply to the solution of military problems. Major topics for discussion will include identification of terrain features, determination of location using resection and intersection techniques, and determination of direction. This course stresses practical application rather than theory; leadership lab.

Class 1, Lab. 1, Credit 2

**MMSM—302** Psychology and Leadership Registration #0701-302

This course provides the student the basic principles of leadership and management of human resources; motivation, morale and communication. Special emphasis is placed on applying the theories and models of the behavioral sciences and personnel management to leadership as it functions in a military environment; leadership laboratory.

Class 1, Lab. 1, Credit 2

**MMSM—303** The Military and American Society Registration #0701-303

This course is designed to give the student an introduction to the principles of war and the study of the application of these principles in military history from 1945 to 1970. Primary emphasis is given to the impact of the Vietnam conflict upon American society and the Army. Other discussions will include the Army of future, the Soviet threat, and a contrast of the U.S. and Soviet Union military systems. Leadership laboratory.

Class 1, Lab. 1, Credit 2

**Third Year**

**MMSM—401** History of the Military Art Registration #0701-401

This course examines the evolution of the art of war in the modern period. This course concentrates on World War I, World War II, and selected military experiences, the changing nature of warfare, and civil-military relations.

Class 4-5, Credit 4-5

**MMSM—402** Military Tactics Registration #0701-402

A continuation of military skills training with emphasis on military intelligence/security, first aid, operations at the small unit level; leadership laboratory; field training exercise.

Class 2, Lab. 1, Credit 3

**MMSM—403** Military Operations Registration #0701-403

A continuation of military skills training with emphasis on military intelligence/security, first aid, operations at the small unit level; leadership laboratory; field training exercise.

Class 2, Lab. 1, Credit 3

**Fourth Year**

**MMSM—501** Combined Arms Operations Registration #0701-501

The course introduces the student to the mission, organization, and capabilities of the branches of the Army. Discussions on the tactics of the Airland Battle 2000, advanced studies in U.S. and Soviet capabilities and tactics, and practical application of these tactics through war gaming; leadership laboratory.

Class 2, Lab. 1, Credit 3

**MMSM—502** Military Administration and Registration #0701-502 Logistic Management

This course includes discussions and seminars on officer extra duties, military justice, supply and property accountability, maintenance management, officer-enlisted personnel management and command and staff responsibilities; leadership laboratory.

Class 2, Lab. 1, Credit 3

**MMSM—503** Military Ethics Registration #0701-503

This course examines the ideas and issues that define the role of the military in our larger society. Emphasis is placed on the professional and ethical standards required of the military officer. Other topics include: discussions on the office personnel management system, active duty orientation, preparations for commissioning; leadership laboratory; field training exercise.

Class 2, Lab. 1, Credit 3

**MMSM—510** Senior Seminar and Project Registration #0701-510

For military science students who have completed their junior year of military study. The seminar is directly related to military science projects that students are working on and consists of written and/or oral presentations given during the quarter. Students may also be required to present this material to other students in a classroom environment.

Class 2, Credit 2