R·I·T

Courses 1985-86

Rochester Institute of Technology Rochester, New York

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.

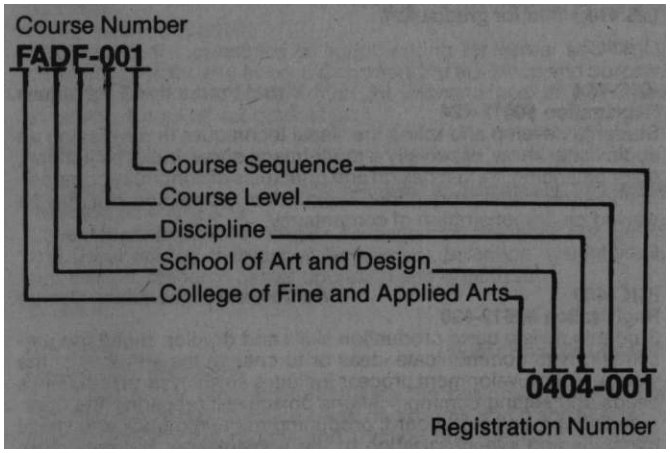
First letter College offering the course

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 1985-86

Produced by RIT Communications

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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.

Table of Contents

In this catalog you will find course descriptions for all course offerings given by the colleges, schools and departments of the Institute for undergraduate or graduate credit. The listing does not include courses specifically for students of the National Technical Institute for the Deaf. These are described in a separate NTID catalog.

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-426 Training and Supervision In the Hospitality Industry
Registration #0612-426
Course includes theory and techniques of training employees in the food, hotel, and tourism management field. The course covers task analysis, job descriptions, recruitment and hiring, training and employee development, supervision, evaluation, and productivity. (Open to FHTM juniors and seniors only: prerequisite to ICIC-519)

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 Audiovisual Seminar
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 Presentation Design
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 I
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 audiotapes 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 Audiovisual Program Design
Registration #0612-501
Allows a student to explore or develop a special competence in audiovisual 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 audiovisual communications majors only.

Credit variable (1-2)

ICIC-502 Practicum In Audiovisual Management
Registration #0612-502
Allows a student to explore or develop a special competence in audiovisual 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 audiovisual communications majors only.

Credit variable (1-2)

ICIC-503 Practicum in Audiovisual 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 audiovisual communications majors only.

Credit variable (1-2)

ICIC-510 Writing for Audiovisual 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 Audiovisual 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 Audiovisual 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 Audiovisual Presentations
Registration #0612-571
The student learns to plan and set up equipment for audiovisual presentations. Includes calculation of power requirements, analyzing facilities and developing plans, setting up, connecting and troubleshooting common audiovisual equipment such as sound systems, projectors, multi-image equipment, screens. (ICIC-489, ICIC-580)

Credit 2 t

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 ICIC-401 or ICIC-421 or equivalent)

Credit 4 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 audiovisual presentations. Includes techniques to produce effects such as multiple exposures, streaks, zooms, neons, 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-586 Advanced Special Effects Slides Production
Registration #0612-586
In this continuation of ICIC-585, the student will analyze, design, and produce special; effects slides with a number of elements. The student will also have the opportunity to learn the operation of a computer-controlled special effects camera stand and to incorporate basic techniques like positive, negative, and gradation masks with camera and compound movements and multiple exposures to produce special effects slides like streaks, zooms, neons, step and repeats, spins, posterizations, seamless masks, pans and animation. Emphasis will be on the development of such slides for multi-projector presentations. In addition to camera operation, the student must design and produce any necessary artwork.

Credit 2-4

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 audiovisual communications majors only.

Credit 2/Qtr.

Graduate Courses

Instructional Technology

ICIT-700 Introduction to instructional Technology I
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 3

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
Registration #0613-705 Instructional Technology
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 variable (3-4)

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

Credit 4

ICIT-712 Computer Assisted Instruction (CAI-1)
Registration #0613-712
Students learn the use of the computer for instruction (computer-assisted instruction) and then produce their own computer-assisted instruction programs. Students review research and computer-assisted instruction, various hardware and software configurations, programmed languages, and sources of already developed computer-assisted courses. The course covers some methods of course and lesson development. Project required. (ICIT-755 or with permission of department)

Credit 4

ICIT-713 Advanced Computer Assisted Instruction (CAI-2)
Registration #0613-713
The student develops complex and sophisticated instructional sequences which incorporate advanced CAI programming techniques; enters the sequences on the computer; tests and debugs the sequences; and using the computer, gathers the student response information necessary to validate the sequences. The student also explains and demonstrates CAI and writes proposals for CAI courses and lessons. (ICIT 712) Two projects required.

Credit 4

ICIT-714 Computer Based Interactive
Registration #0613-714 Instructional Systems (CAI-3)
Students plan and produce segments of a computer-based, highly interactive course which also utilizes a pictorial display medium, preferably video. The student must enter all computer elements and produce the scripts and directions for noncomputer segments, as well as preparing all technical and user documentation. The course incorporates the principles of ICIT-712 (CAI-1) and ICIT-713 (CAI-2). Major project required. (ICIT-712, ICIT-713, ICIT-750, ICIT-755, ICIT-756, media design skills.)

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, designs, 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
Registration #0613-736 Training and Adult Learning
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**
Registration #0613-755 **Technical Training I**
Required for graduation.

Credit 3

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

A two-course sequence which applies the principles of instructional development specifically to those areas of training in which performance criteria can be precisely stated and accurately measured. Such training usually tends to be in technical skill areas where procedures or product are predetermined or can be clearly specified. The course is largely self-paced and self-instructional and the student must complete a project in the technical training area.

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

ICIT-762 **Management & Budgeting in**
Registration #0613-762 **Instructional Technology**
Applies basic theories of management to areas of instructional technology and to management of personnel of those areas. Examines the organizational structure of instructional development units. Covers budgeting and actual financing for services and projects.

Credit 4

ICIT-765 **Individual Learning Style Analysis**
Registration #0613-765
Examines the Ways different individuals learn and relates instructional strategies to learning styles. Covers cognitive style mapping, aptitude treatment interaction, application of norm and criterion referenced tests as each relates to individual learning style. (ICIT-735)

Credit 4

ICIT-770 **Interpersonal Communications**
Registration #0613-770
Instructional development requires that instructional technologists be able to work well with people. Participants in the course are taught to be sensitive to others as well as to examine their own feelings in a group situation. Required for graduation.

Credit 2

ICIT-772 **Group Development and**
Registration #0613-772 **Organizational Change**
Similar in format to ICIT-770, the course extends the concept and practice of interpersonal communications to the area of work-and-task-oriented team-building and organizational change. The course stresses actual personal interaction in a training laboratory environment while including some of the theoretical aspects of causing work-oriented, personal and organizational change. Offered on demand. (ICIT-750, ICIT-751, ICIT-757, ICIT-770, IJCC-753, and permission of department.)

Credit 3

ICIT-780 **Selected Topics in Instructional Technology**
Registration #0613-780
This seminar provides a forum for a small group of students to examine various areas of interest to them. Students select topics, examine them thoroughly, and present the findings for group consideration. Required for graduation. (30 hours course work)

Credit 2

ICIT-840 **Internship**
Registration #0613-840
Special opportunities may occur for students to obtain work experience in a job or environment similar or coincident with their career objectives. In fact, students are encouraged to locate such opportunities. This course recognizes this experience. A proposal (guidelines available from the department) must be submitted prior to registering for this course. (ICIT-750, ICIT-751 plus 20 hours of course work)

Credit variable (1-3)

ICIT-850 **Independent Study**
Registration #0613-850
An opportunity for a student to explore, with a faculty advisor, an area of interest to the student. A proposal (guidelines available from the department) must be submitted prior to registering for this course. (ICIT-750, ICIT-751 plus 20 hours of course work)

Credit variable (1-3)

Department of Career and Human Resource Development

All courses are offered on demand with sufficient enrollment.
Note: Graduate courses applicable to the program are also listed under the College of Business

IJCC-703 **Management of Learning**
Registration #0615-703
Systems of curriculum planning and cognitive styles, goals, objectives, evaluation, measurement, and productivity are studied as they relate to the accountability of faculty, students, and administration.

Credit 2

IJCC-704 **Instructional Techniques**
Registration #0615-704
To develop professional competence in direct applications and uses of various learning styles, including television, special audiovisuals, prepared lectures, seminars, computer assisted instruction, and programed learning.

Credit variable (1-4 credits)

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

ICSS-525 **Assemblers, Interpreters,**
Registration #0603-525 **and Compilers**
A survey of the three basic programming language processors. Topics include design and construction of language processors, formal syntactic definition methods, parsing techniques, and code generation techniques. Laboratory work includes actual construction of language processors. (ICSP-210)

Class 4, Credit 4

Computer Science Courses

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

ICSP-241 **Programming I**
Registration #0601-241 **Algorithmic Structures**
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 **Data Structures**
An introduction to the basic data structures used in computer applications. Both abstract concepts and implementation details will be discussed, including comparisons of alternative implementations. Topics include arrays, records, pointers, dynamic storage allocation, linked lists, stacks, queues, 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, stepwise refinement, test data selection, modurlarity measures (cohesion and coupling), common programming paradigms, and advanced file I/O. Programming projects are required (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, looping and address modification, character manipulation, bit manipulation, floating point arithmetic, decimal instructions, some system I/O macros and debugging techniques. Programming projects will be required (ICSP-243)

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

ICSP-488 **Programming Systems Workshop**
Registration #0601-488
A workshop for the application of 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. (ICSP-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**
Registration #0603-202 **Science**
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 fetching, decoding and execution in a simple CPU, input/output subsystems, interrupts, and variations in memory addressing. The laboratory introduces elementary integrated circuit building blocks including gates, flip-flops, registers, and counters. Additional experiments include an introduction to interrupts. (ICSP-305)

Class 3, Lab 2, Credit 4

ICSS-325 **Data Organization and**
Registration #0603-325 **Management**
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)

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; robots in industry; office automation; computers in education and computer assisted instruction issues, privacy and the Freedom of Information Act; computer abuses and crime — the impact on law enforcement; the future — a cashless society; universal identifiers, computers in the home. Participants will develop several short discussion papers and a major study in one of the course topics. (ICSS-200 or ICSS-202)

Class 4, Credit 4

ICSS-360 **Fundamentals of Computer Science**
Registration #0603-360 **for Transfer Students**
This course covers selected topics from ICSP-241, 242 and 243. It introduces the student to the Unix™ operating system, and the Pascal language, which is then used to examine various data structures including records, linked lists, stacks, queues, trees and graphs. The use of recursion is also studied. This course is intended for students with previous programming experience, but with no background in data structures. 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
An in depth study of the logical design of digital circuits. Topics include combinational circuit design with emphasis upon use of MSI and LSI circuits and CAD tools, sequential circuit synthesis, both synchronous and asynchronous, and an introduction to interfacing techniques. Additional topics to be covered include testing, CAD tools such as logic simulators and logic reduction programs, analog IC's such as op amps, integrated circuit technologies, and an introduction to VLSI design. (ICSP 315, SMAM 265 or equivalent, and SPSP 313)

Class 3, Lab 2, Credit 4

ICSS-420 **Data Communications Systems**
Registration #0603-420
This course is an introduction to the concepts and principles of computer communication subsystems. It examines the effects of topology, communication media, and software protocol on network performance, cost and reliability. The course covers the physical and first level software considerations of the hierarchical model for computer network design. (ICSS-315 and either SMAM 309 or SMAM 352)

Class 4, Credit 4

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

Class 4, Credit 4

ICSS-435 **Systems Specification, Design**
Registration #0603-435 **and Implementation**
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), data-flow diagramming (description and design tool), and hierachical 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 2, Credit 2

ICSS-470 **Finite State Machines**
Registration #0603-470 **and Automata**
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, SMAM-265)

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 unsolvabilty and computability. (ICSS-470)

Class 4, Credit 4

I CSS-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 approaches; data secu rity and recovery, comparisons of the data base approach with traditional file organization and access methods, 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. (ICSS-325, SMAM 265 or equivalent)

Class 4 Credit 4

ICSS-520 **Computer Architecture**
Registration #0603-520
An introduction to computer architecture. Includes a survey of computer architecture fundamentals exemplified in commercially available computer systems, including classical CPU and control unit design, design of arithmetic units, register allocation, primary memory organizations 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 and distributed systems are also presented, along with an analysis of their performance relative to non-parallel machines. Programming projects will be required. (ICSS-440, SMAM-265 or equivalent, and SPSP-313)

Class 4, Credit 4

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

Class 3, Lab 2, Credit 4

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

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

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
This course presents the concepts and principles of the higher level protocols of the ISO reference model, as introduced in ICSS-420 Data Communication Systems. Included in this course will be the investigation of routing techniques, local area networks, interconnection of networks, security issues and user level services. Programming projects will be required. (ICSS-420)

Class 4, Credit 4

ICSS-542 **Distributed Systems Laboratory**
Registration #0603-542
This course will build on topics developed in ICSS-420 Data Communication Subsystems and ICSS-541 Introduction to Computer Networks in a lab setting. Students will be required to design and implement a small computer network addressing issues such as routing strategies, virtual circuits vs. datagrams, data link protocols, and user (presentation) level services. (ICSS-540 and ICSS-541)

Class 4, Credit 4

ICSS-545 **Computer Architecture Laboratory**
Registration #0603-545
This course applies the hardware and software concepts learned from logic design, computer architecture, data communications, and operating systems. Laboratory work will include the design, implementation, debugging, and documentation of major hardware/-software projects. Topics to be presented in the lecture include busses, interfacing, bit slice architectures, microprogramming, microprocessors, analog interfacing, and real time computing. Additional topics related to the specific laboratory projects will also be covered. Programming projects will be required. (ICSS-400, ICSS-420 and ICSS-520)

Class 3, Lab 2, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

ICSS-570 **Introduction to Computer Graphics**
Registration #0603-570
A study of the hardware and software principles of computer graphics. Topics include an introduction to the basic concepts, 2-D transformations, viewing transformations, display file structure, geometric models, picture structure, interactive and non-interactive techniques, raster graphics fundamentals, 3-D transformations and perspective, hidden surface elimination, graphics packages and graphics systems. Programming projects will be required. (ICSS-325)

Class 4, Credit 4

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

Class 4, Credit 4

ICSS-590 **Seminar in Computer Science**
Registration #0603-590
Current advances in computer science.

(Prerequisites set by instructor)

Class 2-4, Credit 2 - 4

ICSS-599 **Independent Study**
Registration #0603-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to study particular computer science topics in greater depth. (Faculty approval is required prior to registration.)

Class 2 - 4, Credit 2 - 4

ICSS-610 **EDP Auditing**
Registration #0603-610
A study of the techniques and approaches used to audit computer data centers and systems. Topics include the methodology and tools of EDP auditing, internal departmental controls, program controls, input/output controls, data security, physical security, computer hardware controls and data communication control. (Fourth-year standing in Computer Science and Technology)

Class 4, Credit 4

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

Class 4, Credit 4

Graduate Courses

Undergraduate Computer Science and Technology students may take 700 and 800 level courses only by consent of the School Director 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-700 **Computer Programming and Problem Solving**
Registration #0603-700
An introductory course in the use of computers, interactive environments, file systems, editor. Programming in a modern structured programming language such as Pascal or Ada, covering: control structures, procedures and functions, recursion, arrays, pointers, file I/O, records. Application areas cover: numerical methods, sorting and searching, graphics, text processing. Programming projects will be required. (Pre-calculus)

Credit 4

ICSS-701 **Programming I**
Registration #0603-701
Fundamentals of computer programming and problem-solving using a structured programming language (Pascal or Ada). Introduction to and use of an interactive editor and file system. Applications in business, science, mathematics, engineering, education, systems programming, and graphics will be covered. Techniques will be introduced for data representation and structuring, sorting, and searching. Programming projects will be required. (Computer literacy, pre-calculus; discrete math, is a co-requisite)

Credit 8

ICSS-702 **Programming II**
Registration #0603-702
The concept of computer programming at various levels of application. At a lower level is a macro assembly language. At a higher level, a new language - APL, Snobol, etc. Combining program segments written in assembly language with segments in a known 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. A study of a programming language that supports these programming practices - ADA, for example. Programming projects will be required. (ICSS-701 or equivalent)

Credit 8

ICSS-703 **Algorithms 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, discrete mathematics)

Credit 4

ICSS-704 **Assembly Language Programming**
Registration #0603-704
Introductory computer architecture (von Neumann machine); addressing methods - direct, indirect, immediate, absolute, indexing, base-register, etc.; operations - machine instructions, directives or pseudo-operations, and macros; representing program paradigms in assembler language - decisions, loops, subroutines, arrays, links, etc; assembly language program design techniques; macro definitions and use; libraries. Programming projects will be required. (ICSS-700, 701 or a programming proficiency in some high-level language.)

Credit 4

ICSS-705 **Discrete Computational Structures**
Registration #0603-705
The fundamental concepts of discrete mathematics which are necessary for understanding further mathematics foundations of Computer Science. Topics include: structures defined on finite sets, elemental^ symbolic logic, patterns of mathematical proof, vectors and matrices, graphs, combinatorics, formal languages, abstract mathematical systems. The relevance of the chosen topics to Computer Science and the applications of computers to these topics will be stresses. (College algebra, computer literacy)

Credit 4

ICSS-706 **Foundations of Computing Theory**
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. (ICSS-705, ICSS-703)

Credit 4

ICSS-707 **Advanced Programming**
Registration #0603-707
An introductory course in the life-cycle issues of large and single/multi-programmer programs. Structured and modular programming, data abstraction and information hiding. The Chief programmer concept. Specific focus on modern programming practices: specification, design and prototyping, coding and verification, integration and maintenance. These, along with the study of a programming language that supports them - ADA, for example. Programming projects will be required. (ICSS-703)

Credit 4

ICSS-708 **Computer Organization and Programming**
Registration #0603-708
An introduction to the basic concepts and terminology of hardware and software systems. Basic hardware is elementary circuit design -gates, Boolean algebra, simple combinational circuits (adders, decoders, multiplexers ...), and simple sequential circuits (various flip-flops, registers, serial adders, counters...). The Operating System as the major software providing a "virtual" interface - virtual memory (paging, segmentation, etc.), file systems, multiprogramming, traps and interrupts, etc. The intent of this course is to prepare the student for future courses in computer architecture and operating systems. Programming projects will be required. (ICSS-704, ICSS-703, ICSS-707)

Credit 4

ICSS-709 **Programming Language Theory**
Registration #0603-709
An introduction to several important programming languages and the basic concepts of language design and specification. Topics will include data and control structures, subprogram sequencing and control, and parameter passing. Languages selected will include examples of string processing, applicative, systems programming, and concurrent languages. Programming projects will be required. (ICSS-702 or equivalent)

Credit 4

ICSS-711 **Programming Language Theory**
Registration #0603-711
An introduction to non-traditional programming paradigms and language translation techniques. Topics will include language translators, parsing, snytax directed translation and storage management for retentive and nonretentive languages. Languages studied will include examples of functional, logic, object oriented and data-flow languages. Programming projects will be required. (ICSS-706 and ICSS-709)

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 implementations. 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. Programming projects will be required. (ICSS-708)

Credit 4

ICSS-721 **Microprocessors and Microcomputers**
Registration #0603-721
A study of microprocessors, microcomputers, and microcomputer applications. Topics to be covered include microprocessor architecture, microcomputer organization and buses, parallel and serial interface techniques, analog interfacing, interrupts, and development trends in microprocessors. Emphasis will be on the use of microprocessors and small microcomputers. Single board microcomputer systems are used in laboratory projects to explore hardware and software design issues, as well as memory design and I/O interface techniques. Programming projects will be required. (ICSS-720)

Class 3, Lab **1** 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. (ICSS-703, 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-730)

Credit 4

ICSS-735 **On-Line Information Systems Design**
Registration #0603-735
The structured analysis, design and implementation of on-line information systems are covered. Topics include data and algorithm structuring, measures of software complexity, software behavior modeling, and packaging. System development and project management are also highlighted. (ICSS-708)

Credit 4

ICSS-738 **Database Systems**
Registration #0603-738
An introduction to the storage and processing of formatted database management systems. Topics include: objectives of database management, file and indexing structures, database system architectures, normalization theory, database machines and distributed databases. Several existing and experimental systems will be studied. (ICSS-703, ICSS-708)

Credit 4

ICSS-739 **Database System Implementation**
Registration #0603-739
An examination of the technical issues related to the implementation of shared access databases. Topics include concurrency control, transaction processing, reliability and recovery. Extensions to the distributed processing environment are also covered. Programming projects will be required. (ICSS-738)

Credit 4

ICSS-744 **Data Communications**
Registration #0603-744 **and Networks I**
An introduction to Computer Communication. This course will cover the fundamentals of data communication, including terminal comm unication 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**
Registration #0603-745 **4 Networks II**
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. Also included will be higher level protocols and the application of computer networks. (ICSS-720, ICSS-744)

Credit 4

ICSS-770 **Fundamentals of**
Registration #0603-770 **Computer Graphics**
Topics include basic concepts, 2-D transformations, windowing, clipping, interactive and raster graphics, 3-D transformations and perspective, hidden line and surface techniques, graphical software packages and graphics systems. Programming projects will be required. (ICSS-703)

Credit 4

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

Credit 4

ICSS-781 **Introduction to Artificial Intelligence**
Registration #0603-781
An introduction to the theory and techniques underlying the development of "intelligent" computer software. Emphasis will be placed on programming techniques and languages used in artificial intelligence research. Students will be required to design and implement programs that use these techniques to build game players, theorem provers, natural language understanding systems or other rudimentary artificial intelligence projects. Programming projects will be required. (ICSS-708, ICSS-709)

Credit 4

ICSS-801 **Software Engineering**
Registration #0603-801
An introduction to software engineering methodologies and technologies useful for developing quality, cost-effective and schedule-meeting software. The course focuses on the engineering of programming systems products. Emphasis is placed on quantitative models. Topics include: current problems in software development, Halstead's software science, complexity metrics, specification and design metrics, cost estimation models, growth dynamics, software reliability models, and models of program testing. (ICSS-708, ICSS-709)

Credit 4

ICSS-802 **Software Engineering Laboratory**
Registration #0603-802
A projects course in applied software engineering with emphasis on the use of software based engineering tools. Available tools include Higher Order Software's specification and code generation system and Stanford University's WEB, an integrated programming and documentation system. Students work in small teams on software development projects. Programming projects will be required. (ICSS-801)

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. Programming projects will be required. (ICSS-708)

Credit 4

ICSS-810 **Operating Systems II**
Registration #0603-810
A laboratory practice course, Operating Systems II is designed to provide the student with practical experience in implementing many of the notions discussed in Operating Systems I. The class, with the instructor serving primarily as a technical advisor, designs the kernel of a small operating system in class in the first 2-3 weeks. This kernel is module tested and downloaded to a standalone processor and test run until it is debugged. Then students form into groups of 3-5 persons each and choose a project to pursue which involves implementing additional features of the operating system. Typical projects are: file systems, memory management, scheduling, and interprocess communications. Programming projects will be required.

Credit 4

ICSS-811 **Operating Systems III**
Registration #0603-811
This is a "topics" course in which the instructor chooses an advanced topic of interest and explores it with the class. The topic may vary from the implementation of an Operating System feature through the study of topics not covered in Operating Systems I to queuing theory of other theoretical topics. Programming projects will be required. (ICSS-809)

Credit 4

ICSS-846 **Text Storage and**
Registration #0603-646 **Retrieval Systems**
A study of contemporary approaches to the storage and retrieval of unformatted text with emphasis on document databases. Students use the experimental SMART information storage and retrieval system, and an AT&T Videotex system for project assignments. Topics include: traditional approaches to indexing and retrieval, text analysis and automatic indexing, clustering algorithms, the SMART system, the extended boolean logic model, pattern matching algorithms and videotex. (Completion of the bridge program)

Credit 4

ICSS-850 **Computability**
Registration #0603-850
Computability is the heart of theoretical computer science, for it is the theory which attempts to formalize the notion of computation. Topics include computation by while-programs, Turing machines, recursive function theory, Symbol-Manipulation Systems, program methodology, the limitation 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 polynominal arithmetic, NP-completeness, and lower bounds on algorithms involving arithmetic operations. (ICSS-706)

Credit 4

ICSS-852 **Coding Theory**
Registration #0603-852
A study of error-correcting codes and their applications to reliable communication of digitally encoded information. Topics include cyclic codes, hamming codes, quadratic residue codes, B.C.H. codes, Designs and Codes, Weight Distributions. (ICSS-706)

Credit 4

ICSS-856 **Theory of Parsing**
Registration #0603-856
Application of theoretical concepts developed in formal language and automata theory to the design of programming languages and their processors, syntactic and semantic notation for specifying programming languages, theoretical properties of some grammars, general parsing, non-backtrack parsing, and limited backtrack parsing algorithms. (ICSS-706)

Credit 4

ICSS-860 **Compiler Construction**
Registration #0603-860
The structure of language translators, lexical and syntactic analysis, storage allocation and management, code generation, optimization, error recovery. Programming projects will be required. (ICSS-706, ICSS-709 and ICSS-711)

Credit 4

ICSS-890 **Seminar**
Registration #0603-890

Current advances in computer science. (Permission of the instructor)

Credit 2-4

ICSS-895 **MS Thesis**
Registration #0603-895
Capstone of the Masters Degree program. Student must submit an acceptable thesis proposal in order to enroll. (Permission of the graduate studies committee)

Credit 4

ICSS-899 **Independent Study**
Registration #0603-899
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to study Computer Science topics in greater depth and more detail. (Faculty approval)

Credit variable

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 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. (Statics and strength of materials)

Class 4, Credit 4

ITEC-420 **Hydraulics**
Registration #0608-420
Study of principal physical and mechanical properties of liquids, hydrostatic pressure and forces; pressure measuring devices; buoyancy and flotation, flow of liquids in closed conduits, and introductory principles of piping systems design; pumps and pump selection; flow of water in open channels and introduction to their design. (Physics) 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, word processing 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, Credit 2

ITEC-438 **Principles of the Treatment of Water and Sewage**
Registration #0608-438
An introduction to water and wastewater treatment, interpretation of analyzed physical, chemical, and biological parameters of water quality with regard to the design and operation of treatment processes and to the control of the quality of natural water; fundamental principles and applications of physical, chemical and biological processes employed in water and wastewater treatment; analysis of waste assimilative capacity of streams, with an introduction to microbiology.

Class 3, Lab. 2, Credit 4

ITEC-444 **Mechanical Equipment for Buildings**
Registration #0608-444
Presentation of mechanical and electrical equipment used in building construction. The codes applicable to plumbing, heating, air-conditioning, and operation and control will be studied.

Class 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 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 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 1986-87, 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

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,

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 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, breakeven analysis, profit determination and statistical cost forecasting. (ITEF-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: setting, 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 Technology**
Registration #0608-513
Designed as a supplement to the introductory programming course. Topics include: word processing, use of packaged programs such as COGO and MINITAB, electronic mail, introductin to graphics, and design of user-friendly programs. Work will be done using timesharing, primarily, but with some time devoted to personal computers. (ICSP-205 or ICSP-220)

Class 2, Credit 2

ITEC-514 **Land Planning**
Registration #0608-514
The environmental and social aspects of land planning are covered as well as the engineering and cost considerations. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wetlands, other planning and control tools, and 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 4, Credit 4

ITEC-516 **Analysis and Design of Reinforced Concrete Structures**
Registration #0608-516
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**
Registration #0608-518
An introduction to masonry design and construction. Both brick and concrete masonry will be covered, with the emphasis on concrete masonry. Topics covered include terminology, non-reinforced masonry, reinforced masonry, joint reinforcement, types of mortar, design of bearing walls and partitions. Use will be made of 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**
Registration #0608-520
Principles of wastewater treatment plant design, conceptual and hydraulic design of activated sludge and trickling filter plants are studied. Tertiary treatment facilities, such as nitrogen and phosphorous 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**
Registration #0608-522
Principles of microbiology and their application to water and wastewater. Principles and practice of water and wastewater treatment processes with emphasis on settling, chemical precipitation, adsorption, disinfection, granular medium filtration, aerobic suspended and attached growth, and anaerobic suspended growth. (ITEC-438)

Class 3, Lab. 3, Credit 4 (Effective 1986-87)

ITEC-525 **Hazardous Waste**
Registration #0608-525
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 hazardous and toxic wastes. (ITEC-438)

Class 4, Credit 4 (Effective 1986-87)

ITEC-526 **Industrial Wastewater**
Registration #0608-526
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**
Registration #0608-527
Study of physical, mechanical and engineering properties of soils; methods of determination of bearing capacity, stress distribution within soil mass and settlement; spread 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**
Registration #0608-528
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**
Registration #0608-530
The course exposes the student to the fields of highway, airport, and rail engineering. The areas of administration, planning, design, construction, maintenance, and operation are covered; 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**
Registration #0608-535
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**
Registration #0608-544
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 an ANSI, ASTM, and others. Students are required to develop and assemble a mock-up set of contract documents.

Class 3, Credit 3, (Effective 1986-87, Class 2, Credit 2)

ITEC-546 **Professional Principles**
Registration #0608-546 **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**
Registration #0608-549
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**
Registration #0608-550
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**
Registration #0608-552
An introduction to the analysis and design of steel structures. Emphasis is on low-rise buildings of the determinate type which are braced versus lateral loads. Topics include tension members, fasteners, welding, columns under axial load and bending, and beams; background of the AISC specification is stressed; current practice in detailing fabrication, and erection; design project. (ITEC-404)

Class 4, Credit 4

ITEC-556, 557 **Wastewater Treatment Plants**
Registration #0608-556, -557 **Operation and Control I & II**
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 ITEC-422 may be taken concurrently.)

Class 4, Credit 4 (Effective 1986-87)

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

Class 4, Credit 4 (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

ITEE-201 **DC Circuits**
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. (Corequisite 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
An introduction to electronic devices and systems. Emphasis on semiconductor diodes (including zener and other two-terminal devices) and transistors (BJTs and FETs), basic operation, biasing and cascading. SCRs' triacs and other PNPN devices will be discussed. Analysis of TTL logic gates will be introduced. (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 hexidecimal arithmetic. (ITEE-203, ICSP-242)

Lecture 3, Lab. 2, Credit 4

ITEE-302 **Linear Integrated Circuits**
Registration #0609-302
A course introducing the concepts of basic linear amplifier theory, emphasizing bipolar and field effect transistors. (ITEE-203)

Lecture 3, Lab. 2, Credit 4

I TEE-303 **Microprocessors**
Registration #0609-303
A first course in microprocessors, this course introduces the characteristics of a basic microcomputer in terms of a hardware and software structure. An analysis of the hardware structure, timing and interfacing is included. Programming assignments in machine language are required. (ITEE-301, 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-422 or equivalent)

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-sinusodial inputs. (ITEE-401)

Class 2, Recitation 2, Credit 3

ITEE-403 **Advanced Circuit Theory**
Registration #0609-403
Transient 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, efficency. 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 3, Lab 1, 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
This course extends the concepts of basic small signal linear amplifiers. It then develops the characteristics of operational amplifiers and studies the design and applications of op amps. Some large signal amplifiers are also discussed and basic feedback is covered. (ITEE 302 or equivalent)

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 for majors in computer technology, with topics as needed for updating in technology. Anticipated offerings include topics in contemporary languages being used (C, Ada), advanced microprocessors, and microcomputer 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, Recitation 2, Credit 4

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

Class 3, Lab. 2, Credit 4

ITEE-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**
Registration #0609-530 **Circuit Elements**
A study of discrete differential amplifiers and integrated operational amplifiers, including applications in instrumentation, active filters, waveform generation and shaping and precision rectifiers. (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 with special attention to transistor ratings and heat sinking requirements. Principles of transformer design, Class C RF amplifiers and Class D regulators are also covered. (ITEE-428)

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 Systems II**
Registration #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 It**
Registration #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**
Registration #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**
Registration #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 indirect addressing 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**
Registration #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, ITEE-437)

Class 3, Lab. 3, Credit 4

ITEE-543 **Minicomputers, Controllers and**
Registration #0609-543 **Peripherals**
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**
Registration #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**
Registration #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**
Registration #0609-550
Basic elements of a power system, energy sources, substation configuration, load cycles, balanced and unbalanced three phase circuits, power factor correction, transmission line configurations and impedances, voltage regulation of transformers, and the per unit system are studied. The symmetrical component method of analysis is introduced. (ITEE-425 or ITEE-412)

Class 3, Lab. 2, Credit 4

ITEE-551 **Protective Relaying**
Registration #0609-551
The physical construction and characteristics of electromechanical relays, short circuit calculation and line, bus, transformer and motor-generator protection are studied. Solid state relays, instrument transformers, and telecommunications and supervisory control are included. (ITEE-402 or equivalent)

Class 4, Credit 4

ITEE-552 **Power Systems II**
Registration #0609-552
The symmetrical component method of three phase circuit analysis is used for fault analysis. 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**
Registration #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**
Registration #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 **Microelectronics I**
Registration #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**
Registration #0609-561
This is a continuation of Microelectronics I. Topics covered are isolation drive-in, device formation, metalization, 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**
Registration #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**
Registration #0609-580
Selected independent study of design project by electrical technology students with the approval of the department. Approval must be granted first week of fall or winter quarter for spring quarter registration.

Class/Lab. as required. Credit 4

Upper Division Mechanical Engineering Technology

ITEM-404 **Applied Mechanics of Materials**
Registration #0610404
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 3, Recitation 2, 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**
Registration #0610-407 **Technology Laboratory I**
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 #0610-408
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**
Registration #0610-409 **Laboratory II**
A course in mechanical laboratory techniques, the analysis ot 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 **Materials Technology I**
Registration #0610414
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 grain growth, ferrous and some non-ferrous metals, heat treatment and age hardening of metals.

Class 3, Credit 3

ITEM415 **Materials Technology II**
Registration #0610415
Three major study areas are plastics, ceramics and corrosion. Included are the structure of plastics, types of polymerization, processing of plastics, ceramic structures and properties, classification of ceramic materials, glasses, bricks, tiles, refractory and insulating materials, corrosion of materials, corrosion rates, types of corrosion, cathode and anode reactions, corrosion control and prevention.

Class 3, Credit 3

ITEM428 **Energy Methods and Reports**
Registration #0610428
Principles of organizing data and facts into clear, concise technical memos, reports, letters, and oral presentations. The course will introduce the students to the methods used in practice to make energy related measurements, performance tests, and audits. Additional topics are library research methods, photographic techniques, industry standards, and VAX data handling/graphical capabilities.

Class 1, Lab 2, Credit 2

ITEM440 **Applied Thermodynamics**
Registration #0610440
The first and second laws of thermodynamics and their applications in mechanical engineering technology. Thermodynamic properties of fluids including ideal gases and pure substances are studied. Thermodynamic processes and applications of thermodynamic principles to steam cycles and refrigeration cycles.

Class 4, Credit 4

ITEM442 **Heat Transfer**
Registration #0610442
A first course in heat transfer. The theory and application of the fundamentals of heat conduction, convection, and radiation. The design and applications of heat transfer-apparatus. (ITEM-440)

Class 3, Lab. 2, Credit 4

ITEM451 **Vibration and Noise**
Registration #0610451
A study of the basic concepts of vibration and noise. Designing equipment for survival in vibration and shock environments. Methods of reducing noise in machinery structures. Environmental tests for vibration and shock. Methods of vibration and noise analysis will be demonstrated. (SMAT-442, ITEM-405)

Class 4, Credit 4

ITEM460 **Applied Fluid Mechanics**
Registration #0610-460
A study of the fundamentals of fluid statics and dynamics. Principles and applications of fluid statics, fluid kinematics, fluid kinetics, the energy conservation principle, dimensional analysis and fluid momentum. Also covered are laminar and turbulent flow in pipes and products, fluid machinery, fluid meters and lifting vanes. (ITEM-440)

Class 4, Credit 4

ITEM465 **Thermofluid Laboratory**
Registration #0610-465
Laboratory experiments in thermodynamics, fluid mechanics and heat transfer. Special emphasis is placed on report preparation and computer-aided data reduction. (ITEM-440, ITEM460)

Class 1, Lab. 3, Credit 3

ITEM499 **Mechanical Technology Co-op**
Registration #0610499

Class 0, Credit 0

ITEM-500, 501 **Senior Design Project I, II**
Registration #0610-500, 501
An individual student project in systems design. The student integrates his program, co-op experiences, and independent studies in the solution of a system design project and presents his findings in written and oral presentations.

Class 2, Lab. 4, Credit 4

ITEM-506 **Machine Design**
Registration #0610-506
The study of the static and dynamic failure of machine elements and the design and analysis of fasteners, springs, shafts and bearings. (ITEM-405)

Class 3, Recitation 2, Credit 4

ITEM-506 **Special Topics in Machine Design**
Registration #0610-506
The study of selected topics such as clutches, brakes, couplings, belts, chains, lubrication and computer-aided design. (ITEM-506)

Class 3, Lab. 2, Credit 4

ITEM-512 **Computer Integrated Mechanical Design**
Registration #0610-512
The use of computers in solving Mechanical Design problems will be emphasized. This will include introduction to data manipulation, plotting, graphics, applications programming, and finite element analysis. (Pre-requisites ICSP-205, ITEM-506).

Class 3, Recitation 2, Credit 4

ITEM-521 **Logic Control Systems**
Registration #0610-521
The analysis and design of logic control systems using Boolean algebra. Emphasis is placed on the control of machines with fluid and relay logic. Introduction to electronic programmable controls. The concepts of ordinary and timed sequence control and machine protection are covered. Logic control systems will be demonstrated in the lab.

Class 3, Lab. 2, Credit 4

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-535 **Analog Control Systems**
Registration #0610-535
The course provides the student with an overview of analog feedback control systems. Students are introduced to topics such as block diagrams, classification of control types, mathematical models, measuring means, and LaPlace Transforms, Control systems design will also be discussed. Lab demonstrations will be presented in the classroom. (ITEM-405, ITEM 460, and SMAT-422).

Class 4, Lab 0, Credit 4

ITEM-540 **Thermal Technology**
Registration #0610-540
Application of thermodynamics to internal combustion engines, compressors, steam cycles, refrigeration, air conditioning, psychometrics 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, moisture calculations; also related heat transfer topics.

Class 4, 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, airconditioning, 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 based adjustment of system designs derived from technical performance optimizations. (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, Class 3, Lab 2

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. 2, 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, ITEM-460)

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)

Upper Division
Manufacturing Engineering Technology

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

Credit 4

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

Class 4, Credit 4

ITEF-425 **Statistical Quality Control II**
Registration #0617-425
This is an advanced course in quality control. The course will cover in detail the following aspects: Process Control Techniques involving X charts, R charts, P charts, NP charts, and Acceptance Sampling techniques involving MIL-STD 105D, MIL-STD 414, and other MIL-STDS.

(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, economic decisions involving net present worth, payback period, and ROI, 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. A step-by-step approach to analyzing a product or a service is presented. The relationship among value, function, quality, 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, CAD functions 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. The course will concentrate on APT.

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. (ITEF-403, 502).

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. (ITEF-471).

Class 3, Credit 4

ITEF-475 **Computer-Alded Manufacturing**
Registration #0617-473
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. (ITEF-403, ITEF-471, and ITEF-502)

Class 3, Lab. 2, Credit 4

ITEF-481 **Work Simplification and Measurment**
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 **Robots 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. (Consent of the Instructor).

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. (All other core ITEF).

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

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. Introduction to CAD utilization, CAD projects included.

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 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, propellents, 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 **Container System***
Registration #0607-321
A detailed study of primary packages. History, manufacturing processes, characteristics, and applications for containers in direct contact with the product. Structural design, chemical compatibility and suitability of container for intended use will be analyzed for basic container types. Students will practice structural design and testing of prototype containers. Primary emphasis will be on rigid paperboard, glass, plastic and metal containers. (IPKG-301, 311, 312)

Class 2, Recitation, Lab. 2, Credit 4

IPKG-322 **Container Systems II**
Registration #0607-322
Corollary course for 321. Primary emphasis will be on flexible paper, foil, plastic, and laminated materials, and selected processing techniques. (IPKG-301, 311, 312)

Class 2, Recitation, Lab 2, Credit 4

IPKG-401 **Career Seminar**
Registration #0607-401
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-321, 322)

Class 2, Lab. 4, Credit 4

IPKG-432 **Packaging for Distribution**
Registration #0607-432
An exploration of different shipping, storage, and use environments common to various products and packages. Structural design of packages for product physical protection, and methods for testing and predicting package performance will be studied. (IPKG-301,321, 322)

Class 2, Lab. 4, Credit 4

IPKG-433 **Packaging for Marketing**
Registration #0607-433
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a 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. (IPKG-431, 432)

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, the Interstate Commerce Act as it applies to shipment of goods in packages; consumer product safety law, environmental law, and patent, trademark, and copyright law as it applies to packaging.

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. Professional Elective.)

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 package 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 or 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 interest.

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 package 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 **Coordinated Dietetics Program**
Introductory clinical dietetics course. Students interact with a representative sampling of personnel in all areas of dietetics. Supervised observations are planned in food management systems, health care facilities and community nutrition programs. (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 in metabolic, gastro-intestinal, renal, musculoskeletal, cardiac, endocrine, febrile, and other diseases. (ISMD-213, SCHG-203, SBIG-212)

ISMD-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 or nutritional care. 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 **(Coordinated Dietetics Program)**
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. (ISMD-213)

Class 4, Credit 4

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

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

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

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

Food and Beverage Management

ISMF-210 **Introduction to Food, Hotel**
Registration #0621-210 **and Tourism Management**
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 to 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 area; 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 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 Bevcon 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
Food Science; sensory and objective evaluation of food quality; chemical and physical properties of foods; interaction of food ingredients; recipe development and presentation; problem-solving; experimental design; technical writing. (ISMF-331, SCHG-289)

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 sen/ice 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-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) (Senior Standing)

Class 1, Lab. 12, Credit 5

ISMF-435 **Purchasing and Inventory**
Registration #0621-435 **Control Laboratory**
Practical application of theory discussed in ISMF-425 is provided by operating as an integral part of Food Systems Management I (Henry's Restaurant). Emphasis is placed on selecting, ordering, receiving, storing, inventory control and evaluation of these components. The laboratory is taken in the subsequent quarter in the School's Purchasing Department. (ISMF-425)

Class 2, Credit 2

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

Credit 0

ISMF-511 **Banquet and Catering Management**
Registration #0621-511
Management experience in planning, organizing, supervising preparation and service of foods for special functions. Emphasis is placed on experiences in organizational behavior, the responsibilities of management in marketing, promotion, sales promotion, sales production, personnel and customer relations and attitudes. Evaluation of management experience by preparation of operations reports. Open to seniors only. (ISMF-331, 340, 341, 424, 425)

Class 1, Lab 12, Credit 4

ISMF-554 **Senior Career Seminar**
Registration #0621-554
A variety of current topics will be researched and discussed as they pertain to the hospitality industry: e.g. employee stress, employee dishonesty, alcoholism, divorce, management's response to current DWI laws, legal drinking age, casino operations.

Class 2, Credit 1

ISMF-555 **Research Problems**
Registration #0621-555
Independent study of research problems in food and hospitality management. Senior students only with faculty sponsorship.

Credit Variable 1-8

Hotel and Resort Management

ISMH-400 **Resort and Recreation Enterprises**
Registration #0622-400
A course designed to provide students an understanding of the planning, development, managing, design, marketing and operations of tourist and recreational enterprises. Student will additionally select specific recreational areas to analyze the unique planning and development strategies associated with each type of enterprise. See courses ISMH-401 to 406 for specific enterprises.

Class 4, Credit 4

ISMH-401 **Ski Resort Management**
Registration #0622-401
The development, marketing and management of ski resorts will be studied with micro-computer applications. (ISMH-400)

Class 1, Credit 1

ISMH-402 **Marina Management**
Registration #0622-402
The development, marketing and management of marinas will be studied with micro-computer applications. (ISMH-400)

Class 1, Credit 1

ISMH-403 **Golf Course Management**
Registration #0622-403
The development, marketing and management of golf courses will be studied with micro-computer applications. (ISMH-400)

Class 1, Credit 1

ISMH-404 **Campground Management**
Registration #0622-404
The development, marketing and management of campgrounds will be studied with micro-computer applications. (ISMH-400)

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-400)

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 tourist 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
The course is designed to introduce the student to the distinctive nature of hotel operations. This is accomplished by identifying the standard functions which inter-relate to produce the whole: hotel service. The hotel's principal product; the guest room, will be given detailed study which will include a manual practice problem. Computerized reservation systems, ethics, security and on-the-job application of operational problems are included. (ISMF-210, BBUA-301, Junior standing)

Class **5,** Credit **5**

ISMH-450 **Hotel Marketing and Convention Sales**
Registration #0622-450
The course is designed to introduce the student to the application of the marketing concept in hotel operations. This will be accomplished by defining the marketing function, situation analysis, marketing organization, sales office work form flow, customer contact methods, and servicing procedures, as generally practiced in the hotel industry. (ISMH-423, BBUM-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 tarriffs and guides. This course provides the basic understanding needed for the subsequent travel labs.

Class 3, Credit 3

ISMT-202 **Travel Lab. II**
Registration #0623-202
The international air transportation system is surveyed. Emphasis is given to the application of fares, baggage allowances, currency regulations and adjustments, and fare construction principles utilizing the Mileage System. Documentation requirements for international travel are also reviewed. (ISMT-201)

Class 2, Credit 2

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 AA/OA. 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. Principles of salesmanship are reviewed and students are given the opportunity to practice various techniques through the application of role-playing. Motor coach and auto rentals are also discussed. (ISMT-201)

Class 2, Credit 2

ISMT-310 **Intermediate SABRE Applications**
Registration #0623-310
Utilization of Sabre for 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

Hotel and Resort Management

ISMT-330 **Convention Sales and Services**
Registration #0623-330
A detailed analysis of the convention industry is conducted as to the planning, cooperating agencies and bureaus, staffing, operations, sales, and management. Emphasis is given jointly in planning convention sales to various market segments, and in providing convention services at the meeting site. Students utilize local facilities to view first hand, convention operations. (ISMH-450)

Class 4, Credit 4

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

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**
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**
Registration #0623-423 **Accounting Systems**
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

Department of Military and Aerospace Science Reserve Officers Training Corps

Army

First Year

MMSM-201 **Introduction to Military Science**
Registration #0701-201
This course is designed to introduce the student to the ROTC program and military map reading techniques. Topics of primary interest will include: the organization and purpose of ROTC program, the organization of the U.S. Army, the National Guard, the Army Reserve, Career branches and the role of a lieutenant; leadership laboratory.

Class 1, Lab. 1, Credit 2

MMSM-202 **Applied Health Dynamics**
Registration #0701-202
This course 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.
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, XPEF—may be taken in lieu of this course.)

Class 1, Lab 1, Credit 2

Second Year

MMSM-301 **Military Geography**
Registration #0701-301
A study of military land navigation with special emphasis given to navigation using a map and compass. Geographic concepts and realities are studied as they apply to the solution of military problems. Major topics for discussion will include identification of terrain features, 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 recent military history. Emphasis will be placed on the Army's role today as peacekeeper and will include discussions on the attempted Iran rescue, Lebanon, Grenada, and El Salvador. Other topics will include the Army of the future, the Soviet threat, and a contrast of the U.S. and Soviet Union military systems. Leadership laboratory.

Class 1, Lab. 1, Credit 2

MMSM-310 **History of the Military Art**
Registration #0701-310
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, Credit 4

Third Year

MMSM-401 **Military Tactics**
Registration #0701-401
This course stresses practical exercises on basic map reading skills and provides a working knowledge of fundamentals and principles of combat operation as placed for and executed at light infantry squad and platoon level; leadership laboratory.

Class 2, Lab. 1, Credit 3

MMSM-402 **Military Communications and Weaponry**
Registration #0701-402
This course provides knowledge and training of basic military skills essential as a junior officer; weapons training, an introduction to military communication equipment and techniques; leadership laboratory.

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 Ethos**
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 3-4

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

Air Force

MMSF-201, 202 Leadership Lab i
Registration #0750-201, 202
Leadership Laboratory I focuses on benefits, opportunities, and privileges, responsibilities associated with an Air Force commission. AF customs and courtesies, AF environment, drills, and ceremonies are also covered. Demonstrates all flight movement procedures. Responsibility of base units to mission accomplishment.

Credit 1

MMSF-301, 302 Leadership Lab II
Registration #0750-301, 302
Demonstrates commanding effectively in individual drill positions and flight formations, effective execution of cadet officer functions within parade ceremonies and squadron drill movements. Application of personal leadership to both military and civilian activities and comprehension of field training are covered.

Credit 1

MMSF-401, 402, 403, 404 Leadership Lab III, IV
Registration #0750-401, 402,403, 404
Advanced leadership experiences in officer activities gives students opportunity to apply principles learned in labs and courses. Orientation for active duty.

Credit 1

MMSF-210, 211,212 The Air Force Today I, II, III
Registration #0750-210, 211, 212
Course series on the basic characteristics of air doctrine; US Air Force mission and organization; functions of US strategic offensive, general purpose, and aerospace support forces; officership; and assessment of written communicative skills.

Credit 1

MMSF-310,311 Air Force Management and Leadership I, II
Registration #0750-310, 311
An integrated management course emphasizes the concepts and skills required by the successful manager and leader. Includes individual motivational and behavioral processes, leadership, communication and group dynamics providing the foundation for the development of the junior officer's professional skills (officership). Fundamentals of management emphasizes decision making, the use of analytic aids in planning, organizing and controlling in a changing environment as necessary professional concepts. Organizational and personal values (ethics), management of change, organizational power, politics and managerial strategy and tactics are discused within the context of military organization. Actual Air Force case studies are used to enhance the learning and communication process.

Credit 5

College of Business

Undergraduate Business Courses

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, and assets. Typical records for various types of business enterprise. Preparation and use of classified financial statements. Includes completion of computer-assisted practice set. (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 individuals 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-310 **Career Seminar**
Registration #0102-310
Career planning for the college student. Aptitudes, interests and course and major selections while in college. Transition from college to the world of work; job search; resumes, interviews, job offers. Getting on board. Importance of career paths to career achievement in organizations.

Credit 2

BBUB-315 **Legal Environment of Business**
Registration #0102-315
An introduction to legal principles and their relationships to business organizations. This includes a review of the laws that govern their operations. This course will explore the background and origin of the U.S. legal system, its law enforcement agencies, and the legal procedures used by the government to enforce its laws. Representative topics will include Torts, Bankruptcies, Regulatory law, and contracts.

Credit 4

BBUB-318 **Business Law**
Registration #0102-318
This course explores in greater depth the implications of the Uniform Commercial Code to business operations. Representative topics covered include: agency, commercial paper, corporations, and torts. Topical cases and examples are used to help the student grasp the business implications of the law and its nomenclature. (BBUB-315)

Credit 4

BBUB-402 **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-318)

Credit 4

BBUB-403 **Legal Aspects of**
Registration #0102-403 **Physical Distribution**
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. (BBUB-315)

Credit 4

BBUB-427 428 **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 **Legal Aspects of Health**
Registration #0102-429 **Care Administration**
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 **Organizational Behavior**
Registration #0102-430
Human behavior in organizations. Course emphasis: individual and interpersonal skills; group and intergroup processes; and management of organizational performance and change. Topics include: leadership; communication; motivation; perception and conflict management. (Junior Status)

Credit 4

BBUB-435, 436 **Health Administrative**
Registration #0102-435,0102-436 **Functions I, II**
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 **Personnel and Human**
Registration #0102-455 **Resource Management**
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-430)

Credit 4

BBUB-470 **Compensation and**
Registration #0102-470 **Performance Appraisal**
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 **Human Resources Planning**
Registration #0102-475 **and Selection**
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-455)

Credit: 1

BBUB-480 **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 **Employee and Labor Relations**
Registration #0102-485
Overview of the functioning of labor unions and employee associations in both the private and public 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 **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 **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 **Purchasing Management**
Registration #0102-534
An exploration of the purchasing and materials handling function of industrial firms. The objective will be to develop an understanding of the relationship of purchasing and materials management to other functions in the industrial environment. The key elements and techniques used for making sound purchasing and materials decisions will be explored. Methods may include: case analysis, independent research, presentations, and attendance at a local professional meeting. (Junior Status)

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-430)

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 3

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-430, BBUF-441, BBUM-463, BBUQ-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-405 **Intermediate Microeconomics**
Registration #0103-405
A course in economic theory at an intermediate level dealing with the contemporary analysis of price and distribution under conditions of free competition and various degrees of monopoly control. Business applications are given along with the exposition of the theory itself. (GSSE-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

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**
Registration #0103-408 **Forecasting**
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-481 **Money and Banking**
Registration #0103-481
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, GSSE302)

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-481)

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

Finance

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. (BBUQ-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**
Registration #0104-450 **and Economics**
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-441)

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**
Registration #0104-510 **and Markets**
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-Proflt Sector**
Registration #0104-530 **Finance**
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

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

BBUM-428 **Traffic and Transportation**
Registration #0105-428 **Management**
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.

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. (Junior Status)

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-550 **Marketing Management**
Registration #0105-550 **Problems**
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-463)

Credit 4

BBUM-551 **Marketing Research**
Registration #0105-551
A study of research methods and procedures used in the marketing process. Topics include problem formulation, sources of market data, research methodology, data collection, data analysis, and the role of marketing research within the firm. (BBUM-463, BBUQ-352)

Credit 4

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

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, BBUQ-352)

Credit 4

BBUM-557 **Comparative Marketing**
Registration #0105-557
A study of marketing in selected foreign countries to acquaint the student with its functional role in various economic environments. Comparisons between geographic regions and cultural settings are explored. (BBUM-555)

Credit 4 (offered upon demand)

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

Credit: 1

BBUM-565 **Advanced Marketing Research**
Registration #0105-565
This course is a continuation of the groundwork acquired in the marketing research course. Emphasis is on the analytical basis of marketing research in support of management decision-making. Multivariate analytic techniques will be stressed and applied to projects and data base analysis. (BBUM-551)

Credit 4

BBUM-570 **Industrial Marketing**
Registration #0105-570
The course is concerned with developing understanding and application of marketing processes to industrial marketing organizations. Topics covered include: industrial purchasing motivations, industrial purchasing organizations, and industrial channels. (BBUM-463, BBUE-405)

Credit 4

Decision Sciences

BBUQ-330 **Data Analysis**
Registration #0106-330
An introduction to the use of data analysis and applied statistics in decision making. Topics include descriptive statistics, sampling and sampling distributions, statistical inference, chi-square tests, and regression analysis. Extensive use of MINITAB. (SMAM-226, ICSS-200)

Credit 4

BBUQ-334 **Management Science**
Registration #0106-334
A survey of quantitative approaches to decision making. Topics include linear programming models (including goal, integer, assignment, and transportation models), PERT/CPM, decision analysis, inventory models, and computer simulation. Extensive use of LINDO. (BBUQ-330)

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)

Credit 4

BBUQ-406 **Quality & Reliability**
Registration #0106-406
Study of the concepts and tools pertaining to quality and reliability. Objectives of quality control. Use of statistical methods for quality control, quality improvement and reliability. (BBUQ-460)

Credit 4

BBUQ-407 **Inventory Management &**
Registration #0106-407 **Material Control**
Definition, behavior and management of inventory. Included are the study of concepts, principles, techniques and systems necessary to deciding which items to order, how many to order, when they are needed and should be ordered, and where and how to store the items. The topics in this course apply primarily to the Independent demand environment, including distribution. (BBUQ-460)
Credit 4

BBUQ-408 **Project and Master**
Registration #0106-408 **Planning**
Study of the dependent demand environment and its interface with independent demand. Includes project planning, forecasting, production planning, and master scheduling. (BBUQ-460)

Credit 4

BBUQ-409 **Material and Capacity**
Registration #0106-409 **Planning and Control**
Continued study of the dependent demand environment and its interface with independent demand. Includes material and capacity requirements planning and production activity control. **(BBUQ**-408)

Credit 4

BBUQ-444 **Productivity Improvement**
Registration #0106-444
Examination of productivity and efficiency issues. Concept of productivity and links between quality and productivity. Effects of system design on productivity. (BBUQ-460)

Credit 4

BBUQ-448 **Industrial Structure**
Registration #0106-448 **and Technology**
Study of the history, prominent leaders and firms, products, strategies, market and cost structures, primary equipment and process technologies and production structures of a selected industry. (BBUQ-460) (Not offered in 1985-86)

Credit 4

BBUQ-450 **Applied Statistical Analysis**
Registration #0106-450
The concept of a general linear statistical model is used to discuss experimental design and regression analysis techniques. Extensive use of MINITAB in solving case problems. (BBUQ-330)

Credit 4

BBUQ-453 **Business Forecasting**
Registration #0106-453
An introduction to forecasting methods in business. Students will be required to analyze several data sets using an interactive forecasting package. (BBUQ-330)

Credit 4

BBUQ-460 **Operations Management**
Registration #0106-460
Case and laboratory oriented study of the production of goods and services. Topics include quality assurance, resource planning, scheduling, materials and capacity control, inventory management, project management, system design, and strategic considerations. (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 1985-86)

Credit 4

BBUQ-474 **Micro/Mini Computer**
Registration #0106-474 **Applications**
A survey of current micro and mini computer systems, available hardware and software, and their applications. Microcomputer applications in small business will be emphasized. Word processing is discussed. (ICSP-208) (Not offered in 1985-86)

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 queuing theory, data collection and analysis for simulation modeling and models validation. A special purpose simulation language, such as GPSS, will be used in team projects that simulates a production process. (BBUQ-330, ICSP-210) (Not offered in 1985-86)

Credit 4

BBUQ-505 **Information Systems**
Registration #0106-505
The role of information systems in business organizations is discussed. Basic systems concepts and the software components of computer-based information systems are introduced. Hands-on use of personal computer technology is required. (ICSS-200, BBUA-301, BBUA-302, BBUB-430)

Credit 4

BBUQ-518 **Manufacturing Information**
Registration #0106-518 **& New Developments**
Study of topics at the interface of production and engineering. In addition to standard engineering data needed for production planning and control, topics will be selected from areas of current interest involving new technology. (BBUQ-408, BBUQ-409) (not offered in 1985-86)

Credit 4

BBUQ-553 **Information Systems**
Registration #0106-553 **Senior Project**
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 1985-86)

Credit 4

BBUQ-554 **Seminar In Decision**
Registration #0106-554 **Sciences**
The course content depends 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

Center for Retail Management

BRER-201 **Introduction to Retail**
Registration #0109-201 **Industry**
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

BRER-300 **Retail Career Seminar**
Registration #0109-300
A fundamental course to assist the student in establishing a sound basis for profiting by the co-op work experience and making career decisions. Major areas covered are: self-awareness and aptitude testing, resume and letter writing techniques, sources of job opportunities, and interviewing procedures.

Credit 1

BRER-301 **Retail Accounting and**
Registration #0109-301 **Merchandise Control**
A study of the acquisition of merchandise investment planning, analysis, and control of the dollar merchandise investment to meet profitability objectives. The course will be organized around the task of the retail buyer.

Credit 4

BRER-401 **Retail Store Operations**
Registration #0109-401 **and Management**
A detailed examination of the operation of a retail enterprise including fixturing, information systems, operating costs, merchandise flows, and security. Particular attention will be paid to the managerial tasks of selecting, training and motivating store personnel. (BRER-201)

Credit 4

BRER-412 **Advanced Merchandising**
Registration #0109-412
An extension of basic merchandising with advanced topics and complex merchandising applications. The emphasis is on merchandising as a control and management tool. The course will enable the student to develop and evaluate the impact of alternative merchandising decisions on the performance of the retail operation. (BRER-301)

Credit 4

BRER-413 **Buying Management and**
Registration #0109-413 **Market Analysis**
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

BRER-431 **Interior Design**
Registration #0109-431
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

BRER-452 **Retail Sales Promotion**
Registration #0109-452
The study of the overall sales promotion functions in a retail environment. Includes the planning, analysis, and evaluation of alternative promotional activities in terms of media selection, budgeting, copy writing, layout. The full promotional mix employed by typical retailers including newspapers, broadcast, display, specialty advertising, and in-store promotions is analyzed and evaluated. (BRER-201)

Credit 4

BRER-501 **Senior Seminar in Retail**
Registration #0109-501 **Management**
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**

BRER-552 **Current Trends in**
Registration #0109-552 **Retailing**
A course that studies and identifies the forces that promote trends in the industry, and the environments in which they exist. Further analysis and attempts to translate the trends into lifestyle merchandising strategies. (BRER-20l)

Credit 4

BRER-553 **Textiles**
Registration #0109-553
Analysis of textile fibers, weaves, and fabrics, methods of printing, dyeing and finishing, evaluation of fabrics and materials commonly used in fashion and home furnishings. (BRER-301)

Credit **4**

BRER-554 **Seminar In Retail**
Registration #0109-554 **Management**
Selected topics associated with various aspects of retailing. Course content and structure will differ according to faculty assigned and quarter when offered. (Permission of instructor)

Credit 4

Graduate Business Courses

Accounting

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)

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 nontaxable 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 equivalent)

Credit 4

BBUA-811 **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

BBUA-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

BBUA-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

BBUA-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

Management

BBUB-740 **Organizational Behavior**
Registration #0102-740
The importance of human behavior in reaching organizational goals. Course emphasis: managing individual and interpersonal relations; group and intergroup dynamics; leadership, communication and motivation skills in managing organizational performance and change.

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.

Credit 4

BBUB-742 **Technology, Business and Society**
Registration #0102-742
A study of changing technologies and their impact on organizations and managers. Consideration of national policy and organizational practices concerning research and implementation of new technologies in areas such as artificial intelligence, robotics, and automation of the service sector. Special attention is paid to social problems deriving from the use of new technologies. (BBUB-740)

Credit 4

BBUB-745 **Business and Public Policy**
Registration #0102-745
Legal issues in areas such as consumer protection, environmental law, occupational safety and health, employment discrimination, labor management relations, antitrust policies, and industrial policy. Ethical, economic, political, legal, and cross-cultural perspectives are considered.

Credit: 1

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 and 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, equal 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 management. Seminar topics have included organizational power e and politics, improving individual and managerial effectiveness, 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-756 Conflict Management and
Registration #0102-756 Negotiating Skills for Managers
A study of current theories and techniques related to constructive management of organizational conflicts and negotiations. Current theories on interpersonal, group and intergroup conflict management. (BBUB-740)

Credit 4

BBUB-757 Interpersonal Skills for Managers
Registration #0102-757
Manager oriented skills related to the interpersonal aspects of managerial work, managing key individual work relationships (bosses, peers, and subordinates), use of communication and leadership skills as a key aspect of effective management. (BBUB-740)

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, comparative management, 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. (Varies with instructor)

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 Research Methods
Registration #0102-770
This course concerns the development, presentation, and use of research in managerial decision-making. Included are the processes by which meaningful research problems are generated, identification of the relevant literature, operationalizing the research design, and interpretation of findings. Students typically work in small groups to execute a research project in one of the functional areas of management for the profit or not-for-profit sector. (BBUQ-782)

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

Economics

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, BBUQ-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

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, BBUE-711)

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. Othertopics will include option valuation, leasing, working capital management, and financial analysis. (BBUF721)

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-721, BBUF-722)

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

Marketing

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-76I)

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

BBUM-766 **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 **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 **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

Decision Sciences

BBUQ-743 **Operations Management**
Registration #0106-743
Case and laboratory oriented study of the production of goods and services. Topics include quality assurance, resource planning, scheduling, materials and capacity control, inventory management, project management, system design, and strategic considerations. (BBUQ-780, BBUQ-782)

Credit **4**

BBUQ-780 **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 per se, 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 **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 **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 Analysis**
Registration #0106-784
An in-depth study of the decision-making process. Emphasis will be on how to structure a complex problem into manageable form, methods for improving creative-problem solving, and the use of decision support systems in decision making. (BBUQ-780)

Credit **4**

BBUQ-785 **Applied Regression Analysis**
Registration #0106-785
The primary objective of this course is to teach the student how to effectively utilize a variety of data analysis techniques commonly referred to as regression analysis. Emphasis will be placed on model formulation and analysis. All students will be required to analyze several large data sets using a standard statistical package. Relevant theory will be introduced to enable the student to pursue further study in data analysis. (BBUQ-782)

Credit 4

BBUQ-786 **Mathematical Programming**
Registration #0106-786
An in-depth study of the application of mathematical programming to business decision making. The objective of this course is to present state-of-the-art methodology and applications of mathematical programming. (BBUQ-780) (Not offered in 1985-86)

Credit 4

BBUQ-788 **Survey Design & Sampling**
Registration #0106-788
This course will cover the following topics in survey design and sampling: (1) questionnaire design, (2) types of sampling techniques, (3) determination of sample size, (4) methods for increasing the response rate, (5) use of appropriate statistics to analyze results. (BBUQ-782) (Not offered in 1985-86)

Credit 4

BBUQ-789 **Simulation**
Registration #0106-789
An introductory course in the use of computer simulation in the solution of complex business problems. A simulation language is introduced and applied in the solution of a term project. Particular attention is focused on the types of problems for which computer simulation is a viable solution technique as well as methods for establishing the validity of the simulation. (BBUQ-780, BBUQ-782)

Credit 4

BBUQ-790 **Information Systems**
Registration #0106-790
The types of computer applications which are used in business organizations are studied. Basic systems concepts and the responsibilities of the participants in systems development projects are also covered. Hands-on application of personal computer software is required. (BBUA-703, BBUF-721, BBUB-740, BBUB-741)

Credit 4

BBUQ-793 **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 **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) (Not offered in 1985-86)

Credit 4

BBUQ-795 **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

College of Continuing Education

Business and The Arts

Accounting

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

Credit: 4

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

Prerequisite: CBCA-201

Credit: 4

CBCA-207, 208 **Accounting for Engineers**
Registration #0201-207, 208
A survey of basic accounting principles for those interested in a general understanding of accounting terminology, its functions within an organization and the application of accounting data in decision making.

Credit: 4/Qtr.

CBCA-308, 309 **Intermediate Accounting**
Registration #0201-308, 309
Design to broaden understanding of accounting practices and improve skills in gathering, analyzing, reporting, and evaluating accounting theory and concepts as they relate to business problems.

Prerequisite: CBCA-203

Credit: 4/Qtr.

Business Law

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

Credit: 4

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

Prerequisite: CBCB-301

Credit: 4

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

Credit: 4

Data Processing and Systems Analysis

CBCC-321 **Data Processing Principles**
Registration #0203-321
Introduction to computer technology including an examination of the concepts function and techniques associated with modern data processing. While this course does not include any programming, the inter-related areas of operation, programming, and systems analysis are discussed.

Credit: 4

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

Prerequisite: CBCC-321 or equivalent.

Credit: 4

CBCC-351 **BASIC Programming for Business**
Registration #0203-351
An introduction to computers and computer programming for business students. After a brief survey of computer systems and terminology, students will learn to utilize a timeshared computer system. The introduction to BASIC programming covers all major functions; problems and examples will be drawn from business applications. NOTE: Not for computer science majors.

Credit: 2

Finance

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

Credit: 4

CBCD-304 **Personal Financial Decision Making**
Registration #0204-304
The course will focus on the financial decision-making process from an individual planning perspective to include basic tax planning concepts, accumulation, and retirement planning models. This course will expand on the topics presented in Personal Financial Management (CBCD-204), with particular emphasis on planning for decisions related to insurance, investments, and estate transfers. Throughout the course basic mathematical concepts (compounding, discounting, etc.) and the effects of taxation will be applied to each area.

Credit: 4

General Management

CBCE-101,102,103 **Human Relations**
Registration #0205-101,102,103
Designed to acquaint both employees and supervisors with basic principles of human behavior: motivation, morale, leadership, communication, emotional understanding and organizational behavior. Managerial aspects common to all supervisory positions emphasized. An identical daytime class also available for shift workers.

Credit: 2/Qtr.

CBCE-200, 201, 202 **The Management Process**
Registration #0205-200, 201, 202
A comprehensive 3-quarter course in effective supervision and management for supervisors and potential supervisors. Approximately 50 topics of current importance to supervisors are presented, as well as essential management principles, business communications, and practical supervision techniques. Specific supervisory problems of course participants are discussed in informal sessions and through projects conducted outside the classroom. Instruction is usually guided by a team of management specialists. Lecture-discussion, panel presentations, audiovisual presentation, simulation exercises and case studies. (Course extends over three consecutive quarters and should be taken in sequence.) A management certificate is awarded for successful completion of the course.

Credit: 12

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

Credit: 4

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

Credit: 4

Small Business Management

CBCE-221 **New Venture Development**
Registration #0205-221
Course presents factors to be considered by those interested in the ownership and management of small business enterprises. Includes who should be an entrepreneur, guidelines for starting a new business, basic legal consideration, and approaches for obtaining capital and credit.

Credit: 4

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

Credit: 4

CBCE-223 **Small Business Marketing**
Registration #0205-223 **and Planning**
The planning and execution of successful small business marketing approaches include market determination, distribution and pricing are presented. The regulatory environment facing small business is included along with techniques for planning growth.

Credit: 4

Marketing

CBCG-210 **Effective Selling**
Registration #0207-210
Investigates the importance of the sales function and the necessary general characteristics of a successful salesperson. The practical applications of effective sales presentation are discussed.

Credit: 4

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

Credit: 4

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

Credit: 4

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

Credit: 4

Mathematics and Statistics for Business

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

Credit: 4/Qtr.

CBCH-351, 352 **Business Statistics**
Registration #0208-351, 352
An introduction to the basic tools of statistical analysis used in business including charts, ratios, frequency distributions, averages, dispersion, probability theory, sampling and decision trees. Logical procedures for making business decisions under conditions of uncertainty are emphasized.

Prerequisite: CBCH-202

Credit: 4/Qtr.

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

Personnel Administration

CBCI-224 **Interviewing Techniques**
Registration #0209-224
A practical approach to interviewing techniques with emphasis on role plays and case studies. Coverage includes employment, disciplinary, counseling, and performance appraisal interviews.

Credit: 4

CBCI-229 **Personnel Administration**
Registration #0209-209
An introduction to the function of personnel administration, including administration of employment, training job analysis, evaluation, appraisal, development, merit rating, compensation plans, adjustment of grievances, and collective bargaining.

Credit: 4

Production Management and Industrial Engineering

CBCJ-209 **Production Management**
Registration #0210-209
The organization of production functions with emphasis on management responsibilities. All levels of factory operation are discussed and relationship between various aspects of production are presented.

Credit: 4

CBCJ-305 **Fundamentals of Industrial Engineering**
Registration #0210-305
An overview of industrial engineering problems and techniques is presented including facilities selection and layout, methods analysis, work measurements, operations planning and control materials handling and an introduction to operations research.

Credit: 4

CBCJ-306 **Industrial Engineering Economy**
Registration #0210-306
The economic factors required for rational decision are presented. Emphasis is placed on analytical tools used in manufacturing environment including evaluation of capital spending alternatives, depreciation methods, decision-making under risk conditions, and value analysis methods.

Prerequisite: CBCJ-305

Credit: 4

Transportation, Traffic and Distribution Management

CBCL-234 **Traffic and Transportation Management**
Registration #0212-234 **(Principles and Practices)**
A study of traffic management and its relationship to other corporate functions. Includes a review of the elements of sound shipping practices with emphasis on securing the most economical mode of transportation.

Credit: 4

CBCL-239 **Traffic and Transportation Management**
Registration #0212-239 **(Rates and Classifications)**
Discussion and practice in the use of freight rates and classifications, the interpretation and determination of freight rates and charges, and analysis of best as well as most economical means of moving materials; extensive use of tariff materials as applied to actual case situations.

Prerequisite: CBCL-234 or equivalent.

Credit: 4

Real Estate

CBCM-201 **Basic Real Estate Principles**
Registration #0213-201
Comprehensive study of real estate principles including: valuation and appraisal, subdivision and development, interest in realty, real estate contracts liens and easement, deeds, bonds and mortgages, license law, agency, leases and ethics. Completion of this course satisfies New York State license requirements for real estate salespersons.

Credit: 4

CBCM-202 **Advanced Real Estate Principles**
Registration #0213-202
A study of topics related to real estate including: operation of real estate broker's office, construction, subdivision development, taxes, alienations, property management, rent regulations, and appraisal. Completion of Basic Real Estate Principles and this course satisfy New York State license requirements for real estate brokers.

Prerequisite: CBCM-201

Credit: 4

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

Credit: 4

CBCM-204 **Real Estate Evaluation**
Registration #0213-204
The evaluation of real estate through appraisal and analysis, basic consideration in real estate management, and the advantages of various types of real estate investments are discussed.

Credit: 4 ,

Insurance

CBCN-271, 272 **Principles of Insurance**
Registration #0214-271, 272
This two quarter sequence course leads to qualification for taking the New York State agents and brokers examination for Casualty and Property insurance licenses. All casualty and property insurance are covered in the class. Emphasis placed on providing students with practical working knowledge of insurance policies and coverages. The course offers practical insight for both insurance professionals and insurance buyers.

Credit: 4/Qtr.

Ceramics

CHAC-201 **Introduction to Ceramics**
Registration #0222-201
An extensive survey of on and off the wheel forming techniques using stoneware and porcelain clays. Students will be introduced to a variety of decorative methods as well as the basics of glazing and firing finished work. Class projects will emphasize the development of competent skills and good design.

Credit: 2

CHAC-211 **Intermediate Ceramic Wheel**
Registration #0222-211 **Throwing**
An exploration of Japanese wheel throwing techniques. Students will work with raku stoneware and porcelain, using methods and tools common to Japanese potter. Class projects will concentrate on production techniques with special emphasis being given to glazing and firing procedures.

Prerequisite: CHAC-201 or equivalent.

Credit: 2

CHAC-301 **Advanced Ceramics**
Registration #0222-301
An introduction to the world of the professional potter. Work will center on advanced forming and decorative techniques ranging from sectional throwing to photo-sensitive emulsion glazing. Special emphasis will be on independent projects which require the potter to master clay and glazing formulation, design, production and firing techniques. Kiln design and construction as well as marketing techniques for finished work will be discussed.

Prerequisite: CHAC-211 or equivalent.

Credit: 2

CHAC-295 **Independent Study: Ceramics**
Registration #0222-295
Independent study may be developed at upper division level. Projects must be developed with instructor, subject to the approval of the program director. Credit may vary from one to five quarter-credits. For information on independent study contact the Division of Business and the Arts.

Credit: Variable

CHAC-298 **Special Topics: Ceramics**
Registration #0222-298
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.

Credit: Variable

Design

CHAD-201, 202, 203 **Basic Design**
Registration #0223-201, 202, 203
Study of basic elements of design: line, shape, texture, color, space and their incorporation in design principles as applied to two and three-dimensional design problems including the graphic arts.

Credit: 2/Qtr.

CHAD-215, 216, 217 Rendering Techniques
Registration #0223-251, 216, 217
This course will introduce students to the materials and techniques used by designers in rendering interiors, layouts, products, etc. Marker sketching, perspective, shadowing, media selection, and presentation techniques will be covered. Suggested for all design students.

Prerequisite: CHAF-201,202,203; CHAD-201,202,203 or equivalent.

Credit; 2/Qtr.

CHAD-220 Art for Reproduction
Registration #0223-220
This course prepares students to enter the field of graphic design by providing orientation and the studio experiences in the presentation of imagery for reproduction. Presentations will include board techniques, materials, tools, mechanical art procedures, printing and bindery processes, etc.

Prerequisite: CHAD-201, 202, 203 or equivalent.

Credit: 3

CHAD-224, 225 Interior Design
Registration #0223-224, 225
Career orientation. Emphasis on practical aspects of the profession. Details of purchasing all furnishings used in a home. Client centered planning and design.

Prerequisite: CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalents.

Credit: 2/Qtr.

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

Credit: 2

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

Credit: 2

CHAD-231 Color Theory in Art
Registration #0223-231
An opportunity to develop an awareness of and sensitivity to the world of color through slide lectures, class discussion and instructor's evaluation. Emphasis on the visual impact of color.

Prerequisite: CHAD-201, 202, 203 or equivalent experience.

Credit: 2

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

Prerequisite: CHAD-224, 225 or equivalent.

Credit: 2

CHAD-241, 242, 243 Model Design
Registration #0223-241, 242, 243
Study of the materials and techniques of model building. Working in scale, drawing, and construction.

Prerequisite: CHAD-211, 212, 213

Credit: 2/Qtr.

CHAD-251, 252, 253 Environmental Design
Registration #0223-251, 252, 253
The study of enclosed space, using material and the elements of design, line, form, texture, and color to develop living space.

Prerequisite: CHAF-201, 202, 203, and CHAD-201, 202, 203 or equivalent experience.

Credit: 2/Qtr.

CHAD-261, 262, 263 Lettering and Layout
Registration #0223-261, 262, 263
Study of commercial layout procedures from rough layouts to comprehensive, type selection, copy fitting, pictorial indication and production procedures as related to contemporary practices.

Course emphasizes the design, structure, historical development and techniques of lettering. Proceeds from rough letter indication to development of finished lettering, and application in commercial advertising problems. Typography and photo lettering methods will be studied in relationship to their use in comercial design.

Prerequisite: CHAF-201, 202, 203 and CHAD-201, 202, 203

Credit: 2/Qtr.

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

Credit: 4/Qtr.

CHAD-311, 312, 313 Graphic Design
Registration #0223-311, 312, 313
A contemporary approach to design for printed advertising with the emphasis on creative experience.

Prerequisite: CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalents. CHAD-261, 262, 263 recommended

Credit: 2/Qtr.

CHAD-315, 316, 317 Advertising Design
Registration #0223-315, 316, 317
The function and skills of the art director touches on all phases of advertising art from concepts and professional studio procedures to practical approaches in design and production. (Formerly named Advertising Practices)

Prerequisite: CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience. CHAD-261, 262, 263 and 311, 312, 313 recommended.

Credit: 2/Qtr.

CHAD-321, 322, 323 Design Applications
Registration #0223-321, 322, 323
Projects in product, furniture, exhibit, interiors and package design developed through visuals, materials, and processes. This course will be tailored to the abilities and needs of the students enrolled.

Credit: 2/Qtr.

CHAD-331, 332, 333 Fashion Graphics
Registration #0223-331, 332, 333
Drawing the fashion figure from live models and photographs students will study proportions, anatomy, body movement, line variations, fashion details and accessory drawing. Work on preliminary editorial and store layouts for retail advertising.

Prerequisite: CHAF-201,202,203; CHAD-201,202,203;CHAF-207 or equivalents.

Credit: 2/Qtr.

CHAD-360 **Portfolio Workshop**
Registration #0223-360
A workshop designed to help students take what they have learned in art classes (or work situations) and prepare and present a saleable portfolio. Projects will be tailored to the needs of individual students allowing them to compile an accurate representation of their skills in most concise, positive and beneficial manner possible. Visits from prominent people in the field showing their work and sharing their experiences.

Credit: 2

CHAD-411,412,413 **Art and Technology**
Registration #0223-411, 412, 413
An inter- media course in researching and comprising the possibilities of applying and coordination technology to the arts involving transformation of an idea into visible form.

Prerequisite: CHAF-201, 202, 203; CHAD-201, 202, 203

Credit: 2/Qtr.

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

Credit: Variable

Drawing

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

Credit: 2/Qtr.

CHAF-306 **Drawing**
Registration #0224-306
Drawing in a variety of media, including an introduction to line, form and color as elements of pictorial expression. Presents organic, inorganic, and imaginative stimuli. May be elected more than once for credit.

Prerequisite: CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalent

Credit: 2

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

Prerequisite: CHAF-201, 202, 203 or equivalent

Credit: 2

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

Prerequisite: CHAF-207 or equivalent

Credit: 2

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

Credit: 2

Painting

CHAF-211 **Introduction to Painting**
Registration #0224-211
Study of the materials and techniques of painting through use of still-life and nature forms. Basic training and foundation for advanced work.

Prerequisite: CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalents

Credit: 2

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

Prerequisite: CHAF-211 or equivalent
Credit: 2

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

Prerequisite: CHAF-317 or equivalent

Credit: 2

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

Prerequisite: CHAF-207 and CHAF-211 or equivalents

Credit: 2

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

Prerequisite: CHAF-201, 202, 203 or equivalents

Credit: 2

Sculpture

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

Prerequisite: CHAF-201, 202, 203;and CHAD-201, 202, 203 or equivalents

Credit: 2

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

Prerequisite: CHAF-247

Credit: 2

Illustration

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

Prerequisite: CHAF-207 or equivalent

Credit: 2

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

Prerequisite: 0223-201, 202, 203, and 0224-201, 202, 203 or equivalent

Credit: 3

CHAF-263 **Calligraphy**
Registration #0224-263
Students will explore the history of the alphabet through slides, lectures, and projects. Italic handwriting with related variations and techniques will be taught.

Credit: 2

CHAF-363 **Calligraphy Workshop**
Registration #0224-363
Further study in the methods and techniques of calligraphy. Students will be able to pursue study in a vaiety of styles and letter forms in a concentrated manner. May be elected more than once for credit.

Prerequisite: CHAF-263 or equivalent

Credit: 2

Printmaking

CHAF-296 **Introduction to Printmaking**
Registration #0224-296
An introduction to the methods, materials, tools, and techniques of printmaking. Areas covered include woodcuts, etching, engraving and lithography. Students are required to pull an edition of print in each area.

Prerequisite: CHAF-201, 202, 203; and CHAD-201, 202, 203 or equivalents. Additional fee required for supplies.

Credit: 2

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

Prerequisite: CHAF-296. Additional fee required for supplies.

Credit: 2

CHAF-293 **Creative Papermaking**
Registration #0224-293
Students will explore and trace the history of papermaking through ancient devices to modern techniques and trends. Lectures and readings will supplement and expand upon the lab work.

Credit: 2

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

Credit: Variable

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

Credit: Variable

Metalcrafts and Jewelry

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

Credit: 2

CHAM-211 **Intermediate Metalcrafts**
Registration #0225-211 **and Jewelry**
Work of a more complex nature will be introduced. Some techniques included will be surface treatment of metal, more sophisticated stone setting, basic holloware, casting and more.

Independent and creative statements will be emphasized in keeping with the student's technical and aesthetic development. May be elected more than once for credit.

Prerequisite: 6 credits CHAM-201 or presentation of portfolio

Credit: 2

CHAM-301 **Advanced Metalcrafts and Jewelry**
Registration #0225-301
For advanced students in the arts or crafts interested in and capable of exploring a particular area. Content and method decided by conference between student and instructor and directed toward development of student's own creative ability. Advanced level academic credit is variable in proportion to class and outside assignments scheduled. May be elected more than once for credit.

Prerequisite: presentation of portfolio.

Credit: 2

CHAM-295 **Independent Study:**
Registration #0225-295 **Metalcrafts/Jewelry**
Independent studies may be developed at the upper division level. Project must be developed with instructor, subject to approval of the program chairperson or the Division of Business and the Arts. Credit may vary from one to five quarter-credits. For information on independent studies contact the Division of Business and the Arts.

Credit: Variable

CHAM-298 **Special Topics:**
Registration #0225-298 **Metalcrafts and Jewelry**
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.

Credit: Variable

Weaving/Textiles

CHAT-201 **Introduction to Weaving**
Registration #0226-201
An introduction to the materials, processes and techniques of weaving. Emphasis on basic skills includes fiber analysis, yarn calculations, warping loom dressing, **4** harness loom techniques, finishing, designing, drafting and color effects. May be elected more than once for credit.

Credit: 2

CHAT-211 **Intermediate Weaving**
Registration #0226-211
A continuation in the development of weaving techniques and design skills through advanced study of color effects, drafting, 4 harness and tapestry techniques. The course will include samples of a particular technique plus home assignments and a final project to satisfy individual needs. May be elected more than once for credit.

Prerequisite: 6 credits CHAT-201 or presentation of portfolio.

Credit: 2

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

Prerequisite: presentation of portfolio.

Credit: 2

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

Credit: Variable

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

Credit: Variable

Woodworking

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

Credit: 2

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

Credit: 2

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

Prerequisite: presentation of portfolio.

Credit: 2

CHAW-295 **Independent Study: Woodworking**
Registration #0227-295
Independent studies may developed at the upper division level. Projects must be developed with an instructor, subject to the approval of the program director. Credit may vary from one to five quarter-credits. For information on independent study contact the Division of Business and the Arts.

Credit: Variable

CHAW-298 **Special Topics: Woodworking**
Registration #0227-298
Special topics are experimental course announced quarterly. Watch for title in the course listing each quarter.

Credit: Variable

international Studies

CHGI-211 **Chinese Language and Culture:**
Registration #0233-211 **China and the Chinese People**
This course will introduce basic Chinese culture as well as 100 daily conversational sentences. The emphasis in this quarter will be on Chinese culture characteristics, traditional philosophies and religions, beliefs, family structure, political life, economic system and trade practices, especially when these impact on contemporary practices.

Credit: 4

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

Credit: 4

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

Credit: 4

CHGI-221 **Japan: The Changing**
Registration #0233-221 **Tradition**
What are foundations of Japan's economic and technological success? This course considers the economy, government, and society of modern Japan and traces its emergence from the first contracts with the West in the 1500's to its present position as a leading economic power. To help Westerners understand the Japanese, Dr. Edwin O. Reischauer, scholar and former Ambassador to Japan, authored the text and aided in developing and producing this course. This course may serve as a behavior science elective.

Credit: 4

Deaf Studies

CHGD-211 **Sign Language & Manual**
Registration #0234-211 **Communications System I**
This course is designed to develop fluency at a basic level. This course includes introduction and practice of approximately 300 basic signs, theoretical consideration and practice of grammatical features of sign language, fingerspelling and socio-linguistic information regarding the appropriate application of manual communication skills in communicating with deaf persons.

Credit: 2

CHGD-212 **Sign Language & Manual**
Registration #0234-212 **Communications System II**
This course is a continuation of conversational signing skill development. The course includes 300 additional basic signs, continued practice with the grammatical features of sign language, fingerspelling practice, and further sociolinguistic information regarding the appropriate use of manual communication skills between deaf and hearing persons.

Prerequisite: CHGD-211 (minimun grade of B) or equivalent sign skill.

Credit: 2

CHGD-213 **Sign Language & Manual**
Registration #0234-213 **Communication System III**
The third in a series of basic conversational sign language courses. This course introduces the student to approximately 300 additional signs, continues the practice of the grammatical features of sign language, refines fingerspelling skills, and further develops students' sensitivity to the use of manual communication by deaf and hearing persons.

Prerequisite: CHGD-212 (minimum grade of B) or equivalent sign skill.

Credit: 2

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

Prerequisite: CHGD-213 (minimum grade of B) or equivalent sign skill

Credit: 2

CHGD-312 **American Sign Langauge II**
Registration #0234-312
The second in a series of American Sign Language courses. This course continues the study of grammar, syntax and lexical items of A.S.L. Culture aspects of the deaf community are considered as they relate to the language of deaf people.

Prerequisite: CHGD-311 (minimum grade of B) or equivalent sign skill

Credit: 2

CHGD-241 **Aspects & Issues of**
Registration #0234-241 **Deafness I**
This course will develop knowledge and understanding of the effects of hearing impairment, particularly with regard to the audiological, psychological, educational and vocational implications. Class activies include a simulated deafness experience, films, lectures and discussions.

Credit: 3

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

Recommended: CHGD-241

Credit: 3

Humanities

CHGH-201, 202, 203 **Humanities**
Registration #0235-201, 202, 203
These are three interdisciplinary courses in which literature, art, music, and philosophy are related to the historical, economic, and scientific forces that have shaped western civilization. 201 studies the culture of modern world; 202 deals with ancient Greece, Rome, and the Middle Ages; and 203 traces the development of the Humanities from the Renaissance through the Romantic age.

Credit: 4/Qtr.

CHGH-210 **Introduction to**
Registration #0235-210 **Art Appreciation**
A study of the elements involved in the creation of the visual arts (painting, sculpture, architecture) and of the factors which affect an audience's response to them.

Credit: 4

CHGH-220 **Introduction to History**
Registration #0235-220
This course will broadly survey the major periods of world history and will attempt to define what is unique and distinctive about the historian's approach to reality.

Credit: 4

CHGH-230 **Introduction to**
Registration #0235-230 **Music Appreciation**
A study of the elements of music (such as rhythm and melody), of different musical styles, and of music in the context of history.

Credit: 4

CHGH-260 **Introduction to Literature**
Registration #0235-260
A study of works that illustrate the essential nature of poetry, fiction and drama, and elements involved in each.

Credit: 4

CHGH-270 **Introduction to Philosophy**
Registration #0235-270
By introducing major philosophers and the issues that they have traditionally concerned themselves with, this course aims to acquaint students with the methods of philosophical questioning and argumentation.

Credit: 4

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

Credit: Variable

Communications

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

CHGL-120 **Basic Communication**
Registration #0235-120
This course provides an opportunity for students to improve their reading, writing, listening skills. For college-prep students or adults who want to upgrade their communication skills.

Credit: 3 (Diploma)

CHGL-204 **Dynamic Communications I**
Registration #0235-204
This course deals with six aspects of communication: reasoning, listening, speaking, reading, writing, and information acquisition. Emphasis on each aspect is given throughout the course. Readings on the communicative process, speeches, writing assignments, and self-evaluation as well as instructor evaluation are used to develop communicative skills. Special emphasis is given to the skills of written communication.

Credit: 4

CHGL-205 **Dynamic Communication II**
Registration #0235-205
This course builds on the skills acquired in Dynamic Communication I. Emphasis will be on organizing and supporting ideas in papers of several paragraphs. The major exercise is the writing of an 8-10 page researched position paper and an oral defense of the paper's thesis. A study of critical reading techniques will teach students to evaluate the substance, logic, organization, and clarity of their own writing.

Prerequisite: CHGL-204 or equivalent.

Credit: 4

CHGL-**220** **Communications**
Registration #0235-220
This advanced course for students with superior writing skills consolidates the course content of Dynamic Communications I, CHGL-204 and Dynamic Communications II, CHGL-205.

Credit: 4

CHGL-206 **Vocabulary**
Registration #0235-206
This course will help you improve your vocabulary and its usage. Some aspects of language study which directly apply to vocabulary building will be examined: origins of words, historical development of their forms and meanings, their current usages, and use of dictionary and context to distinguish meanings.

Credit: 1

CHGL-298 **Special Topics: Communications**
Registration #0235-298
Special Topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.

Credit: Variable

CHGL-301 **Effective Speaking**
Registration #0236-301
Students will learn the principles of speaking in public and will deliver several speeches ranging from demonstrations to persuasive forms. Self, peer and instructor critiquing will be used for evaluation of tape-recorded and TV-monitored speaking experiences.

Credit: 4

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

Credit: 4

CHGL-307 **Business Communications**
Registration #0236-307
In Business Communications students will apply the basic principles of effective communication to situations characteristic of the business and industrial setting. Writing assignments and classroom activities include job applications, memos, letters, reports and interpersonal communications.

Prerequisite: CHGL-204, 205 or equivalent

Credit: 4

CHGL-308 **Technical Report Writing**
Registration #0236-308
Students learn to prepare reports of the sort required by practicing engineers and managers in industry and business. They will develop the ability to analyze audiences and purposes, state problems, design reports, and write and edit them. Assigned reports will be discussed and critiqued by peers and instructor.

Prerequisite: CHGL-204, 205 or equivalent.

Credit: 4

Behavioral Studies

CHGS-201 **Anthropology-Introduction**
Registration #0237-201
Anthropology studies the similarities and differences between cultures. This course will explore the influences of environmental, technology, work, authority, kin and non-kin groups, enculturation, religion, folklore and art in different societies. It will stress the value of cross-cultural comparisons in understanding American culture and society.

Credit: 4

CHGS-211 **Psychology-Introduction**
Registration #0237-211
Psychologists study a broad range of topics to discover more about how people think, feel, and interact with others. In this survey course students learn how scientific methodology has been used to discover some of the causes and factors involved in sensation, perception, motivation, emotion, stress, learning, development, personality, psychological disorders, and social behavior. Students are encouraged to apply this information to their daily lives.

Credit: 4

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

Credit: 4

CHGS-222 **Principles of Economics II**
Registration #0237-222
This course covers micro-economic problems such as distribution of income, allocation of resources, price determination under competition, monopolies, supply and demand and their applications to business firms and labor unions. It also deals with the structure of American industry and the roles played by government, business, and individuals viewed in the light of current economic trends.

Credit: 4

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

Credit: 4

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

Credit: 4

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

Prerequisite: CHGS-211

Credit: 4

CHGS-317 **Understanding Stress**
Registration #0237-317
Physiological, psychological, and social stress can have serious consequences on one's daily life. This course is designed to familiarize students with the basic concepts of stress, the positive and negative ramifications of stress, and examine strategies for managing stress.

Prerequisite: CHGS-211 or equivalent

Credit: 4

Photography

Students enrolled in photographic courses have the studios and laboratories available to them only for the scheduled class times. On a space available basis additional time may be secured but not to exceed the equivalent of one regularly scheduled lab or studio period per week. Work done in the studios or laboratories must be for the specific purpose of meeting course objectives.

CHGP-021 Introduction to Photography
Registration #0231-021
For the novice photographer who would like to learn how to produce aesthetically and technically acceptable photographs. Topics include cameras, lenses, films, developing, printing, and enlarging, filters, flash photography and print finishing. The emphasis is on successful solution of practical photographic problems.

Credit: none

CHGP-101 Photography Workshop
Registration #0231-101
A flexible course in the application of photography to create expression. Emphasis is on self-criticism and the development of the individual's ability to create meaningful and purposeful photographs. Class time devoted to developing and enlarging as well as group and individual critique sessions. All shooting assignments are completed outside of class.

Credit: 2

CHGP-102 Photography Workshop
Registration #0231-102
Continuation of CHGP-101. Students are encouraged to develop in areas of specific interest to them. Excellence in the creative as well as the technical aspects of photography, printing and presentation is stressed. Students should bring examples of past work to first class. This course may be elected more than once for credit.

Credit: 2

CHGP-104 Color Photography Workshop
Registration #0231-104
The course will acquaint students with skills in color materials handling, from exposure to color printing. Aesthetic and communicative aspects of color photography will be stressed. Small format equipment with color negative and reversal materials will be used. Students should bring examples of the past work to first class. May be elected more than once for credit.

Prerequisite: CHGP-102 or equivalent.

Credit: 2

CHGP-201, 202, 203 Basic Professional Photography
Registration #0231-201, 202, 203
An introductory course to photographic principles and practice designed primarily for the inexperienced who aspire to enter photography as a profession, who would find such knowledge useful in a related field or who wish to improve personal knowledge. Both theory and practice are provided in a wide range of picture taking and darkroom techniques. Some background in photography is desirable but not absolutely necessary. This course is a prerequisite to all other courses in the professional photography program.

Credit: 4/Qtr.

CHGP-211, 212, 213 Color Photography
Registration #0231-211, 212, 213
Color theory and applied problems in color photography, processing and printing. Negative and reversal processing, color balance and correction, internegatives, duplication techniques, elements of masking and optimum reproduction methods.

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 4/Qtr.

CHGP-221, 222, 223 Illustrative Photography
Registration #0231-221, 222, 223
The application of various specialized photographic techniques to creative image making. Special emphasis on single source studio lighting techniques to achieve desired visual effects. Novel and innovative camera methods and photographic design concepts are stressed. Particular emphasis on advertising photography applications and on the essence of the subject. Topics will include still life, food and consumable products, fashion assignments and some location photography. The principle camera format used will be 4x5. Equipment is available at the studios for use during class hours. Some small format photography will also be required.

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 3/Qtr.

CHGP—231, 232, 233 Portrait Photography
Registration #0231-231, 232, 233
A foundation course in portraiture, including concepts and psychology of portraiture and the use of professional cameras and studio equipment through lectures, demonstrations, and assigned projects. Stress is placed on understanding facial types and on the appropriate use of light. It is recommended that students who enroll in this course also schedule Portrait Retouching CHGP-331, 332, 333

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 3/Qtr.

CHGP-241, 242,243 Commercial Photography
Registration #0231-241, 242, 243
Materials, equipment and techniques with emphasis on the solution of problems in commercial photography. It is recommended that students who enroll in this course also schedule Commercial Retouching, CHGP-321, 323

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 3/Qtr.

CHGP-301, 302 Motion Picture Photography
Registration #0231-301, 302
Designed for the amateur, the school teacher and those interested in basic film production. Super 8mm will be the principle size camera and film used, however, 16mm will be used toward the conclusion of the course. Included will be scripts and story boards, composition, continuity, cutting, editing, sound and presentation. The participants should have a personal Super 8mm camera available for use during the program.

Credit: 3/Qtr

CHGP-321, 322, 323 Commercial Retouching
Registration #0231-321, 322, 323
Methods used in retouching commercial negatives and prints: bleaching, lettering, use of etching knife and abrasives. Last quarter includes color retouching and use of airbrush.

Credit: 1/Qtr.

CHGP-331, 332, 333 Portrait Retouching
Registration #0231-331, 332, 333
Retouching portrait negatives, using pencil, knife, abrasives and dyes. Last quarter includes Ektacolor negatives and major correction of anatomical features.

Credit: 1/Qtr.

CHGP-351 Industrial Photography: Instrumentation
Registration #0231-351
Fundamental applications of a variety of photographic techniques will be presented. Weekly projects will give students hands-on experience with methods such as high-speed flash, sequence, motion picture and streak photography; panoramic and peripheral photography; schlieren, shadow graph and thermal photography; infrared, ultraviolet and polarization photography; etc.

Although mathematical concepts are utilized, emphasis is placed on understanding underlying photographic measurement principles rather than on absolute mathematical rigor. May be elected three times for credit.

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 3

CHGP-352 **Industrial Photography:**
Registration #0231-352 **Audiovisual Techniques**
You will have an opportunity to prepare audiovisual programs using current techniques and equipment. You will learn special photographic methods used for the production of programs that exhibit both technical excellence and visual impact. Also included are presentations on the use of the medium as a training, promotional and educational tool. May be elected three times for credit.

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 3

CHGP-353 **Industrial Photography:**
Registration #0231-353 **Special Topics**
Through guided individual study students have the opportunity for more comprehensive work in either the instrumentation or audio-visual areas. Also, specialized topics not covered in standard course may be scheduled with the consent of individual faculty members. For listing of special topics available any particular quarter consult department chairperson. May be elected more than once for credit.

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 3

CHGP-361, 362 **Law Enforcement Photography**
Registration #0231-361, 362
Advanced photographic applications in various aspects of law enforcement photography. Fingerprints, infrared and ultraviolet photography. Forgery, surveillance and accident photography.

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 3/Qtr.

CHGP-366 **Dye Transfer Printing**
Registration #0231-366
The dye transfer color printing process is covered in its theory and through practical laboratory assignments. Mordant, dye acidity and contrast, color balance controls, dyeing, image transfer and registration.

Prerequisite: CHGP-211, 212, 213 or equivalent.

Credit: 3

CHGP-401, 402, 403 **Fashion Photography**
Registration #0231-401, 402, 403
A course designed to expand the photographer's vision and awareness to the problems of fashion photography. Emphasis on sensitivity to light, the beauty of the model, and most important, on the development of the student's personal taste in expressing the inherent qualities of the garment. Students should bring to first class examples of past work, whether it be fashion photography or not.

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 3/Qtr.

CHGP-404, 405, 406 **Architectural Photography**
Registration #0231-404, 405, 406
Photographic interpretation and effective visual presentation of buildings, both as structures for habitation as well as art forms in themselves. Use and application of view camera included. Effective use of small format equipment. Assignments to be completed outside of class time include exteriors, interiors, landscapes, details and individual as well as group buildings. Students must make arrangements for printing outside of class.

Credit: 3/Qtr.

CHGP-411 **Photography of the Natural World**
Registration #0231-411
Through lectures, field trips, class discussion, and critiques, the student is offered an opportunity to develop an awareness and sensitivity to the beauty of the natural world. There are a number of field trips scheduled to areas such as Letchworth Park, Bergen Swamp, Sapsucker Woods and other appropriate locations. Transparency materials are exclusively in the 35mm format. The student is expected to have his or her own camera, light meter and some type of close-up accessory. May be elected twice for credit.

Prerequisite: CHGP-201, 202, 203 or equivalent.

Credit: 4

CHGP-431,432, 433 **Photographic Communication**
Registration #0231-431, 432, 433
Photography for people in action and situations. The decisive moment and "candid" pictures. Picture stories and sequences. Effective use of available light. Historical perspectives. Use of writing and captions in conjunction with photographic images. Shooting and printing portion of the assignments to be completed outside of class time.

Credit: 2/Qtr.

CHGP-295, 298 **Photographic Vision I and II**
Registration #0231-295, 298
The Photographic Vision is a video-based two course sequence all about photography, presented in a medium that enhances the power of the photograph. The course covers the basic mechanical skills of camera handling, the nomenclature of the tools and materials, the history of photography, and the technical, artistic and commercial dimensions of this craft. Photography is approached as an art form and as unique means of human communication as well as a technical skill. Students desiring darkroom experience should also register for a Photography Workshop: CHGP-101 or 102. Completion of CHGP-295 and 298, CHGP-101,102 along with four credits of Photography electives, will satisfy the requirements of Basic Professional Photography: CHGP-201, 202, & 203.

Credit: 3/Qtr.

Photographic Science

CHGR-207, 208, 209 **Fundamental of Photographic**
Registration #0238-207, 208, 209 **Science**
Principles of sensitometry, photographic chemistry and applied photography. Subject areas include densitometers, sensitometers, logarithms, characteristic curves and photographic response relationships. General emulsion and photographic processing chemistry formulations, time-temperature relationship, chemical balance and process control. The view camera and its use, perspective, depth of field, lighting and proper metering techniques, filters, flash and photography as a pictorial and a scientific instrument.

Prerequisite: A background in algebra and trigonometry is suggested.

Credit: 4/Qtr.

CHGR 217, 218, 219 (lec.); 224, 225, 226 (lab) **Photographic**
Registration #0238-217, 218, 219, 224, 225, 226 **Chemistry**
This course will provide the student with an understanding of the chemical basis of photography necessary to the continued study of photographic science, and to provide a systematic study of the manufacture and properties of silver halide photographic emulsions and processing solutions.

Specific topics will be: formation and growth of silver halide crystals: chemical and spectral sensitization; addenda and coating; latent image theory and application of conventional and diffusion transfer processing; comparisons of silver halide and non-silver photographic systems.

The course will assume only an introductory knowledge of chemistry. Yet science or engineering graduates entering photographic research or involved in other areas of photographic technology will find in the course a basis for their work and for further study. The lecture may be taken by itself.

Prerequisite: CHGR-201,202,203 and CHGR-207,208 or equivalent.

Credit: 4/Qtr. (Lec. 3, Lab 1)

CHGR-227, 228, 229 **Black and White Sensitometry**
Registration #0238-227, 228, 229
The relation of photographic density to exposure in a light-sensitive silver halide emulsion, including radiation source, exposure measuring devices, sensitometers, chemical development and processing, D-Log curves, densitometers, tone reproduction, and the necessary latent image theory.

Prerequisite: CHGP-207, 208, 209 and CTAM-210 or equivalent.

Credit: 4/Qtr.

CHGR-237,238 **Radiometry**
Registration #0238-237, 238
You will become acquainted with the human visual process, light sources, attenuators, receivers and the physical parameters involved in the generation, propagation, composition and measurement of radiant energy particularly as it relates to photographic materials and fundamental optical systems.

A background in algebra and trigonometry is recommended.

Prerequisite: CHGP-207 and CTAM-210 or equivalent.

Credit: 3/Qtr.

CHGR-307 **Quality Control of Photographic**
Registration #0238-307 **Solutions**
Principles of photographic processing solutions, their chemical and sensitometric analysis, the application of statistics and the design of photographic processing machines for precision photographic processing. Identification of processing errors, processing for permanence, modification and restoration of photographic images.

Content purpose and criticality of control of the chemical components in Black and White and Color processing solutions. Current procedures and instrumentation for the analysis and control of processing solutions. Testing for the identification of processing errors. Design of replenishment formulas. Principles of machine design construction materials and processing solution compatibility. Specific examples of use in present day machines.

Prerequisite: CHGR-217, 218, 219 or equivalent.

Credit: 3/Qtr.

CHGR-407, 408, 409 **Optics**
Registration #0238-407, 408, 409
Introduction to geometrical and physical opticals applied to photographic systems and optical instruments.

Prerequisite: CTAM-251, 252 or equivalents.

Credit: 3/Qtr.

CHGR-414, 415, 416 **Color Sensitometry**
Registration #0238-414, 415, 416
Photometric measurements, color specification, spectrophotometry, visual and printing densities, integral and analytical color densitometry, color reproduction, dye deficiencies and masking.

Prerequisite: CHGR-227, 228, 229 and CTAM-251, 252, 253 or equivalents. Computer programming background also required.

Credit: CHGR-414, 415-3; CHGR-416-4

CHGR-417,418, 419 **Image Evaluation**
Registration #0238-417, 418, 419
The course objective is to develop a fundamental and rigorous understanding of the problems of evaluating photo-opticals systems. Both the subjective and the objective methods of analysis are discussed in considerable detail.

The main topics are: point-and-line-spread function of photo-optical systems; derivation of the line-spread function of photographic emulsions; one-dimension image formation and convolution integrals; Fourier analysis and Fourier transforms; autocorrelation and its applications; modulation transfer function of photo-optical stems (OTF).

Prerequisite: CHGR-407,408,409 and CTAM-305,328 or equivalent. Computer programming background also required.

Credit: 3/Qtr.

CHGR-421 **Mathematical Methods In**
Registration #0238-421 **Photographic Science**
A survey of various mathematical techniques useful in devising or modeling photographic systems. Each method is applied to numerous problems and examples from photographic science after development of the pertinent mathematics. Topics selected from: linear spaces, transformations, dimensional analysis, information theory, system analysis, distributory theory, stochastic processes.

Prerequisite: CTAM-251, 252, 253 or equivalents.

Credit: 4

CHGR-520 **Xerography and Electrographics**
Registration #0238-520
The objectives of this course which is directed towards working engineers, scientists and experienced technicians, are to provide a comprehensive program devoted to the scientific background and practical applications of electro-photographic, to emphasis the relationship of silver photography to electrostatic imaging, and to provide practical experience in xerographic image formation and reproduction.

Topics which will be covered in lectures, demonstrations, and laboratories include: electrical imaging and electrostatic principles; photoconductivity; the electrical latent image;dry and wet development; image transfer and fusing; and novel technical approaches.

The prerequisites assume a background in general physics (especially electricity) and college mathematics or equivalent experience.

Fundamental principles of selected subjects will be received.

Credit: 3

CHGR-527 **Theory of the Photographic Process**
Registration #0238-527
An advanced course in photographic theory covering the underlying principles and mechanisms of the photographic process. Latent image formation, photographic sensitivity, emulsions, and development processes will be discussed in terms of the basic principles of solid state physics, the concepts of band structure, trapping levels, lattice defects, surface space charge layers, and interface electrochemistry will be described and employed.

Prerequisite: CHGR-217, 218, 219 and 224, 225, 226 or equivalent.

Credit: 4

CHGR-528 **Theory of the Color Process**
Registration #0238-528
The measurements of color photography, colorimetry, tone and color reproduction, spectrophotometry, and masking theory are treated in a common mathematical notation.

Prerequisite: CHGR-217, 218,219 and 224, 225,226 and CHGR-414, 415, 416 or equivalent

Credit: 4

CHGR-529 **Non-Sliver Imaging Systems**
Registration #0238-529
The purpose of the course is to examine the more promising non-silver and unconventional silver halide systems in view of the future requirements in cost, sensitivity, image quality, color rendition, ecology (to compare them to present silver imaging systems), and to consider the reasons for the commercial failure and future prospects of other systems.

The course will emphasis the principles and methods of physics and chemistry which have been developed into non-silver photographic systems, rather than the extensive empiricism which has been characteristic of this field. The student will gain an understanding of the principle non-silver systems and today's research and product trends. Topics include: latent-image theory; exposure effects: mechanism of development and spectral sensitization; sensitometry; and image evaluation.

Prerequisite: CHGR-527 or equivalent

Credit: 4

CHGR-557, 558, 559 **Independent Research**
Registration #0238-557, 558, 559
Individual project involving research in an applied professional or scientific photographic subject carried^out under the guidance of a professor.

Prerequisite: Permission of Chairperson, Photography.

Credit: 3/Qtr.

Printing

CHGT-101,102,103 **Process Camerawork**
Registration #0239-101,102,103
Fundamentals of photography and photomechanical principles and techniques for black and white reproduction. Emphasis on line and halftone photography. Designed for the individual who wants to do process camerawork or who wants to become more proficient in this area.

Credit: 2/Qtr.

CHGT-111,112,113 **Color Separation Camerawork**
Registration #0239-111,112,113
Fundamentals of light and color as applied to masking and color separation in offset lithography. Densitometric control of the photographic operations is emphasized; various masking methods are surveyed. Laboratory projects supplement lecture material.

Prerequisite: CHGT-101,102, 103 or equivalent.

Credit: 2/Qtr.

CHGT-121,122,123 **Offset Layout and Stripping**
Registration #0239-121,122,123
Examination and treatment of negative and positive films to remove defects; study and application of various methods of assembling film negatives or positives into flats in preparation for pastemaking; study of proofing systems and types of impositions.

Credit: 2/Qtr.

CHGT-131,132 **Offset Platemaking**
Registration #0239-131,132
A comprehensive course covering all aspects of offset platemaking. Includes all imaging methods for lithographic plates, such as the various forms of presensitized-, wipe-on, photopolymer-, deep-tech-, bi- and tri-metal plates as well as transfer and direct camera plate systems; basic step and repeat layout and procedures on two machines are also studied.

Credit: 2/Qtr.

CHGT-141,142,143 **Offset Presswork**
Registration #0239-141,142,143
A study of the fundamentals of lithographic presswork. Emphasis is placed on principles, procedures, equipment and the relationship of materials.

Credit: 2/Qtr.

CHGT-151,152,153 **Color Stripping**
Registration #0239-151,152,153
An advanced study of image assembly to include **4** color process stripping; pin register systems; proofing systems; contacting procedures. Students should have taken prerequisite course of offset layout and stripping.

Prerequisite: CHGT-121, 122,123 or equivalent experience.

Credit: 2/Qtr.

CHGT-201, 202, 203 **Introduction to Printing**
Registration #0239-201, 202, 203
Survey of the various phases of production employed in major printing processes, encompassing the major steps from design to finished printed product.

Credit: 2/Qtr.

CHGT-207 **Printing Design and Layout**
Registration #0239-207
Fundamentals of layout and design as applied to commercial printing and advertising, including how to design with type, specify type and illustrations, and produce layouts from thumbnail sketches to a completed comprehensive design. Emphasis on technical and printing problems.

CHGT-211 **Phototypesetting Procedures**
Registration #0239-211
Study and analysis of phototypesetting procedures, emphasizing techniques of phototypography through the medium of contemporary laboratory facilities. One field trip.

Credit: 2

CHGT-215 **Bookbinding**
Registration #0239-215
This course is intended to give the student an introduction to the skills of hand bookbinding. The purpose is to experience bookbinding as an art form. Content will cover history, materials, methods of bookbinding and restoration. Students should bring two books of their own for rebinding.

Credit: 2 ^

CHGT-219 **Estimating**
Registration #0239-219
A basic course in planning production, cost of materials, hour costs, hour rates, estimating time and time standards.

Credit: 4

CHGT-227 **Copy Preparation**
Registration #0239-227
Copy preparation for reproduction; working from layouts; arrangement and handlings for paste-up, separation mechanicals, and photographic copy; requirements of reproduction proofs; writing complete specifications for stripping and camera.

Credit: 3

CHGT-231, 232 **Printing Plates**
Registration #0239-231, 232
Theory and practice of platemaking for lithographic, letter press and flexographic printing plus theory of gravure cylinder making.

Credit: 2/Qtr.

CHGT-237 **Technology of Typesetting**
Registration #0239-237
An introduction to machine typesetting including hot metal, tape and phototypesetting.

Credit: 2

CHGT-241 **Typography**
Registration #0239-241
The typographical factors important to all phases of printing design from simple commercial work to books. Special attention is given to the logical selection of types, and their fitness for a variety of jobs.

Credit: 2

CHGT-251, 252 **Paper and Printing**
Registration #0239-251, 252
A survey of kinds of paper and papermaking emphasizing the graphic arts processes and their relation to varieties of paper; instruction in utilizing paper characteristic for printing advantage. Attention given to the economics of paper buying, the problems of the pressroom, and the paper revolution.

Credit: 2

CHGT-301, 302, 303 **Reproduction Camerawork**
Registration #0239-301, 302, 303
The photographic process as it relates to the printing of black and white color reproductions. Emphasis on basic photography; line and half-tone photography; tone reproduction; and color separation photography. The theoretical approach is stressed; however, students will be involved in various photographic activities.

Credit: 2/Qtr.

CHGT-314 **Flexography**
Registration #0239-314
A study of the theory and practice of flexographic printing, uses and development of flexography, plate and ink requirements, press principles and operation, experiments in printing on a wide variety of surfaces.

Credit: 2

CHGT-317, 318 **Computer Applications in Printing**
Registration #0239-317, 318
A basic course covering computers and how they are used in graphic arts applications. Characteristics and types of computers used are discussed as well as introduction to programming concepts.

Credit: 2/Qtr.

CHGT-341 **Printing Processes**
Registration #0239-341 **Intro to Offset Press**
A basic introduction to offset presses. Covering: lithographic theory, the applications of lithography, capabilities and limitations of process and basic press design and function. The material will be presented in the form of lectures and demonstrations.

Prerequisite: CHGT-203

Credit: 2

CHGT-407 **Ink and Color**
Registration #0239-407
This course is designed to meet the needs of both management and production printing students. A two-hour lecture course on all facets of ink manufacturing and color matching; lab project participation by the student is strictly voluntary. Emphasis on technical and printing problems with offset (wet/dry) and letterpress inks.

Credit: 2

CHGT-421 **Imposition and Finishing**
Registration #0239-421
Course is designed to understand imposition planning as related to and governed by folding and other finishing operations. Content deals with the concepts of pre-press planning, binding and finishing. Included are topics on preparing layouts, forms and folded paper material for binding. Laboratory experiments include operation of modern bindery equipment and the binding of a hardcover bound book.

Credit: 2

Science and Technology

Mathematics

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

CTAM-101,102,103 **Mathematics**
Registration #0240-101,102,103
A three-quarter sequence for students whose high-school mathematics background is insufficient to allow them to enroll in degree-level mathematics course. This is an accelerated intermediate high school algebra course with an introduction to trigonometry.

Credit: 3/Qtr.

CTAM-201, 202 **Technical Mathematics**
Registration #0240-201, 202
A two-quarter sequence to meet the needs of students enrolled in AAS degree programs. This is an introduction to college algebra and trigonometry covering basic algebraic concepts and operations, algebraic and transcendental (trigonometric, logarithmic, and exponential) functions.

Prerequisite: CTAM-103 or equivalent.

Credit: 4

CTAM-203 **Technical Calculus**
Registration #0240-203
An elementary applied calculus course for students in the AAS program. This course covers the basic Differential and integral calculus of algebraic and transcendental function with applications.

Prerequisite: CTAM-202 or equivalent.

Credit: 4

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

Credit: 4

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

Credit: 4

CTAM-210 **College Algebra and Trigonometry**
Registration #0240-210
A study of algebraic and transcendental (trigonometric, logarithmic, and exponential) functions including graphs and equations.

Prerequisite: Three years of high school mathematics or equivalent, including intermediate algebra.

Credit: 4

Calculus for Technologists — See CTEM-420, 421.

CTAM-251, 252, 253 **Calculus**
Registration #0240-251, 252, 253or equivalent

Credit: 4

CTAM-305 **Calculus**
Registration #0240-305
Partial differentiation; multiple integrals; solid analytic geometry; vector calculus with emphasis on applications to science and engineering.

Prerequisite: CTAM-253 or equivalent

Credit: 4

CTAM-306 **Differential Equations**
Registration #0240-306
Ordinary differential equations through nth order with emphasis on first and second order linear. Applications, numerical methods, LaPlace Transforms.

Prerequisite: CTAM-305 or equivalent

Credit: 4

CTAM-318 **Boundary Value Problems**
Registration #0240-318
A continuation of CTAM-306, Differential Equations. Topics covered are Fourier Series, an introduction to partial differential equations; series solutions of differential equations; applications of the material covered.

Prerequisite: CTAM-306 or equivalent

Credit: 4

CTAM-328 **Engineering Mathematics**
Registration #0240-328
An introduction to matrix algebra and vector analysis. Topics covered are matrix operations with application; vector algebra, vector calculus, gradient, divergence and curl; linear and surface integrals; independence of path and the divergence theorem; applications.

Prerequisite: CTAM-305 or equivalent

Credit: 4

CTAM-341, 342 **Engineering Statistics**
Registration #0240-341, 342
Designed to provide the student with a working understanding of the basic statistical strategies useful in the analysis and interpretation of data generated by problems of variation in the physical and applied sciences, and as such is a study of the concepts and techniques of mathematical probability and statistics and its role as the central core of all statistical strategies.

Prerequisite: CTAM-305 or equivalent

Credit: 4

CTAM-407 **Linear Algebra**
Registration #0240-407
Topics covered in this course are: vector spaces: systems of linear equations; linear transformations and matrices; determinants; characteristic roots and vectors; similarity of matrices and quadratic forms; applications of the above.

Prerequisite: CTAM-252 or equivalent

Credit: 4

CTAM-417 **Numerical Analysis**
Registration #0240-417
This course covers linear difference equations; numerical methods for solving equations; interpolation, iteration, and approximating procedures; error analysis or related methods; empirical formulas; and problems involving computer applications. Where applicable, the computer will be used in solving problems.

Prerequisites: FORTRAN or BASIC Programming and CTAM-306 or equivalents

Credit: 4

CTAM-420 **Complex Variables**
Registration #0240-420
A study of the calculus of complex functions. Cauchy Theory leading to residue theory and conformal mapping.

Prerequisite: CTAM-305 or equivalent.

Credit: 4

Electrical (Applied Science)

CTBE-401, 402, 403 (lec.): 406, 407, 408 (lab.) **Circuit Analysis**
Registration #0241-401,-402, -403, -406, -407, -408
Circuit parameters, Ohm's Law, Kirchhoffs Laws, combination of elements, voltage and current division, mesh and nodal analysis, linearity and superposition. Thevenin's and Norton's theorems, dependent sources, transient analysis, sinusoidal steady-state analysis, polyphrase circuits, complex frequency, pole-zero diagrams, resonance, magnetically coupled circuits, two-port theory. Fourier series analysis of circuits. Laplace transform techniques of circuit solution.

Prerequisite: CTCP-303 and CTAM-305 or concurrent with CTAM-306.

Credit: 4 (Lec. 3, Lab. 1)

CTBE-411, 412, 413 **Electric and Magnetic Fields**
Registration #0241-411, 412, 413
Electric and magnetic field application in dielectrics and magnetic core component. Wave propagation and the formulation of dynamic field equations and their specific application to radiation problems, waveguides, antennas, shielding, and transmission lines.

Prerequisite: CTAM-328 and CTBM-342 or equivalent.

Credit: 4

CTBE-421,422, 423 **Electronics**
Registration #0241-421,422, 423
An integrated treatment of basic electronic devices and their circuits with emphasis on active circuits and their analysis; biasing, stability, and frequency response consideration, feedback amplifiers and non-linear circuits.

Prerequisite: CTBE-403 and 408 or equivalent.

Credit: 4

CTBE-431, 432 **Electronics (Advanced)**
Registration #0241-431, 432
An in depth study of stability, feedback, temperature and noise effects as applied to operational amplifiers. Application of integrated circuit operational amplifiers as RC filters and in linear and nonlinear modes.

Prerequisite: CTBE-423 or equivalent

Credit: 4

CTBE-433 **Electronics (Communications)**
Registration #0241-433
Introduction to systems for transmitting information at high frequencies — AM, FM, PM. Digital and sampled-data systems including basic information theory and noise. Emphasis is on basic understanding utilizing analysis as a tool to demonstrate application and to further understanding. Topics to include propagation, RF amplification, modulation and detection, basic antenna and transmission line principles, D-A and A-D conversion, signal-to-noise ratio, bandwidth, sampling theory, and noise sources with their effects on information transmission.

Prerequisite: CTBE-412 and CTBE-423 or equivalent.

Credit: 4

CTBE-434 **Digital Logic Design**
Registration #0241-434
Concepts of Boolean algebra and related switching circuit theory, analysis and synthesis of AND/OR, NAND/NOR logic. Use of Darnaugh map techniques for combinational logic. Simplification, analysis, and synthesis of sequential circuits using transition and state tables, number systems and codes. TTL, ECL, HTL, digital MOS device characteristics.

Prerequisite: CTBE-423 or equivalent.

Credit: 4

CTBE-461, 462,463 **Electrical Engineering Principles**
Registration #0241-461, 462, 463
A course for non-electrical majors. Electric and magnetic circuits, electrical measurements, electronic devices, transformers, power systems, machines, and control circuits.

Prerequisite: CTAM-305 and CTCP-303 or equivalent.

Credit: 4

CTBE-501 **Electromagnetic Energy Conversion**
Registration #0241-501
Theoretical development of magnetic circuit principles as applied to electromechanical energy conversion with emphasis on electromagnetic field and mechanical energies. Electromagnetic devices are discussed with emphasis on the magnetic circuit point of view under steady-state operation conditions.

Prerequisite: CTAM-306 and CTBE-412 or equivalent.

Credit: 4

CTBE-511, 512 **Control Systems**
Registration #0241-511, 512
Control systems are analyzed with emphasis on open and closed loop operation. System parameters are discussed including block diagrams, transfer functions, and stability. Nyquist criteria and Bode plots are presented to predict and analyze the operation and design of control systems.

Prerequisite: CTBE-501 and CTBE-403 and 408, CTBE-511, or equivalent.

Credit: 4

Mechanical (Applied Science)

CTBM-341, 342 **Engineering Mechanics**
Registration #0242-341, 342
Vector methods in statics and dynamics, force systems, friction, moments, centers of mass and centroids, moments and products of inertia, work, velocity, acceleration, kinetic energy, momentum, rigid body motion, rotation, work, potential energy, conservative forces and impulse.

Prerequisite: CTCP-302 and CTAM-305

Credit: 4

CTBM-344 (lec); 354 (lab) **Strength of Materials I**
Registration #0242-344, 354
Stress, strain, Hooke's Law, shear, torsion, shear and bending in beams, moment diagrams and deflection of statically determinate beams.

Prerequisite: CTBM-341 or equivalent.

Credit: 4 (Lec. 3, Lab. 1)

CTBM-345 **Strength of Materials II**
Registration #0242-345
A continuation of the study of the way engineering materials behave. Slope and deflection of statically indeterminate beams, analysis of special beams, reinforced concrete beams, shear center, bending or torsion stresses combined with direct stresses, combined stresses for general types of loading. Mohr's circle, column analysis, energy of strain and impact, Castigliano's Theorem.

Prerequisite: CTBM-344 and 354.

Credit: 4

CTBM-347 (lec), 357 (lab) Engineering Materials
Registration #0242-347, 357
Properties of engineering materials from the standpoint of atomic and crystalline structure, imperfections, and phase changes.

Prerequisite: CTBM-341.

Credit: 4 (Lec. 3, Lab. 1)

CTBM-401 Thermodynamics I
Registration #0242-401
Fundamental properties of thermodynamic systems: perfect gases, state and energy equations, laws of thermodynamics, and properties of pure substances.

Prerequisite: CTCP-302 and CTAM-306 or equivalents.

Credit: 4

CTBM-402 Thermodynamics II
Registration #0242-402
Thermodynamic properties of steam and refrigerants: fluids, heat transfer, mixtures of gasses and vapors, internal combustion cycles and vapor power cycles.

Prerequisite: CTBM-401 or equivalent.

Credit: 4

CTBM-403 Thermodynamics III
Registration #0242-403
Additional material on vapor power cycles and internal combustion engines, reactive systems, and fundamentals of heat transfer.

Prerequisite: CTBM-402 or equivalent.

Credit: 4

CTBM-411 Fluid Mechanics I
Registration #0242-411
The basic properties of fluids are described. The principles of fluid behavior are investigated and applied to practical problems. Forces developed by fluids in motion are also examined. Major topics include incompressible viscous flow and boundary-layer theory. Films showing flow phenomena are used to supplement the lecture material.

Prerequisite: CTBM-401 or equivalent

Credit: 4

CTBM-412 Fluid Mechanics II
Registration #0242-412
Introduction to special flow systems. Major topics include potential flow, compressible flow, and the behavior of fluids in open channels, dimensional analysis and its relation to model flow-testing. Lectures are supplemented with films.

Prerequisite: CTBM-411.

Credit: 4

CTBM-551 Machine Design I
Registration #0242-551
Statics of linkage mechanisms, Kinematics and dynamics of linkages, analytical methods of solution based on vector analysis, graphical methods, and additional vector methods of solution.

Prerequisite: CTBM-345 or equivalent.

Credit: 3

CTBM-552 Machine Design II
Registration #0242-552
Kinematics of cam mechanisms, dynamic analysis of cams and some vibrational analysis, cam synthesis, stress analysis of machine design, including the selection of materials.

Prerequisite: CTBM-551.

Credit: 3

CTBM-553 Machine Design III
Registration #0242-553
Design of machine elements (shafts, springs, gears, bearings, clutches and brakes), vibration analysis, material selection, additional analytical and graphical solutions.

Prerequisites: CTBM-552.

Credit: 3

CTBM-554 Linkage Mechanism Synthesis
Registration #0242-554
The combining of linkage mechanisms to perform machine functions. Coordinating of output motion with input motion for four and six-link mechanisms, Combinations and inversions of four-bar and slider-crank linkages. Analyzing coupler-curves. Coupler-cognate mechanism synthesis. Solving problems by graphical and analytic methods with typical applications to machine design.

Prerequisite: CTBM-551 or permission of advisor.

Credit: 3

Chemistry

CTCC-211, 212, 213 General Chemistry
Registration #0244-211, 212, 213
For chemistry majors and others who desire an in-depth study of general chemistry; atomic structure, chemical bond, properties of elements and compounds, states of matter, solutions, acids and bases, oxidation-reduction reactions,chemicals calculations, qualitative and quantitative analysis.

Prerequisite: 3 years of high school math or equivalent, including intermediate algebra.

Credit: 3/Qtr.

CTCC-216 Qualitative Inorganic Analysis
Registration #0244-216
A lecture-laboratory course designed to present and illustrate the principles of the methodology of qualitative inorganic cation and anion analyses.

Prerequisite: Concurrent with CTCC-213 or equivalent.

Credit: 2

CTCC-217, 218 Quantitative Analysis
Registration #0244-217, 218
A lecture-laboratory course designed to illustrate the techniques and skills required for volumetric and gravimetric quantitative analysis.

Prerequisite: Concurrent with CTCC-211, 212 or equivalent.

Credit: 2/Qtr.

CTCC-231 Organic Chemistry
Registration #0244-231
A lecture course serving as an introduction to the science of organic chemistry. A survey of the nomenclature of organic molecules and a discussion of the structure and properties of the various classes of organic compounds is presented.

Prerequisite: CTCC-213 or equivalent.

Credit: 3

CTCC-232, 233 (lec); 237, 238 (lab) Organic Chemistry
Registration #0244-232, 233, 237, 238
Fundamental principles of organic reactions are examined for the various types of organic chemicals. Nomenclature, stereochemistry, physical characterization techniques, and reaction types are stressed. Laboratory; preparation of various types of organic chemicals. Emphasis is on the techniques of separation and identification.

Prerequisite: CTCC-231 or equivalent.

Credit: 5 (Lec. 3, Lab.2)

CTCC-241, 242, 243 (lec); 246, 247,248 (lab) Engineering
Registration #0244-241, 242, 243, 246, 247, 248 Chemistry
A general chemistry course for engineering science and applied science students. The fundamental concepts relating to the physical states of matter, the atomic theory, chemical reactions, thermodynamics, kinetics, electrochemistry, solutions, acid-base theory, oxidation-reduction reactions, nuclear chemistry and a brief introduction to organic chemistry, biochemistry and polymer chemistry as these topics relate to technological problems are presented. The emphasis is placed on the techniques available for the solution of real problems. The laboratory includes applications of the principles discussed in lecture to the solution of specific or project oriented laboratory problems.

Prerequisite: CTAM-202 or equivalent.

Credit: 4 (Lec 3, Lab. 1)

CTCC-311 (lec); 316 (lab) Analytical Chemistry
Registration #0244-311, 316 Instrumental Analysis
Elementary treatment of instrumental theory and techniques; properties of light; refractive index, ultraviolet, visible and infrared spectrophotometry; emission spectroscopy; flame photometry; electrochemistry; Nernst Law; pH meters and electrodes. A knowledge of organic chemistry is desirable.

Prerequisite: CTCC-213, CTCC-218 or equivalents; CTAM-210 required or to be taken concurrently.

Credit: 5 (Lec. 3, Lec./Lab. 2)

CTCC-313 (lec); 317 (lab) Analytical Chemistry-Separations
Registration #0244-312,317
Inorganic and organic separations; Raoult and Henry Laws; phase rules; distillation; extraction; absorption and surface effects; electrophoresis; chromatography including gas, liquid, column, paper, thin layer, and ion exchange.

Prerequisites: CTCC-213, CTCC-218 or equivalents; CTAM-210 or equivalent.

Credit: 5 (Lec. 3, Lec./Lab. 2)

CTCC-313 (lec.) Introduction to Physical Chemistry
Registration #0244-313
Properties of gases, kinetic-molecular theory; Boltzman Distribution functions; non-ideal behavior; first law of thermodynamics; heat capacities; Euler's theorem and homogeneous functions; thermochemistry; and introduction to the second law.

Prerequisites: CTCC-213, CTCC-218 or equivalents; CTAM-253

Credit: 3

CTCC-401, 402 (lec); 405, 406 (lab) Physical Chemistry
Registration #0244-401,402, 405, 406
Kinetic-molecular theory of gases, states of matter, atomic and molecular structure, thermodynamics, quantum theory, chemical kinetics, photochemistry, spectroscopy (x-ray, optical, magnetic), chemical kinetics, electrochemistry, absorption and heterogeneous catalysis, and macromolecular structure analysis.

Prerequisite: CTCC-233 and 238, CTCC-313; CTAM-305 or take concurrently

Credit: 5 (Lec 3, Lec./Lab 2)

CTCC-403 (lec); 407 (lab) Physical Chemistry
Registration #0244-403, 407
A lecture course presenting some of the more mathematical aspects of physical chemistry. Selected topics from the areas of chemical statistics, quantum theory, chemical bonding molecular states and spectra, and the gas, liquid and solid states are discussed.

Prerequisite: CTCC-402 and 406 or equivalent.

Credit: 5 (Lec. 3, Lec./Lab. 2)

CTCC-417 Chemical Literature and
Registration #0244-417 Technical Writing
Organization of technical libraries, classification of scientific literature into original and secondary sources and techniques for making literature searches; use of card catalog, index, abstracts, monographs, handbooks, critical tables, journals, bibliographies, technical catalogs, and patents; preparation of literature research reports.

Prerequisites: CTCC-233 and 238, CTCC-313 or equivalent.

Credit: 2

CTCC-511, 512 Instrumental Analysis
Registration #0244-511, 512
Instrumental techniques of analysis including spectrophotometry, conductance, potentiometry, and refractive index measurement, gas chromatography, mass spectroscopy, NMR, and electron spin resonance. Emphasis is placed on the uses of instrumental methods for structure determination, measurement of reaction, kinetics and mechanisms.

Prerequisites: CTCC-313, CTAM-253 or equivalents.

Credit: 4

CTCC-521 Synthetic Organic Chemistry
Registration #0244-521
An extensive discussion of the methodology and strategy of the synthesis of complex organic molecules including a discussion of the stereochemistry and mechanism of the synthetic processes.

Prerequisites: CTCC-233 and 238 or equivalent.

Credit: 3

CTCC-522 Physical Organic Chemistry
Registration #0244-522
Topics include activation parameters, kinetic treatment of mechanism elucidation, linear-free energy concepts, quantitative analysis of conformational and electronic effects, simple Huckel Molecular Orbital Theory, electrocyclic reactions, acidity functions and primary and secondary isotope effects.

Prerequisite: CTCC-233 and 238, CTAM-253 or equivalent.

Credit: 3

CTCC-523 Advanced Topics in Organic Chemistry
Registration #0244-523
Several of the following advanced topics in organic chemistry are covered: polyfunctional compounds, modern synthetic methods, stereochemistry, conformational analysis, free radical reactions, natural and synthetic polymers.

Prerequisites: CTCC-233 and 238 or equivalent.

Credit: 3

CTCC-525 (lec). 535 (lab) Qualitative Organic Analysis
Registration #0244-525, 535
A combination of chemistry and spectroscopic techniques is used to identify the structure of "unknown" organic compounds.

Prerequisites: CTCC-233 and 238

Credit: 3 (Lec. 1, Lec./Lab 2)

CTCC-528 Organic Chemistry of Polymers
Registration #0244-528
Introduction to the chemistry of synthetic, high molecular weight polymers and a survey of their diverse structures and properties. Mechanisms of condensation, free radical and ionic polymerization

Prerequisites: CTCC-233 and 238 or equivalent.

Credit: 3

CTCC-551 Inorganic Chemistry
Registration #0244-551
The properties and structures of the elements and their compounds in relation to electronic and stereochemical principles. Some emphasis on the reactions and spectroscopic identification of inorganic compounds.

Prerequisites: CTCC-233 and 238, CTCC-401 and 405 or equivalents.

Credit: 4

CTCC-555 Biochemistry
Registration #0244-555
Introduction to modern biological chemistry, physiological and physical-chemical aspects of energy metabolism, intermediary metabolism, biosynthesis of biopolymers, and metabolic regulations; structure and function of proteins and nucleic acids as an introduction to enzymology, molecular biology, and molecular genetics.

Prerequisites: CTCC-233 and 238 or equivalent.

Credit: 3

CTCC-561 Surface and Colloid Chemistry
Registration #0244-561
Surface energy of liquids and solids, adsorption, catalysis, preparation and properties of classical colloids, electrical and optical properties of colloids, formation and properties of macromolecules.

Prerequisite: CTCC-403 or equivalent.

Credit: 2 Credit: 2/Qtr.

CTCC-562 **Photochemistry**
Registration #0244-562
Properties of visible and ultraviolet radiation, adsorption of radiation, spectra, mechanisms in gases, liquids, and solids; experimental techniques.

Prerequisite: CTCC-403 or equivalent.

Credit: 3

CTCC-563 **Chemical Thermodynamics**
Registration #0244-563
A study of the basic fundamentals of thermodynamics and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases will be calculated based on spectroscopic data.

Prerequisite: CTCC-403 or equivalent.

Credit: 3

CTCC-564 **Quantum Chemistry**
Registration #0244-564
The application of quantum mechanics to the covalent bond, diatomic molecules, resonance and complex molecules; molecular spectroscopy; elements of quantum statistical mechanics.

Prerequisite: CTCC-403 or equivalent.

Credit: 3

CTCC-565 **Chemical Kinetics**
Registration #0244-565
Methods of investigating the kinetics of chemical reactions and the theories used to interpret their results. Focus on homogeneous reactions in gas and liquid phases; discussions of references from recent chemical literature.

Prerequisite: CTCC-403 or equivalent.

Credit: 3

CTCC-598 **Topics in Chemistry; Spectrometrlc Identification**
Registration #0244-598 **of Organic Compounds**
A practical approach to the elucidation of the structure of organic compounds through detailed analysis of their infrared, ultraviolet-visible, nuclear magnetic resonance and mass spectrometric properties. The emphasis is on the solution of real problems.

Prerequisite CTCC-233 or equivalent.

Credit: 3

CTCC-599 **Independent Study — Chemistry**
Registration #0244-599

Faculty-directed study of chemical topics on a tutorial basis.

Prerequisite: Consent of instructor.

Credit: 1-3

Physics

CTCP-201, 202, 203 (lec); 206, 207, 208 (lab) **College**
Registration #0245-201, 202, 203, 206, 207, 208 **Physics**
A basic course in college physics using algebra and trigonometry; statics, dynamics, harmonic motion, sound, heat, fluid-flow, wave motion and optics, electricity and magnetism. Emphasis on understanding of basic principles and applications to problem solving.

Prerequisite: CTAM-202. Students who have not taken CTAM-202 must take mathematics qualifying exam.

Credit: 4 (Lec., 3; Lab., 1)

CTCP-301, 302, 303 (lec); 306, 307, 308 (lab) **Physics**
Registration #0245-301, 302, 303, 306, 307, 308
General physics for engineering and science students; statics, dynamics, harmonic motion, wave motion, sound, heat, fluid-flow, optics, electricity and magnetism. Application of calculus to solving problems.

Prerequisite: CTAM-253 or equivalent.

Credit: 4 (Lec., 3; Lab. 1)

CTCP-457 **Modem Physics**
Registration #0245-457
An introductory course of 20th century physics. Review of classical physics, special relativity, quantum effects, duality of waves and particles, the hydrogen atom, many-electron atoms.

Prerequisite: CTCP-303, CTAM-305

Credit: 4

CTCP-458 **Modem Physics**
Registration #0245-458
A continuation of CTCP-457, Molecular physics, statistical mechanics, solid state physics and devices, lasers.

Prerequisite: CTCP-457 or equivalent.

Credit:4

CTCP-459 **Nuclear Physics**
Registration #0245-459
Elementary particles, nuclear structure, nuclear reactions-fission and fusion. Nuclear power, accelerating machines.

Prerequisite: CTCP-458 or equivalent.

Credit: 4

Contemporary Science

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

Prerequisite: CTAM-201 or CTAM-205 or CBCH-201 or equivalent.

Credit: 4

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

Prerequisite: CTAM-201 or CTAM-205 or CBCH-201 or equivalent.

Credit: 4

CTCS-223 **Contemporary Science-Physics**
Registration #0246-223
An introduction to the fundamental principles of physics for nonscience majors, and the application of these concepts to areas of interest and concern in our contemporary technological society. The conceptual basis for the phenomena of heat, light, sound, mechanics, electricity and magnetism are discussed and are related to such topics as astronomy, space exploration, lasers and environmental concerns. The course is presented in a lecture-demonstration format.

Prerequisite: CTAM-201 or CTAM-205 or CBCH-201 or equivalent.

Credit: 4

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

Credit: 4

Computer Systems

CTDP-200 Introduction to Micro-computers
Registration #0249-200
Expanding use of the computer from large data processing centers to the small business office to the home has created the need for a new level of understanding-computer knowledge. This technical course will help you become familiar with small computers, more comfortable with terminology and technology involved in computing and more aware of computers' significance and potential. You will also learn beginning BASIC. **Not for computer systems majors.**

Credit: 4

CTDP-201 Computer Techniques
Registration #0249-201
Programming in BASIC using time-sharing terminals. After an introduction to log-on and log-off procedures the course deals with the computer as a tool for solving applied problems. **Not for computer systems majors**

Prerequisite: CTAM-202

Credit: 2

CTDP-208 Introduction to Programming
Registration #0249-208
Fundamentals of programming using the structured programming language PASCAL. Topics include basic problem-solving methods, algorithm development, elementary data types, expression evaluation, use of basic control structures and sub-programs. Programming projects will be required.

Prerequisite: CTDS-202, or approval of computer systems advisor.

Credit: 4

CTDP-210 Program Design and Validation
Registration #0249-210
Program design, including specification, structured development, advanced data types, procedures and functions, program validation and verification; programming paradigms, including basic internal sorting and searching algorithms. Programming projects will be required.

Prerequisite: CTDP-208

Credit: 4

CTDP-215 FORTRAN Programming
Registration #0249-215
A study of FORTRAN programming techniques and applications. Topics include FORTRAN constants, variables, expressions, function, logical operations, storage allocations, statements, I/O manipulation, program structures, subprograms, plotting, debugging, diagnostic methods and applied problem solving methods.

Prerequisite: CTDS-202

Credit: 4

CTDP-301 COBOL Programming
Registration #0249-301
COBOL Programming techniques and applications. Topics include COBOL coding methods, data processing and sequential file manipulation, table look-up SORT and SEARCH verbs, introduction to the concept of modular and structured programming. COBOL debugging and editing facilities, establishment of documentation standards, case studies. **Not for computer systems majors.**

Prerequisite: CTDS-202 or CBCC-322

Credit: 4

CTDP-304 Advanced COBOL Programming
Registration #0249-304
Advanced COBOL programming techniques and applications with topics including magnetic tape and disc file processing techniques using COBOL, subroutines, over-lay and segmentation, report writer, core dump analysis, modular and structured programming techniques, coding optimization techniques, and case studies. **Not for computer systems majors.**

Prerequisite: CTDP-301

Credit: 2

CTDP-305 Assembly Language Programming
Registration #0249-305
A study of assembly language programming methods with topics including computer organization, assembly process, assembly coding, addressing, binary arithmetic, repeatability, storage allocation, subroutine linkage, looping and address modification, character manipulation, bit manipulation, floating-point arithmetic, decimal instruction set, some system I/O, macros and debugging techniques.

Prerequisite: A high level language.

Credit: 4

CTDP-306 Advanced Assembly Techniques
Registration #0249-306
A study of advanced techniques in assembly language programming. Topics include macro definition and invocation, conditional assembly, system macros and supervisor calls, program linkage, reentrant and recursive programs and I/O programming at the interrupt level. Programming projects will be required.

Prerequisite: CTDS-315, CTDS-325

Credit: 4

CTDP-307 Business Applications Programming
Registration #0249-307
The mastery of the techniques and concepts of programming within a business programming environment. Emphasis on algorithmic solutions to business application problems, including report generation, sorting and table processing and generation and complex I/O processing. Project management, programming teams and tooling and stubbing are used in the course. Structured COBOL is used. Students will also program against a data base in a host-embedded programming language. Laboratory emphasis.

Prerequisite: CTDS-325

Credit: 4

CTDP-318 A PL Programming Techniques
Registration #0249-318 and Applications
Topics include APL programming and style, function definition and recursive programming, APL report formatting features, file I/O subsystem, graphic I/O and scientific and business systems application. Programming projects will be required.

Prerequisite: A high level language

Credit: 4

CTDP-320 Computer Programming for Engineers
Registration #0249-320
Computer programming in FORTRAN using time-sharing terminals. Emphasis is on problem solving and using the computer as an engineering tool. **Not for computer systems majors.**

Prerequisite: CTAM-305 and CTCP-303

Credit: 4

CTDP-330 PL/I Programming
Registration #0249-330
Topics include elementary data types and control structures, data structuring capabilities (arrays and records), run-time error handling standard built-in functions, text processing and user-written functions and subroutines. Emphasis is on developing well-structured and modular programs. Programming projects will be required.

Prerequisite: A high level language.

Credit: 4

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

Prerequisite: CTDP-307, CTDS-335, CTDS-485

Credit: 2/Qtr.

CTDS-200 Introduction to Computers & Programming
Registration #0250-200
Basic concepts and overview of computer science. The topics include historical development algorithms, flowcharting, programming in a problem-oriented language like BASIC, exposure to assembly language, hardware concepts, including a functional description of CPU operations, data representations and manipulation, software concepts, including compilers, assemblers, and operating systems, and the application of the computer to various disciplines. **Not for computer systems majors.**

Prerequisite: High School Intermediate Algebra.

Credit: 4

CTDS-202 Introduction to Computer Science
Registration #0250-202
An introduction to the computer information representation, instruction execution, and the software interface to the user. Topics include integer (binary and decimal) and floating point arithmetic, logical operations; introduction to machine language and assembly language, input/output operations and operating systems and editors.

Prerequisite: Permission of advisor.

Credit: 4

CTDS-230 Discrete Structure
Registration #0250-230
A study of discrete mathematical foundations with topics that include propositional logic, set algebra, functions and relations, Boolean algebra and Boolean functions, permutations and combinations, vectors and matrices, graphs, digraphs, trees and strings. Applications of these structures are related to the various areas of computer science.

Prerequisite: CTAM-202 or equivalent.

Credit: 4

CTDS-315 Digital Computer Organization
Registration #0250-315
An introduction to the logical design of a computer. Topics include a review of arithmetic and Boolean algebra, combinational and sequential circuit design, Flip-flops and adders, storage mechanisms and their organization, instruction fetch decode and execution in a simple CPU, input/output subsystem, interrupts and variations in memory addressing.

Prerequisite: CTDP-305

Credit: 4

CTDS-320 Data Structure Analysis
Registration #0250-320
Information structures: sequential lists, stacks, queues, sequential allocation; linked lists, circular lists, doubly linked lists, linked allocation; trees, tree traversal; lists, orthogonal lists, multilinked structures; dynamic storage allocation and garbage collection. Programming projects will be required.

Prerequisite: CTDP-210 and CTDP-305

Credit: 4

CTDS-325 Data Organization and Management
Registration #0250-325
This course combines the content associated with file organization (sequential, indexed and direct access physical organization); space optimization and directory organization; an introduction to external sorting and searching, and the basics of data modeling, data base organization and management. Programming projects will be required.

Prerequisite: CTDS-320

Credit: 4

CTDS-335 Systems Specification, Design
Registration #0250-335 and implementation
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 systems (design tool). Students are also introduced to other tools (e.g. HIPO charts, N-S charts, etc.) An introduction to the structured design methods of Yourdon is included.

Prerequisite: CTDS-325

Credit: 4

CTDS-340 Finite State Machines and Automata
Registration #0250-340
Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis and synthesis, sequential iterative systems and space-time transformations.

Prerequisite: CTDS-315

Credit: 4

CTDS-400 Logical Design
Registration #0250-400
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.

Prerequisite: CTDP-315

Credit: 4

CTDS-420 Data Communication Systems
Registration #0250-420
Data communication and telecommunication systems. Including communication techniques, communication interfaces; common carrier implications and tariffs, exchanges; concentrators, multiplexors, front-end computers; buffering response time and human factors; network cost and design analysis, software considerations.

Prerequisite: CBCH-351, CTDS-315

Credit: 4

CTDS-430 Numerical Methods
Registration #0250-430
Topics include introductory error analysis, roots of an equation, solution of systems of linear and non-linear equations, interpolation, power series calculation of functions, numerical integration and first-order ordinary differential equations. The computational aspects rather than mathematical development will be emphasized. Programming projects will be required.

Prerequisite: CTEM-421 or equivalent and FORTRAN or BASIC.

Credit: 4

CTDS-440 Operating Systems
Registration #0250-440
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlocks, 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.

Prerequisite: CTDS-315 and CTDS-320

Credit: 4

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

Prerequisite: CTDS-340

Credit: 4

CTDS-485 Data Base Concepts
Registration #0250-485
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.

Prerequisite: CTDS-325

Credit: 4

CTDS-520 Computer Architecture
Registration #0250-520
A study of computer architectural analysis and design. Topics include review of basic theories, hardware technology, parallel and distributive logic, asynchronous and synchronous machines and case study.

Prerequisite: CTDS-315

Credit: 4

CTDS-525 Assemblers, Interpreters, and Compilers
Registration #0250-525
A survey of three basic programming language processors; assemblers, interpreters, and compilers. The topics include design and construction of language processors, formal syntactic definition methods, parsing techniques and code generation techniques.

Prerequisite: CTDS-320

Credit: 4

CTDS-530 Discrete Simulaton
Registration #0250-530
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.

Prerequisite: CBCH-351

Credit: 4

CTDS-545 Processor Design Concepts
Registration #0250-545
A survey of processor design and implementation techniques. Topics include microprogramming and emulation, comparisons of microcode and hardwired logic. I/O processors and subsystems, high-level language and operating system support, and processor speed-up techniques. Lectures will be supplemented with outside reading and/or programming assignments.

Prerequisite: CTDS-315

Credit: 4

CTDS-550 Review of Computer Science
Registration #0250-550
Review of significant advances in computer science which have occurred in the last few years—designed to give graduating or upperclass students an overview of recent technological and theoretical advances. (Normally taken during the last quarter of school.)

Prerequisite: Must have fifth year standing.

Credit: 4

ase study.

Prerequisite: CTDS-315

Credit 4

CTDS-565 Computer Systems Selection
Registration #0250-565
A study of computer systems design, evaluation, and selection methodology. The design aspect deals with the problem of specifying physical systems on the basis of logical design specifications and performance analysis of existing and proposed computer systems. The selection aspect covers vendor proposal requests, evaluation and validation of proposals and procurement methods.

Prerequisites: CTDS-315 and CTDS-320

Credit: 4

Lower Division Electrical Technology

CTEE-101,102,103 Basic Mathematics for Electronics
Registration #0253-101,102,103
Course will begin with a brief review of fundamental arithmetic and algebraic concepts for those whose skills have lessened due to time lapse. The slide rule, powers of ten and units and dimensions applicable to the field of electronics will be emphasized. Ratios, simultaneous equations, exponents, radicals, quadratic equations, and logarithms with specific applications; solution of Ohm's and Kirchhoff's Laws, trigonometric functions, right triangles and vector algebra.

Prerequisite: One year of high school mathematics or equivalent.

Credit 3

CTEE-105,106,107 Electrical Schematics
Registration #0253-105,106,107
Electrical symbols, schematics, color codes, specifications and ratings, logic diagrams, block diagrams, wiring and control diagrams.

Prerequisite: Concurrent enrollment in CTEE-101.

Credit: 1

CTEE-321 Digital Systems
Registration #0253-321
Introduction to binary and octal number systems, logic components and their functions; truth tables; gates, switches, counters, flipflops, integrators, differentiators and adders; application to mechanical, relay, fluidic, pneumatic and electronic digital logic systems.

Prerequisite: CTIL-203 or equivalent.

Credit: 3

CTEE-322 Analog Systems
Registration #0253-322
Introduction to all types of transducers; study of operational amplifiers and their uses with transducers in analog control of electromechanical systems; study of all types of differential transducers and their role in analog control systems.

Prerequisite: CTIL-203 or equivalent.

Credit: 3

CTEE-323 Computer Systems
Registration #0253-323
Flow diagrams of a computing system; computer input-output systems, card, tape, photoelectric, voice; computing portion of the computer, storage, memory, comparing systems, information flow; similarities and differences between analog and digital computers; advantages, disadvantages and limitations of the analog and digital computers; auxiliary computer systems, sorters, plotters, keypunch, printers, related computer systems, numerical control; interfacing systems between computer and computer controlled systems; processing typical problems on the computer including flow diagrams; discussion of types of problems which lend themselves to computer systems.

Prerequisite: CTIL-203

Credit: 3

CTEE-361, 362, 363 (Lec); 366, 367, 368 (Lab) Applied Electronics
Registration #0253-361, 362, 363, 366, 367, 368
Applications of electronic components and circuits which have become electronic building blocks; applications of oscillators, tuned circuits, amplifiers, power amplifiers, multi-vibrators, switching, waveshaping and other circuits; applications of integrated circuits including special purpose amplifier, operational amplifier, timers, regulators, zero voltage switches and other integrated circuits both linear and digital. The laboratory includes testing, troubleshooting and analysis of electronic circuits.

Prerequisite: CTIL-203.

Credit: **4** (Lec 3; Lab 1)

Lower Division Mechanical Technology

CTEM-301 Applied Mechanics and Strength
Registration #0254-301 of Materials
Basic principles of statics, systems of forces, free-body diagrams, equilibrium conditions, friction, centroids, moments of inertia

Prerequisite: CTCP-201 or equivalent.

Credit: **4**

CTEM-302 Applied Mechanics and Strength
Registration #0254-302 of Materials
Principles of dynamics; kinematics and kinetics of rectilinear, rotational and plane motion; velocity, acceleration; inertia; work, energy, power, impact.

Prerequisite: CTEM-301 or equivalent.

Credit: 4

CTEM-303 **Applied Mechanics and Strength of Materials**
Registration #0254-303
Strength of materials, principles of stress and strain, properties of materials, shear and thermal stresses, stress and deflection of beams, column analysis, connections, combined stresses.

Prerequisite: CTEM-301 or equivalent.

Credit: 4

CTEM-315 **Principles of Mechanical Design I**
Registration #0254-315
Additional material, with emphasis on applications, on area moments, centers of gravity, beam deflection, end loading, columns, stress and strain, plastic deformation, stress concentrations, torsion.

Prerequisite: CTEM-303

Credit: 2

CTEM-316 **Principles of Mechanical Design II**
Registration #0254-316
Thin-walled tubes, non-circular shafts, springs, screw threads, belts, stress in cylindrical shells.

Prerequisite: CTEM-315

Credit: 2

CTEM-317 **Principles of Mechanical Design III**
Registration #0254-317
Ball and roller bearings, gears, stresses in thick-walled cylinders, shrink and press fits, flywheel design, elastic impact, curved beams, cams, loading of flat plates.

Prerequisite: CTEM-316 and CTID-203

Credit: 2

CTEM-420 **Calculus for Technologists I**
Registration #0254-420
An elementary applied calculus course covering the differential and integral calculus of algebraic functions with emphasis on applications.

Prerequisite: CTAM-202 or equivalent.

Credit: 4

CTEM-421 **Calculus for Technologists II**
Registration #0254-421
A continuation of CTEM-420. Topics covered in this course are: application of the integral calculus; differential and integral calculus of the transcendental function; and basic techniques of integration with emphasis on applications to engineering technology problems.

Prerequisites: CTEM-420 or equivalent.

Credit: 4

CTEM-422 **Solutions of Engineering Problems**
Registration #0254-422
A continuation of CTEM-421, this course covers selected applied mathematics topics including; differential equations through 2nd order linear, LaPlace Transforms, Taylor's series, and other appropriate topics. Emphasis is on the application of these topics to engineering problems.

Prerequisites: CTEM-421 or equivalent.

Credit: 4

Lower Division
Manufacturing Technology

CTEF-201, 202, 203 **Manufacturing Analysis**
Registration #0255-201, 202, 203
Introduction to current manufacturing processes, casting, forming, stamping, welding and chipless machining, to produce parts on a production basis. Selected pieces will be analyzed with respect to production sequencing and cost, including costs of material handling, manufacture, inspection, and assembly. Projects involving solution to production problems will be assigned.

Prerequisite: CTIS-203 or equivalent

Credit: 3

CTEF-210 **Industrial Plastics**
Registration #0255-210
An introductory course in industrial plastics with emphasis on the practical aspects such as properties, identification, processing methods, design and suitability for given applications. Classwork will be supplemented with demonstrations, discussions of samples, and several field trips.

Credit: 4

CTEF-211,212 **Metallurgy**
Registration #0255-211,212
Review of chemical and metallurgical terms; manufacturing process; theory of constitutional diagrams; space-lattices, theory of hardening, heat treatment and general properties of ferrous and non-ferrous metals and alloys; effects of composition and mechanical working upon such properties as grain size, hardenability, machinability and weldability of metals. Some knowledge of chemistry and physics is desirable.

Credit: 3

CTEF-314, 315 **Materials Technology I, II**
Registration #0255-314,315
A two quarter course involving a study of materials, their structure and characteristics. Topics covered include atomic and crystal structure, phases and phase diagrams, physical properties, corrosion and oxidation, diffusion in metals, recovery, recrystallization and grain growth, age hardening and heat treatment of metals. The effect of processes such as welding on the metallurgy of the part will be examined. Organic and ceramic materials will also be studied.

Prerequisite for CTEF-315 is CTEF-314.

Credit: 3/Qtr.

CTEF-328 **Report Writing**
Registration #0255-328
Principles of organizing data and information into clear and concise engineering reports; technique of library research; oral reports; minutes of meetings; business letters; short and formal reports.

Credit: 2

CTEF-360 **Intro to Numerical Control**
Registration #0255-360
The philosophy of the use of numerical control in manufacturing. The course will review manual programming, examine different applications of numerical control, and introduce computer-assisted programming techniques. N/C machine tools will be demonstrated.

Credit: 4

CTEF-370 **Tool Design**
Registration #0255-370
The design of special tooling, jigs, and fixtures for economic production. The principles of positioning, locating and clamping are studied along with the analysis of cutting forces. Also covered are tools for inspection and gauging.

Prerequisite: CTEF-202

Credit: 4

CTEF-380 **Time Study**
Registration #0255-380
The principles and applications of the basic techniques for improvement of the man-job-time relationship, job standards and recording, and work-space design for the efficient use of manpower.

Prerequisite: CTEF-202

Credit: 3

CTEF-391 **Production Control**
Registration #0255-391
This course prepares the student to deal with production planning algorithms and inventory control models. Subjects such as forecasting, inventory control techniques, production planning and scheduling and material requirements planning will be presented.

Prerequisite: CTEF-202

Credit: 4 (Lec. 3, Lab. 2)

Building Technology (Industrial Technology)

CTIB-101,102 **Architectural & Structural Blueprint Reading**
Registration #0261-101,102 **(Residential, Commercial)**
Reading and interpretation of architectural and structural drawings; use of scales, symbols for materials, drafting conventions, schedules and specification; freehand sketching, elementary mathematics, and some quantity take-off.

Credit: 3

CTIB-201 **Architectural Drawing**
Registration #0261-201
Introduction to architecture, the role of architectural drawings in the construction process, and basic drafting techniques used in architectural drawing including pencil techniques, freehand sketching and lettering. Introduction to drawings required in the traditional construction drawing set.

Credit: 2

CTIB-202 **Architectural Drawing**
Registration #0261-202
Introduction to the techniques of the architectural design process including preliminary presentation drawings and isometrics. Preparation of drawings required in the design and construction process of different building types.

Prerequisite: CTIB-201

Credit: 2

CT1B-203 **Architectural Drawing**
Registration #0261-203
Advanced study in the complete architectural process required in developing more complex building types. Preparation of design and schematic drawings of different building types.

Prerequisite: CTIB-202

Credit: 2

CTIB-204, 205, 206 **Architectural Drawing**
Registration #0261-204, 205, 206
Design development, presentation and working drawing preparation including: plans, elevation, sections, and details of different building types. Site planning, cost analysis, perspective presentation and related design skills.

Prerequisite: CTIB-203

Credit: 2

CTIB-207, 208, 209 **Architectural Drawing**
Registration #0261-207, 208, 209
Advanced design development, presentation and working drawing preparation including; plans, elevation, sections, and details of different building types. Site planning, cost analysis, perspective presentation and related design skills.

Prerequisite: CTIB-206

Credit: 2

CTIB-231 **Surveying**
Registration #0261-231
Introduction to surveying including measurement of horizontal distances, leveling, theory of error, bearings and azimuths, measurement of angles, tachymetry, traverse surveys and computations. Several field trips provide familiarization with instrument use.

Prerequisite: High school algebra and trigonometry or equivalent.

Credit: 4

CTIB-241 **Building Construction (Materials)**
Registration #0261-241
Study of basic construction materials including concrete, masonry, metal, wood, bitumens, plastics, coatings, glass and glazing. Basic physical properties of materials are defined and emphasis is placed on practical applications. Design of concrete mixtures and basic stress-strain relationships are covered.

Credit: 3

CTIB-242, 243 **Building Construction**
Registration #0261-242, 243 **(Methods and Procedures)**
Elements and details of building construction. Study of fundamental design concepts, building codes, foundations, wood, steel and concrete construction specification and management.

Prerequisite: CTIB-241 or equivalent.

Credit: 3

CTIB-251 **Construction Contracting**
Registration #0261-251
Construction activities from the contractors' viewpoint. Bidding procedures from bid advertisement to bid opening; bonds, insurance, contracts, subcontracts and bidding documents; construction safety, project planning, scheduling and control. Governmental controls including zoning and building codes.

Credit: 3

CTIB-252, 253 **Building Estimating**
Registration #0261-252, 253 **(Residential, Commercial)**
Basic cost estimating of residential and commercial construction projects including types of estimates, quantity taken off, unit price, material and labor costs, overhead, profit and contingencies, Job cost data sources and cost indices are reviewed.

Prerequisites: CTIB-101 or CTIB-203 or equivalent

Credit: 3

CTIB-301 **Structural Theory**
Registration #0261-301
Analysis of loads, determination of reactions, horizontal and vertical shear, shear diagrams, bending moments, axial and combined stress, truss analysis, deflections and continuous frame study.

Prerequisites: CTEM-301 and CTEM-303 or equivalents

Credit: 4

CTIB-302 **Structural Design**
Registration #0261-302
Fundamentals of structural design including the basic design concepts of structural steel, reinforced concrete, and timber: design of beams, columns, and trusses including connections.

Prerequisites: CTIB-301 or equivalent.

Credit: 4

CTIB-311,312, 313 **Architectural Projects**
Registration #0261-311, 312, 313
Advanced work in architectural drafting to develop specialized skills in design development, contract documents, frame construction, shop drawings, site planning or other related areas. Program to be planned individually to match the individual requirements of each student.

Prerequisite: CTIB-206, or equivalent.

Credit: 2

Engineering Drawing

CTID-101 **Mechanical Blueprint Reading I**
Registration #0262-101
The major thrust of this course is to enable the student to visualize machine parts represented on the blueprint as actually needed in practice. This is accomplished by covering such topics as lines, freehand sketching, orthographic projection, auxiliary and sectional views as well as callouts for machine processes. A brief introduction to Geometric Dimensioning and Tolerancing is also included.

Credit: 1

CTID-102 **Mechanical Blueprint Reading II**
Registration #0262-102
This course is a continuation of CTID-101 dealing with further study of machine detail and assembly drawings, however, the major emphasis of the course will be the application of modern geometric dimensioning and tolerancing as used on all types of drawings as derived from the ANSI Y14.5 government standards.

Credit: 1

CTID-141,142,143 **Tool Design**
Registration #0262-141,142,143
Drafting and design of shop tools. Student makes design drawings under instructor's supervision. Design of various machine cutting tools, gauge design, design of drilling jigs and milling fixtures. Principles and practice of punch and die design. Fundamentals of plastic molding and extruding with emphasis on production of practical designs. Consideration given to importance of tooling costs, redesign for economical production and production processes as they affect the designer. Course designed for tool and die makers, manufacturing managers, quality control managers and engineers. Drafting board and instruments required.

Prerequisites: CTID-203 and CTIS-203, CTAM-103, or equivalents.

Credit: 2

CTID-151,152,153 **Machine Design**
Registration #0262-151,152,153
These courses cover analytically the major topics of machine design. They include properties and behavior of materials, basic principles of statics and dynamics, design of basic machine elements, spring and linkage design, methods of fastening, gear and bearing selection.

Prerequisite: CTAM-103, CTID-203, CTIS-203 or equivalent.

Credit: 3

CTID-201 **Engineering Drawing**
Registration #0262-201
This is an introductory course in mechanical drawing. Spatial objects are first drawn by free hand sketching before drawing instruments are used. Topics covered include lettering, orthographic and isometric drawings, auxiliary and section views, and principles of dimensioning and tolerances.

Credit: 2

CTID-202 **Engineering Drawing**
Registration #0262-202
This course is a continuation of CTID-201 which covers in more detail the topics included in CTID-201. In addition, drawings involving flat pattern developments and intersections, threads, fasteners and springs are also taught.

Prerequisite: CTID-201 or equivalent.

Credit: 2

CTID-203 **Engineering Drawing**
Registration #0262-203
This course continues the teaching of the fundamentals of drafting as done in CTID-201 -2 and includes topics on geometric tolerancing and dimensioning and welding, electrical, and piping drawings. The last half of the course requires the student to prepare a complete set of drawings, including detail, assembly, parts and materials list, as needed to manufacture a complete machine component.

Prerequisite: CTID-202 or equivalent.

Credit: 2

CTID-211 **Engineering Graphics**
Registration #0262-211
This is an introductory course in drafting addressed to prospective engineering students. Its content is essentially the same as CTID-201 and 202 with emphasis on graphic communication rather than skills development.

Credit: 2

CTID-212 **Engineering Graphics**
Registration #0262-212
This course covers the fundamental principles of descriptive geometry as used to find graphical solutions of spatial engineering problems. Students are taught methods of drawing an object in any view desired and also problems of ordinary point-line-plane are solvable by the same methods.

Prerequisite: CTID-211 or CTID-202 or equivalent.

Credit: 2

CTID-213 **Engineering Graphics**
Registration #0262-213
The subject of graphical kinematics is introduced by first covering the principles of basic motion; namely velocity and acceleration. These concepts are then applied to the design and analysis of mechanisms such as linkages, cams, gears, pulleys, belts, etc. The graphical approach is emphasized where applicable throughout the course.

Prerequisite: CTID-212 or equivalent.

Credit: 2

Electromechanical (Industrial Technology)

CTIL-201, 202, 203 (lec) **Elements of Electricity**
CTIL-206, 207, 208 (lab) **and Electronics**
Registration #0264-201, 202, 203, 206, 207, 208
Basic laws of electricity; introduction to electric components, resistance, inductance, capacitance and their application to D.C. and A.C. circuits; analysis of electric systems including resonant circuits, single phase, balanced polyphase circuits, operation and application of meters; semi-conductor concepts (PNP, NPN, SCR, UJT, TRAIC, DIAC, photo-sensitive) and operating characteristics and integration and application to electric and electronic devices and systems. Lab sessions introduce instrumentation, troubleshooting and problem solving.

Prerequisite: CTAM-103 or equivalent. If you're in doubt about whether you're prepared for this course, you should take the math diagnostic test.

Credit: 4 (Lec. 3; Lab.1)

CTIL-221, 222 **Mechanical Components and**
Registration #0264-221, 222 **Mechanisms**
Introduction to mechanical elements of electromechanical systems; Study of individual components and mechanisms in terms of functions and operating characteristics. Topics covered are: Torque, inertia, work, power, efficiency, gears, (spur, bevel, helical, worm), gear trains, differentials and integrators, belt drives, chain drives, pins, couplings, cams, linkages, switches. Independent approach to practical problem solving is stressed.

Prerequisites: CTCP-201,202 and CTID-201,202,203 or equivalents.

Credit: 4

CTIL-301, 302 (lec); 306, 307 (lab) **Machines and Power**
Registration #0264-301, 302, 306 307 **Systems**
Basic concepts and characteristics of D.C., synchronous and induction machines including transformer action, turns ratio, losses, power factor, waveforms and impedance matching; single phase and three phase operation; study of the machine in an electromechanical system including types of control (torque, speed, voltage, current) and associated devices (clutches, brakes, coupling, bearings, mounting); electrical and mechanical power transmission; specialized machines such as metadynes, arnplidynes, selsyns, synchro control transformers and their systems applications. Lab sessions develop a qualitative feel for characteristics and applications of power systems, machines and their control. -

Prerequisites: CTIL-201,202,203 and CTAM-201,202 or equivalents.

Credit: 4 (Lec. 3; Lab. 1)

CTIL-303 (lec), 308 (lab) **Pneumatic and**
Registration #0264-303, 308 **Hydraulic Systems**
Introduction to pneumatic and hydraulic components; pneumatic and hydraulic power systems; compressors, pumps, efficiency and applications; integrated electromechanical power systems; Lab sessions develop a qualitative feel for characteristics and applications of power systems, machines and their control.

Prerequisites: CTCP-201,202

Credit: 4 (Lec. 3; Lab. 1)

CTIL-351, 352, 353 **Electromechanical Devices**
registration #0264-351,352, 353 **and Systems**
Concepts and principles of electromechanical system components and systems; temperature, displacement, force, electropneumatic, electrohydraulic transducers, encoders, amplifiers and control elements and their applications to systems, Thermistor, thermocouple, pneumatic temperature transducers. LVDT, proximity sensors, strain gauges, pressure, flow, level transducers, control valves, motors, mechanisms and control devices; open loop, closed loop, digital analog, sequential systems. Analysis of systems representative of types found in industrial use today. The laboratory includes analysis and troubleshooting of operational electromechanical systems.

Prerequisite: Successful completion of all other technical courses in CTIL curriculum.

Credit: 4

Machine Shop

All courses must be taken in the proper sequence in each program. For additional information call department, 262-2741.

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

Credit: 1

CTIS-104 to CTIS-109 **Advanced Machine Shop I, II**
Registration #0266-104,105,106
#0266-107,108,109
Advanced work on lathes, milling machines and grinders; explanations and demonstrations on more difficult problems; assemblies and temporary tooling. Some work done entirely in metrics. Must accurately handle tool room layout, machining, and measuring equipment. Special emphasis on skill, neatness and accuracy.

Prerequisite: CTIS-203

Credit: 1

CTIS-111 to CTIS-119 **Instrument Making & Experimental**
Registration #0266-111,112,113 **Work I, II, III**
#0266-114,115,116
#0266-117,118,119
Students must operate all tool room equipment. Skillful manipulation of hand tools; make small temporary tooling required to form or bend the finished parts; blank development and precision layout; make small punches, dies, cutters and assemblies to simulate actual industrial model work.

Prerequisite: CTIS-203

Credit: 1

CTIS-121 to CTIS-129 **Tool and Die Making I, II, ill**
Registration #0266-121,122,123
#0266-124,125,126
#0266-127,128,129
Planning and making accurate, complete tool and die assemblies. Emphasis is on accuracy of the individual parts and in the fitting of the assembled tool or die. Samples from the forming and blanking dies are inspected for quality.

Prerequisite: CTIS-106

Credit: 1

CTIS-131 to CTIS-139
Registration #0266-131,132,133 **Hand Screw Machine Op**
#0266-134,135,136 **Automatic Screw Mach Op**
#0266-137,138,139 **Automatic Screw Machine Op**
Operation and set-up of both hand and automatic single and multiple spindle automatic screw machines to produce parts using standard and special tools. Constructional details and general maintenance of equipment; advanced set-up, developing ingenuity in setting up and tooling for more economical production.

Prerequisite: Mechanical Blueprint Reading CTID-101, should be taken concurrently.

Credit: 1

CTIS-141 to CTIS-146 **Turret Lathe Operation I, II**
Registration #0266-141,142,143
0266-144,145,146
Introduction to basic machine shop techniques and fundamentals of metal removal for bar and chucking machines. Explanations, demonstrations and working out practical operations and problems on various makes of turret lathes. Construction details and general maintenance of equipment; advanced turret lathe operation; work out a series of set-ups for a variety of specialized tooling applications.

Not offered 1985-86, call department, 262-2741.

Prerequisite: Mechanical Blueprint Reading CTID-101, should be taken concurrently.

Credit: 1

CTIS-151,152,153 **Shop Mathematics**
Registration #0266-151,152,153
Precision measuring instruments, calculations of feeds and speeds, tapers, screw threads and gear ratios; indexing calculations, gearing percentages, figuring stresses, graphs and elementary algebra designed to increase analytical ability to solve complicated shop problems.

Credit: 2

CTIS-154,155,156 **Shop Trigonometry**
Registration #0266-154,155,156
Elements of geometry designed to increase analytical ability in solving complicated shop problems; solving trigonometric equations and their unknown dimensions or angles from data on practical working drawings.

Prerequisite: CTIS-153 or equivalent.

, Credit: 2

CTIS-157,158 **Shop Mathematics**
Registration #0266-157,158
Identical to Shop Mathematics CTIS-151,152,153 except for differences in scheduling and credits per quarter. Offered Winter and Spring quarter days and evenings.

Credit: 3

CTIS-161,162 **Heat Treatment**
Registration #0266-161,162
Practical heat treatment of metals; Carburizing, cyaniding, nitriding, annealing, normalizing and hardening of steels. Relation of tool steels to particular applications and their resulting properties, including hardness, toughness, wear resistance, machinability and movement in hardening; treatment of nonferrous alloys including alluminum, brass, bronze, zinc beryllium, copper, silver, monel, stainless and magnetic steel. Several types of heat treating furnaces and atmospheres are available for laboratory exercises and demonstrations of these metals and alloys to prove out the theories of class lectures and discussions.

Credit 2

CTIS-201, 202, 203 (lec); 206 207, 208 (lab) **Machine Shop**
Registration #0266-201, 202, 203, 206, 207, 208
Machine shop theory and techniques involving basic machine tools, machining theories and practices. Explanations, demonstrations and working out of basic problems in measuring, layout and cutting tools, with lathe, milling, drilling and grinding work. Must register for lecture and lab.

Credit 2

CTIS-204 (lec); 209 (lab) **Machine Shop**
Registration #0266-204, 209
A combination of CTIS-201, 202, 203 and 206, 207, 208. Offered Summer and Fall quarter only.

Credit 6

CTIS-281 **Numerical Control (Mill)**
Registration #0266-281
This course is designed to offer the student the fundamentals and techniques in Numerical Control Part Programming Explanations and demonstration of EIA and ASCII Punched tape coding. Point to Point and Contour Programming, linear and circular interpolation, looping and macros. Special canned cycles are introduced and used along with the hands on experience.

Prerequisite: Phase I Machine Shop diploma or equivalent.

Credit 3

CTIS-282 **Numerical Control (Lathe)**
Registration #0266-282
Code system and format as used by industry for writing programs in contour, linear and circular interpolation along with safe and efficient tooling techniques. Canned turning, facing, drilling and threading cycles will be covered with compensation for tooling radius. Bar feed programming along with straight and taper threading. Will include hands on.

Prerequisite: Phase I Machine Shop diploma programs or approval of machine shop counselor.

Credit 3

CTIS-283 **Computer Programming for**
Registration #0266-283 **Numerical Control**
Course emphasizing programming for numerically controlled machine tools with point-to-point and straight-line milling capabilities. Pattern manipulations utilizing programs developed for a computer system will be stressed. Part programming output consisting of original input information, necessary information for post-processors for various machine tools with graphical output of optimum cutter path on a plotter interfaced to the computer; time sharing on a remote computer.

Prerequisite: CTIS-282 or program experience.

Credit 3

Machine Tool

CAIM-120 **Industrial Machine Shop I**
Registration #0270-120
A beginning industrial machine shop course introducing students to the basic machines in industry today, and the techniques used in operating them. The care and skillful use of precision measuring and gauging equipment. Introduction to metal cutting machines such as lathes, horizontal and vertical mills, bandsaws, and drill presses. Also covered are the basic skills in layout and bench work.

Lab 15, Credit 4

CAIM-121 **Basic Machine Shop I (DT)**
Registration #0270-121
This course is intended to introduce the student with hands on experience performing such tasks as: tool grinding, thread cutting, drilling layout and bench work. The techniques of precision measurement is covered to a great extent. Safety and neatness of projects is covered throughout the quarter.

Lab: 5 hours per week Credit 2

CAIM-122 **Basic Machine Shop II (DT)**
Registration #0270-122
In this course the student will be introduced to more advanced type of machining, such as, horizontal mills, precision grinding, layout, drilling and tapping, and additional bench work projects. Safety and neatness of work are stressed throughout the quarter (0270-121 or equivalent)

Lab 5 hours per week, Credit 2

CAIM-123 **Machine Shop (EMT)**
Registration #0270-123
This course is designed to introduce the student to hands on experience. Explanation and techniques are demonstrated to the student in precision measurement, tool grinding, engine lathe, drill press, layout and sawing. Safety and neatness of work is stressed throughout the quarter.

Lab 5 hours per week Credit 2

CAIM-210 **Materials and Methods**
Registration #0270-210
Machine shop theory and techniques involving the basic machine tools, the practical application of cutting material, tool geometry, measuring and inspection, turning and milling, threads and threading, drilling and grinding work. Introduction of plastic and powder metal, its properties and processing method.

Class 3, Credit 3

CAIM-212 **Production Automated Machining**
Registration #0270-212
Emphasis on production machines, such as turret lathes, screw machines, centerless grinders, multiple drills, numerical control machines and punch presses. Explanation and demonstration for the most economical method for machining, such as flow sheets, time study and tooling for production.

Class 3, Credit 3

CAIM-214 **Numerical Control Programming**
Registration #0270-214 **and Machining**
The study of basic concepts for manual programming for numerical control equipment. Techniques of point to point and continuous path programming, linear and circular interpolation, looping and macros, and special "canned Cycles" are introduced and used.

Peripheral equipment such as CRT's plotters, printers, tape punch and floppy disc are used as input/output devices, and will be demonstrated and used throughout the course. (CAIM-120 or equivalent, CAIG-107 or equivalent.)

Class 3, Credit 3

CAIM-218 **Tool and Gage Making**
Registration #0270-218
This course offers the student a basic knowledge of jigs and fixtures. Studies of the basic principles and construction of work holding devices: clamps, locators, supports and tool assemblies. Design consideration: economics, comparative cost analysis and practical application of jigs and fixtures. The actual development of a workable jig and fixture design. (0271-110, 0271-120.)

Class 3, Credit 3

CAIM-220 **Diemaking**
Registration #0270-220
Introduction to the manufacturing process of diemaking and related to the production process of stamping sheet and plate materials primarily but not necessarily metals.

Empirical (experience) and technical data is used to develop the details, techniques, and theories of cutting and forming processes of pressworking (stamping) dies.

Guidelines for the manufacture of die components, selection of proper die sets, and economical materials use is maximized. (0271-110,0270-231.)

Class 3, Credit 3

CAIM-222 **Metallurgy and Heat**
Registration #0270-222 **Treating**
An introductory course in physical and mechanical characteristics of metals and alloys, crystal structure. Heat treating of steels and the use of the iron-carbide equilibrium diagram, transpiration diagram, hardenability of tool steels and alloy steels.

Class 3, Lab 3, Credit 3

CAIM-231 **Industrial Machine Shop II**
Registration #0270-231
Extensive use and refinement of machine tools, such as engine lathes, turret lathes, vertical mills, and surface grinders. Explanation and demonstrations on more difficult problems, assemblies and temporary tooling. Emphasis on neatness, time, quality and accuracy are stressed. (0270-120, 0274-106 or equivalent.)

Lab 15, Credit 4

CAIM-232 **Intermediate Machine Tool**
Registration #0270-232 **Technology**
Advanced work on lathes, milling machines, surface and cylindrical grinders. Principles of cutting theory and basic cutter grinding are discussed and demonstrated. Introduction to theory and practices of electrical discharge machining (EDM) and numerical control (N/C) is given. EDM and N/C machines are demonstrated and used in the course. (0270-231.)

Lab 15, Credit 4

CAIM-233 **Advanced Machine Tool**
Registration #0270-233 **Technology**
Option to plan and manufacture precision assemblies of any of five (5) different dies; Compound, Progressive, Blank, Form, or Perforating.

Utilizing standard machining techniques, and/or digital readout, numerical control, or electrical discharge machining, machined components are heat treated, by students, using furnace, induction, and/or torch methods.

Surface, internal, or external grinding is then performed to achieve gage block tolerances of tenths (.0001) of a thousandth of an inch. All components are inspected for conformance by standard measuring devices, coordinate measuring machine and/or electronic or optical comparators. This data is documented on inspection format for quality. The precision die assemblies are modular, interchangeable and produced by different manufacturing processes. These produce a pressworked component to a part drawing. (0270-232 or equivalent, 0270-220 lecture to be taken at the same time.)

Lab 15, Credit 4

Drafting Technology

CAID-110 **Principles of Blueprint Reading**
Registration #0271-110
To aid the student in reading, visualizing and interpreting basic blueprints in the industrial environment.

Class 3, Credit 3

CAID-147 **Blueprint Reading (EMT/PKG)**
Registration #0271-147
An introductory course which develops the concept of how and why engineering drawings exist. Drawings are sketched and interpreted. Mechanical, electrical, and hydraulics are studied including working with tolerances and geometric tolerancing.

Class 1, Lab 2, Credit 2

CAID-208 **Introduction to Computers**
Registration #0271-208
Presents computers terminology, functions and commands. Programs will be developed.

Class/Lab 5, Credit 3

CAID-210 **Manufacturing Processes**
Registration #0271-210
Manufacturing Processes will acquaint students with methods of fabricating which are used to convert ideas into usable products and/or machines.

Class 5, Credit 5

CAID-211 **Materials Selection**
Registration #0271-211
Investigates the use and conditions of materials in a product lifecycle. The atomic, chemical and mechanical composition of materials, including the testing of materials will be studied.

Class 3, Credit 2

CAID-215 **Drafting Mechanics I**
Registration #0271-215
Presents the methods and tools to measure and qualify the physical world. Topics will include components, forces, motion and problem solving as it relates to mechanical physics. (CAID-255 is a required lab)

Class **4,** Credit **4**

CAID-238 **Technical Drawing I**
Registration #0271-238
Technical Drawing I will provide students with an understanding of the use (s) of Technical Drawings and common drafting practices. The course will include lettering, instrument use, geometric construction, definition of lines, multi-view projection theory, dimensioning practices, and related information. It will provide drafting methodologies for students, which will assist them in attaining proficiency skill levels in each area listed above.

Class 2, Lab 8, Credit 5

CAID-239 **Technical Drawing II**
Registration #0271-239
Technical Drawing II will present technical information to analyze and prepare accurate mechanical drawings from verbal instructions and engineers' sketches. Accuracy and neatness is stressed. Proficiency is developed in both coordinate and geometric dimensioning and tolerancing. Four significant drawing projects will be accomplished, as well as one or more minor projects. (CAID 238)

Class 2, Lab 8, Credit 5

CAID-245 **Introduction to Computer Aided Drafting**
Registration #0271-245
The course includes an overview of the architecture and components of various CAD systems. A CAD system will be used to gain operator skills. (CAID-239 or equivalent.)

Class 1, Lab 3, Credit 2

CAID-216 **Engineering Drawing for Machinists**
Registration #0271-216
The course is intended to aid the student in understanding machine shop drawings. After completing this course, the student will have proper knowledge of Geometric Construction, Sketching, Multiview Projection, Sectional Views, Auxiliary Views, and the use of Drafting instruments and Equipment. (CAID-110)

Class 3, Credit 3

CAID-217 **Drafting Mechanics II**
Registration #0271-217
This course will investigate the operation of different components in a mechanical system. Also the rational understanding to choose specific components for specific application.

Class 5, Credit 3

CAID-219 **Drafting Mechanics III**
Registration #0271-219
Will provide a basic working understanding of electricity, current flow and power with applications in simple circuits.

Class 3, Credit 2

CAID-225 **Drafting Mechanics Lab**
Registration #0271-225
A hands-on experience with demonstrations of the laws of physics and the collection of data as a result of these experiments.

Lab 3, Credit 1

CAID-240 **Technical Drawing III**
Registration #0271-240
Will enable the student to interpret an engineer's design layout. The student individually and in a team setting will draw a complete set of working detail drawings, including a listing of manufacturing methods, materials, specifications, heat treatment and parts listed (CAID-239.)

Class 1, Lab 6, Credit 3

CAID-241 **Technical Drawing IV**
Registration #0271-241
This course applies the study of electronic components and graphic symbology to the practice of drawing schematic, block, and logic diagrams and printed circuit board layouts. A portfolio of drawings will be developed by the completion of the course.

Class 2, Lab 3, Credit 2

CAID-247 **Computer-Aided Drafting**
Registration #0271-247
The purpose of this course is to develop a set of working drawings with advanced system commands. Flowcharting and file management techniques will be required as supporting documentation for each project. The course will also include the digitizing board as an electronic input device for existing drawings and/or sketches. (CAID-245)

Class 2, Lab 4, Credit 3

CAID-249 **Fundamentals of Designing Printed Circuits**
Registration #0271-249
This course will provide practical knowledge and skills of printed circuit board terminology layout, components, construction techniques, and design parameters. Camera ready (manually taped) board layouts will be generated by interpreting schematic diagrams, parts lists, and engineering and component specifications.

Lecture 3, Lab 3, Credit 4

CAID-251 **CAD/CAM Printed Circuit Board Layout**
Registration #0271-251
This course is designed to cover all aspects necessary to produce the libraries, artwork, and documentation requirements of a CAD generated printed circuit board layout. To maximize CAD hands-on time, class size will be limited.

Prerequisite: CAID-249 or equivalent

Class 3, Lab 3, Credit 3

Automated Equipment Technology

CAIE-101 **App. Physical Principles I**
Registration #0271-101
A course designed to give the students tools to measure and qualify the world around them in terms of physical laws. Areas of study to be linear motion, Newton's laws, friction, forces and equilibrium, and rotational motion. Both mathematical and graphical solutions to vector problems will be undertaken.

Class 3, Lab 2.5, Credit 3

CAIE-102 **App. Physical Principles II**
Registration #0271-102
An extension of CAIE-101 this course proceeds to examine the properties of solids, liquids, and gaseous states of matter; heat and temperature; and harmonic motion as it applies to sound, light, and other electromagnetic radiations. (CAIE-101)

Class 3, Lab 2.5, Credit 3

CAIE-201 **Machine Devices/Systems**
Registration #0272-201
The student will learn, through hands on experience and study, the following areas: gears, chain drives, belt drives, pulleys, linkages, universals, differentials, bearings, cams, lubrication and friction, speed changes and braking.

Class 3, Lab 3.5, Credit 3

CAIE-202 **Hydraulic/Pneumatic Systems**
Registration #0272-202
Basics of fluid mechanics are studied. Primary areas of study are pressure flow, viscosity, turbulence, work, energy and power. Hydraulic and pneumatic components such as pumps, motors, cylinders, flow and pressure control valves are studied along with fluid conditioning. Pneumatic logic and its application is studied.

Class 3.5, Lab 4, Credit 4

CAIE-203 **Electricity/Electronics I**
Registration #0272-203
To introduce the electrical circuit, basic principles of circuit action, and experience with circuit components and devices. Proper use of instruments needed to power and measure electrical circuit values will be taught. Analysis of series, parallel, and complex D.C. circuits will be conducted. Comparisons and contrast between electrical circuits and conducted. Comparisons and contrast between electrical circuits and other types of circuits encountered by the electromechanical technician, e.g., magnetic, hydraulic, mechanical will be pointed out.

Class 3, Lab 2.5, Credit 3

CAIE-205 **Electricity/Electronics II**
Registration #0272-205
Introduce the concept of alternating current. Study the generation of A.C., analyze the action of A.C. resistive and reactive circuits, use appropriate equipment and instruments to analyze and diagnose AC circuits. Values peculiar to A.C. circuits will be studied, (i.e.: reactance, impedance, phase angle, etc.) Both lab and mathematical techniques requisite to the analysis of A.C. will be taught. (CAIE-203)

Class 3, Lab 2.5 Credit 3

CAIE-211 **Rotating Electrical Machinery**
Registration #0272-211
Study will be made of A.C. and D.C. generators; of D.C. and A.C. motors, and of single and polyphase transformers. Basic generators and motors actions will be studied. Regulations, efficiency and power factor will be addressed. (CAIE-205)

Class 1.5, Lec./Dem.: 1.5, Lab 3, Credit 3

CAIE-212 **Transducers & Control Systems**
Registration #0272-212
Operation of input and output transducers (mechanical, fluid-mechanical acoustic, thermal, optical, magnetic, chemical) and the interface and feedback systems they function within. She/he will be able to identify normal and abnormal operation of open and closed loop systems utilizing these transducers. (CAIE-211)

Class/Dem.: 3, Lab 4, Credit 4

CAIE-215 **Electrical Control Systems**
Registration #0272-215
Students will examine basic methods of Electrical control circuits. Both Electro-mechanical and programmable controller devices will be examined. Safety features in controls will be stressed, forward and reverse control, jogging, plugging, sequential control will be some of the features. (CAIE-205)

Class 1.5, Lec./Dem: 1.5, Lab 3, Credit 3

CAIE-221 **Electricity/Electronics III**
Registration #0272-221
Operation of basic electronic circuits (rectifiers, amplifiers, oscillators, switching, wave shaping, timing) utilizing semi-conductors. Students will add, subtract, divide and multiply binary numbers and be able to construct logic circuits to perform and operations. (CAIE-205).

Class/Dem: 4.5, Lab 4, Credit 4

CAIE-231 **Automated Equipment**
Registration #0272-231 **Systems Troubleshooting**
Experiences in diagnosing and correcting faults introduced into electromechanical systems. Emphasis will be placed upon the development of a systematic approach to troubleshooting. Students will be exposed to such items as logs, machine history, flow charts, and other reports generated by maintenance systems. (Units I, II, III).

Class 1.5, Lab 4, Credit 3

CAIE-298 **Special Studies**
Registration #0272-298
A flexible course designed to permit the Automated Equipment Technology student to pursue, in depth, some aspect of the technical fields. To be conducted in either the class or independent study mode. The credit will be based on the nature and extent of the study undertaken.

Credit 1-4

Packaging Mechanics

CAIP-201 **Introduction to Packaging**
Registration #0273-201
Role of the packaging person conduct, responsibilities, safety, packaging materials, Blueprint Reading.

Class 4, Credit 3

CAIP-206 **Packaging Machinery Systems I**
Registration #0273-206
Product Filling: Types and methods of container filling. Bottle closing; capping, sealing, can closing; double seaming. (CAIP-201, 202)

Class 3, Lab 2, Credit 2

CAIP-207 **Packaging Machinery Systems II**
Registration #0273-207
Package labeling, coding, marking, imprinting, case packing, cartoning, wrapping, bundling, form fill sealing.

Class 5, Lab 2, Credit 4

CAIP-210 **Packaging Machines and**
Registration #0272-210 **Related Equipment**
Packaging line operations, handling of perishable products, refrigeration, pasteurization, support equipment.

Class 5, Lab 2, Credit 4

CAIP-215 **Package Machinery**
Registration #0273-215 **Troubleshooting and Repair**
Problems associated with packaging machinery, cause and correction. (CAIP-206, 207)

Class 4, Lab 2, Credit 4

CAIP—230 **Packaging Machinery Set-up**
Registration #0273-230 **and Operation**
Changeover procedures, adjustment, start-up, fine tuning

Lab 6, Credit 2

Communication

CAIG-104 **Communication Skills**
Registration #0274-104
A review of basic skills in reading, writing, listening, speaking, study skills and time management.

Class 2, Recitation I, Lab 1, Credit 2

CAIG-105 **Communicating on the Job**
Registration #0274-105
An application of communication skills to entry-level jobs. Includes writing business letters and memos, giving and following directions, filling out forms, practicing interpersonal communications in simulated job scenes. (CAIG-104).

Class 3, Recitation 1.5, Credit 3

CAIG-220 **Composition — Written and Oral**
Registration #0274-220
An emphasis on developing the college essay and on adopting the writing process to oral presentations. Topics include reasoning and persuasion, planning and organizing, using rhetorical devices, and revising. A documented, library research project is required. (CAIG-104)

Class 4.5, Credit 4

CAIG-206 **Technical Communication**
Registration #0274-206
An introduction to the principles of technical writing for the technician. Assignments typically relate to projects in the student's major field of study and include a proposal, short informal reports, instructions, and a formal technical report. An extensive Job Search Module prepares students to explore career options, then search, apply and interview for employment. (CAIG-105, 204)

Class 4.5, Credit 4

CAIA-210 **Interpersonal Communications**
Registration #0274-210
An opportunity to explore and practice the communication skills that service technicians will use on the job. Emphasis will be focused on ways to work with customers and clients as a representative of the service organization. (0274-105)

Class 2, Credit 1

Mathematics

CAIG-106 **Industrial Mathematics**
Registration #0274-106
Topics include fractions and decimals; measurement; introduction to algebra; ratio and proportion; speeds and feeds, tapers, pulleys and gears; introduction to geometry and trigonometry with applications to machine tool and drafting.
Required of all first quarter students in Machine Tool Technology and Drafting Technology programs.

Class 3, Recitation 4.5, Credit 3

CAIG-107 **Algebra and Trigonometry I**
Registration #0274-107
A concentrated review of elementary algebra and trigonometry. Topics include properties of real numbers; order of operations, operations with real numbers and polynomials; factoring and algebraic fractions; linear equations; graphing; exponents and radicals; quadratic equations; solution of right and oblique triangles with applications to numerical control and vectors.

Class 3, Recitation 4.5, Credit 3

CAIG-207, 208 **Algebra and Trigonometry II, III**
Registration #0274-207, 208
A standard pre-calculus sequence.
207: Topics include a review of the fundamentals of algebra; graphs of trigonometric functions; graphs of y = a sin (bx + c) and y = a cos (bx + c); vectors; solutions of linear, fractional, quadratic, quadratic type and radical equations; relations and functions. (CAIG-107) or equivalent).
208: Topics include quadratic functions and conic sections; logarithmic and exponential functions and equations; circular functions; trigonometric identities and equations; inverse trigonometric functions; complex numbers and DeMoivre's theorem. (CAIG-207 or equivalent).

Class 4, Recitation 2, Credit 4

Computer Service

CAIC-201 **Fundamentals of Computers**
Registration #0275-201
An introduction to electronic data processing. A study of basic computer theory, file storage media, input-output devices, binary and hexadecimal number systems and programming techniques.

Class 3, Recitation 3, Credit 4

CAIC-205 **Introductory Programming I**
Registration #0275-205
An interactive programming course utilizing the BASIC language. Emphasis is placed on development of skills necessary for the technician to communicate with a computer using the BASIC language.

Class 1, Lab 2, Credit 2

CAIC-212 **Electrical/Electronic**
Registration #0275-212 **Schematic Interpretation**
The student will learn to read and interpret various diagrams related to the servicing of computers. Drawings studied will be electrical wiring diagrams, schematics, logic and block diagrams and others found in service manuals.

Class 2, Credit 2

CAIC-202 **Computers I**
Registration #0275-202
The study of the organization and operation of microcomputers and microprocessors, with emphasis on CPU operation during machine and assembly program execution. Microprocessor instruction sets in regards to data transfer, arithmetic and logic instructions, and control over I/O devices will be studied. (CAIC-201)

Class 3, Lab 4, Credit 4

CAIC-207 **Introductory Programming II**
Registration #0275-207
An interactive programming course utilizing the PASCAL language. Emphasis is placed on the development of skills necessary for the technician to communicate with a computer using the PASCAL language.

Class 1, Lab 2, Credit 2

CAIC-215 **Special Tool/Equipment Use**
Registration #0275-215
The care and use of special tools and testing equipment used to repair computers will be studied. The student will demonstrate proficiency in a lab situation.

Lab/Demo 2, Credit 1

CAIC-216 **Digital Circuits**
Registration #0275-216
A study of the logic concepts and circuits used in digital systems including measuring instruments, communications; and computers. Integrated circuits are used to demonstrate the digital techniques of gating, counting, storing, shifting, and converting. (CAIE-205)

Class 3, Lab 4, Credit 4

CAIC-203 **Computers II**
Registration #0275-203
The analysis of microcomputers with emphasis on system logic, timing and interfacing to I/O devices. Functional and in depth operation of these components will be studied, with the use of diagnostic programs and digital test equipment. (CAIC-202)

Class 2, Lab 4, Credit 3

CAIC-209 **Introductory Programming III**
Registration #0275-209
An interactive programming course utilizing the FORTRAN language. Emphasis is placed on the development of skills necessary for the technician to communicate with a computer using the FORTRAN language.

Class 1, Lab 2, Credit 2

CAIC-218 **Linear Circuits**
Registration #0275-218
The properties of linear integrated circuits and their applications in power supplies, regulators, amplifiers, oscillators, and multivibrators will be studied. (CAIE-205)

Class 1.5, Lab 3, Credit 2

CAIC-204 **Computers III**
Registration #0275-204
The study of micro and mini-computer operating systems used in industry today. The student will learn file management, copy, backup, directory, and formating routines along with various methods of file protection. These commands will be used to communicate with the computer system during systems troubleshooting and preventative maintenance techniques. (CAIC-201)

Class 3, Lab 4, Credit 4

CAIC-211 **Introductory Programming IV**
Registration #0275-211
An interactive programming course utilizing the COBOL language. Emphasis is placed on the development of skills necessary for the technician to communicate with a computer using the COBOL language.

Class 1, Lab 2, Credit 2

CAIC-220 **Computer Systems Troubleshooting**
Registration #0275-220
Hands on experience will be given in diagnosing and repairing faults in computers using documentation and tests equipment. A specific fault analysis approach will be taught that emphasizes a systematic approach to troubleshooting. (CAIC-203)

Lab 15, Credit 5

Statistics
(Graduate Level)

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

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.

Prerequisite: CQAS-711 or equivalent

Credit: 3 or 4

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; basic concepts of total quality control, and management of the quality control function.

Prerequisite: Consent of the department

Credit: 3

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.

Prerequisite: Consent of the department.

Credit: 3

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.

Prerequisite: CQAS-712 or equivalent.

Credit: 3

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.

Prerequisite: CQAS-712

Credit: 3

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.

Prerequisite: CQAS-801

Credit: 3

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 and for the multivariate case; expected value and moment generating functions; special continuous distributions.

Prerequisite: Consent of department

Credit: 3

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.

Prerequisite: CQAS-821 or equivalent.

Credit: 3

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, and certainly one should not apply univariate analysis 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.

Prerequisite: CQAS-801,802

Credit: 3

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.

Prerequisite: CQAS-830

Credit: 3

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.

Prerequisite: CQAS-802 or equivalent.

Credit: 3

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.

Prerequisite: CQAS-841 or equivalent

Credit: 3

CQAS-851 Nonparametric Statistics
Registration #0280-851
Distribution-tree testing and estimation techniques with emphasis on applications.
Topics: sign tests; Kolmogorov-Smirnov statistics; run tests; Wilcoxon-Mann-Whitney test; chi-square tests; rank correlation; rank order tests; quick tests.

Prerequisite: CQAS-712 or equivalent.

Credit: 3

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 problems; optimal sample size; decision diagrams. Applications to marketing; oil drilling, portfolio selection; quality control; production; and research programs.

Prerequisite: CQAS-881 or equivalent

Credit: 3

CQAS-856 Interpretation of Data
Registration #0280-856
Advanced topics related to use of statistics in investigational analysis, including narrow limit gauging, practical designs of experiments, analysis of small sample data, analysis of means, identifying assignable causes and other methods for trouble shooting with statistical methods.

Prerequisite: CQAS-712 or equivalent.

Credit: 3

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.

Prerequisite: CQAS-712 or equivalent.

Credit: 3

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, moving averages, exponential smoothing, analysis of forecast errors, Box-Jenkins models, transfer function models, case studies.

Prerequisite: CQAS-841 or equivalent.

Credit: 3

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.

Prerequisite: CQAS-802, 842

Credit: 3

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 probabilities and likelihoods, hypothesis testing, and the multi-variable case.

Prerequisite: CQAS-712

Credit: 3

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.

Prerequisite: CQAS-712 or equivalent.

Credit: 3

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.

Prerequisite: Consent of the department

Credit: 3

CQAS-895 Statistics Seminar
Registration #0280-895
This course or sequence of courses, provides for one or more quarters of independent study and research activity. This course may be used by other departments or other colleges at RIT to provide special training in statistics for students who desire an independent study program in partial fulfillment of graduate degree requirements.

Prerequisite: Consent of all departments involved.

Credit: 3

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.

Prerequisite: Consent of the department.

Credit: 3

College of Engineering

Computer Engineering

Required Courses

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

Class 1, Credit 0(F)

EECC-341 **Introduction to Digital Systems**
Registration #0306-341 **for Computer Engineers**
This course will study the combinatorial 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)

Class 3, Lab 2, Credit 4 (W)

EECC-550 **Computer Architecture I for**
Registration #0306-550 **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; computer architecture—defining the hardware software interface; and from architecture to organization (one to many). (EECC-341, ICSS-440)

Class 4, Credit 4 (S/Sr)

EECC-551 **Computer Architecture 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 amplifiers, analog switching for applications in multiplexors 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 slices, 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, partioning 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 NMOS 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 (F, 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 (W)

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

Class 3, Lab 3, 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 Interlace 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 (S)

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.

EEEE-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)

EEEE-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)

EEEE-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)

EEEE-351 **Circuit Analysis I**
Registration #0301-351
Potential Difference: voltage polarity notation; current power and energy sources and sinks; linearity; resistance; source models; inductors; capacitors. Kirchhoffs 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 anal 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; impedance, reactance, resistance; admittance; susceptance, conductance; impedance to admittance conversions; impedance bridges; power.

Class 4, Recitation I, Lab 2, Credit 4 (Spring and Summer Quarters)

EEEE-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. Transfer Functions; frequency response; Bode diagrams; generalized signals and complex frequency; LaPlace transforms and the complex frequency plane; poles and zeros of transfer functions. Variable Frequency Circuit Response: parallel and series resonance; bandwidth; poles and zeros of impedance and admittance functions; resonance in nonstandard circuit. Three-phase Networks: Y and delta loads; power; measurement of power. Two-port notations and definitions; Open circuit impedance parameters; short circuit admittance parameters; hybrid parameters; transmission parameters; interconnection of two-ports. Characteristics of common magnetic materials; analysis of linear and nonlinear magnetic circuits; magnetic hysteresis; self and mutual induction; coupled coils; analysis of circuits with coupled coils; linear and ideal transformers; resonance in coupled circuits. (EEEE-351)

Class 3, Recitation 2, Lab 2, Credit 4 (Fall and Winter Quarters)

EEEE-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.

EEEE-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 their 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. (EEEE-240)

Class 4, Lab 0, Credit 4 (Fall and Winter Quarters)

EEEE-453 **Linear Systems I**
Registration #0301-453
Introduction to signal analysis and concepts of linear systems. Fourier series: evaluation of Fourier coefficients. Circuit analysis with periodic inputs.
Exponential form of Fourier series. Relationship between the exponential and trigonometric forms. Differentiation and integration of Fourier series. Fourier transforms: evaluation of Fourier transforms. Linear systems: input and output FT. Energy spectrum and energy spectral density. LaPlace transform: evaluation of LaPlace transform. Inverse LT through partial fraction expansion; application of LT to circuits and systems. Transfer functions (Bode diagrams). Double sided LaPlace transform. (EEEE-352)

Class 4, Credit 4 (Spring and Summer Quarters)

EEEE-554 **Linear Systems II**
Registration #0301-554
Review of (continuous) linear systems concepts and techniques. Time-frequency signal and system relationships: time-bandwidth products; convolution in time and frequency. Discrete representation of continuous signals: sampling theorem, sample and hold action, A/D and D/A conversion. Elements of discrete signal processing: conceptual view, special sequences, linearity and shift invariance, difference equations, impulse response sequence and the convolution sum. Linear discrete shift invariant discrete system analysis: general input-output difference equation, response to exponential sequences, the Z transform, the inversion integral, the transfer function, transforms of common sequences, basic theorems, partial fraction expansions. "Frequency Response" of Discrete Systems: sinusoidal input/output, frequency response H (ejw), relations between Z plane and s plane, j axis and Z plane unit circle, frequency response in Z plane, aliasing effects. Introduction to Digital Filters: difference equations and transfer functions, block diagram realizations, FIR and IIR systems, Central sum, central shift, partial fraction, cascade effects on algorithms, aliasing effects and the bilinear transform, impulse invariant design vs. bilinear transform, FIR filters and windows. Frequency Domain in Methods: continuous system analogy, the discrete Fourier transform, processing in the frequency domain, intra, to FFT. Quantization Effects: single quantization coefficient quantization, arithmetic quantization, signal scaling and overflow. (EEEE-453)

Class 3, Credit 4 (offered annually) Class 3, Credit 4 (offered annually)

EEEE-441, 442 Electronics I, II
Registration #0301-441, -442
Solid-state electronic devices, their external characteristics and models. Analysis of electronic circuits for rectification, amlification, instrumentation and control. Introduction to electronic circuit design. (EEEE-352 concurrently)

Class 3, Lab. 3, Credit 4
EEEE-441 (Fall and Winter Quarter)
EEEE-442 (Spring and Summer Quarter)

EEEE-461, 462 Electrical Engineering I, II
Registration #0301-461, -462
A course for non-electrical engineering majors. Circuit analysis, electronics, switching circuits, logic and the elements of communication. (SPSP-207, SMAM-306)

EEEE-461 Class 3, Lab. 3, Credit 4 (Winter and Spring Quarter)
EEEE-462 Class 3, Lab. 3, Credit 4 (Fall and Winter Quarter)

EEEE-471,472 Electromagnetic Fields I, II
Registration #0301-471, -472
Vector analysis, electrostatics and dielectrics, conduction current fields, magnetics, time varying fields, Maxwell's equations and wave equations. Concepts of retarded potentials. Electromagnetic propagation in waveguides, free space and transmission lines. Concepts of reflection, transmission and impedance matching. (SMAM-328)

EEEE-471 Class 4, Credit 4 (Spring and Summer Quarter)
EEEE-472 Class 3, Lab. 3, Credit 4 (Fall and Winter Quarter)

EEEE-531 Electromechanical Energy Conversion
Registration #0301-531
A development of the basic relationships of field energy, magnetic force, torque and generated voltage in an electromechanical device and expansion of these fundamentals into an understanding of the operational characteristics of the electrical machine. (EEEE-352)

Class 3, Lab. 3, Credit 4 (Fall and Winter Quarter)

EEEE-590 Thesis
Registration #0301-590
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.

Credit 4

EEEE-513 Introduction to Classical Controls
Registration #0301-513
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. (EEEE-453, SMAM-420 desirable)

Class 3, Lab. 3, Credit 4 (Spring and Summer Quarter)

EEEE-534 Introduction to Communication Systems
Registration #0301-534
Review of linear systems as applied to communication signal processing. Non-linear devices in communication systems. Introduction to the Fourier transform and its role in spectral analysis of signals and systems. Introduction to amplitude modulation—DSB-SC, AM, SSB, NSB and their applications. Introduction to frequency and phase modulation techniques. Noise theory and the role of noise in communications systems. (SMAM-351, EEEE-453)

Class 4, Credit 4 (Spring and Summer Quarter)

EEEE-544 Physics of Electronic Devices
Registration #0301-544
This course will provide an understanding of the physical mechanisms which govern the operation of semiconductor devices. The relationships between the physical, structural parameters of the device and its electrical performance will be studied. Topics include semiconductor fundamentals, pn junction diodes, bipolar transistors, field and MOS field effect transistors. (EEEE-442)

Class 4, Lab. 0, Credit 4

EEEE-545 Digital Electronics
Registration #0301-545
The objective of this course is to teach students how to analyze digital electronic circuits. Topics include: transistors in the saturation, active, and cutoff regions; normal and inverse models; and JFETs and MOSFETs in the saturation and triode regions. The following logic families are covered in considerable detail: RTL, 1^2 L, DTL, T^2L, ECL, CMOS, NMOS, and PMOS. A discussion of the applications and characteristics of analog switches concludes the course. (EEEE-240, 352, 544, SMAM-306)

Class 3, Lab. 3, Credit 4 (Spring and Summer Quarter)

EEEE-645 Special Semiconductors
Registration #0301-645
The study of a variety of semiconductor devices generally used for purposes other than signal processing, including thyristers, unijunction transitors, opto-couplers, and power MOS. The applications stressed are concerned with the user of electrical power for control of lighting, motion, and hear. Particular attention is given to switching mode power supplies and regulators and to class D switching amlifiers. (EEEE-545)

Class 3, Lab. 3, Credit 4

EEEE-650 Design of Digital Systems
Registration #0301-650
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. (EEEE-240)

Class 4, Credit 4 (Spring Quarter)

EEEE-665 Microcomputer Systems I
Registration #0301-665
This is the introductory course dealing with the structure and operation of microcomputers. 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. (EEEE-240, or consent of instructor and ICSP-220)

Class 3, Lab. 3, Credit 4 (Summer and Fall Quarter)

EEEE-666 Microcomputer Systems II
Registration #0301-666
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 DIA 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. (EEEE-665)

Class 3, Lab. 3, Credit 4 (Winter and Spring Quarter)

EEEE-670 Introduction to Microelectronics
Registration #0301-670
Introduction to the physics and chemistry of fabricating integrated circuits. Topics include maskmaking, epitaxial layer growth, diffusion, oxidation, ion implantation, and metallization. The course includes a design project where the student designs an analog integrated circuit including the circuit layout and process specification. Students will also use computer modeling and simulation programs such as SPICE, BISIM, and SUPREME. This course is a prerequisite for EEEE-676, I.C. Processing Laboratory, in which integrated circuits are actually made.

Class 4, Credit 4 (Summer and Fall Quarter)

EEEE-671 **Hybrid Microelectronic Design**
Registration #0301-671
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.

Class 3. Lab. 3, Credit 4 (Spring Quarter)

EEEE-679 **Active and Passive Filters**
Registration #0301-679
The first half of this course deals with the filter transfer functions, poles and zeros and the concepts of filter amplitude and phase response. Butterworth, Chebyshev and elliptic filters are considered as well as low-pass/high-pass and low-pass/band-pass transformations. The second half of the course deals with methods of practical filter design with emphasis placed on active, operational filters. (EEEE-453)

Class 4, Credit 4

EEEE-693 **Digital Data Communications**
Registration #0301-693
A course on the principles and practice of modern data communications systems. Topics covered include pulse amplitude modulation, frequency shift keying, phase-shift keying, pulse code modulation, digital error control, and fundamentals of system design. (SMAM-351)

Class 4, Credit 4 (Spring Quarter)

Technical Elective Courses Offered Upon Sufficient Demand

EEEE-532 **Electrical Machines I**
Registration #0301-532
The design and operating characteristics, both static and dynamic, of transformers and synchronous and induction machines. (EEEE-531)

Class 3, Lab. 3, Credit 4

EEEE-535 **Introduction to Power Electronics**
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. (EEEE-441, EEEE-531 or concurrent registration for EEEE-531)

Class 3, Lab. 3, Credit 4

EEEE-536 **Motor Application and Control**
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. (EEEE-453, 531)

Class 3, Lab. 3, Credit 4

EEEE-614 **Design of Control Systems**
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. (EEEE-513)

Class 3, Lab. 3, Credit 4

EEEE-621 **Transmission Propagation and Waves**
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 beamforming. (EEEE-471, 472)

Class 3, Lab. 3, Credit 4

EEEE-672 **Optical Devices and Systems**
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

EEEE-674 **Fiber Optics: Theory and Application**
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.

Class 3, Lab. 3, Credit 4

EEEE-675 **Analog/Hybrid Computation**
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. (EEEE-513)

Class 4, Credit 4

EEEE-676 **I.C. Processing Laboratory**
Registration #0301-676
This is a laboratory course designed to introduce the student to integrated circuit processing. The following topics will be investigated; safety, vacuum technology and evaporation of metals, artwork generation, photoreduction, photoresist technology, wafer characterization, wafer cleaning, metal semi-conductor fabrication, diffusion, solar cell fabrication, MOS transistor fabrication, wire bonding and packaging. Each laboratory exercise requires extensive preparation on the part of the student, in the form of research, reading, computations and device design. (EEEE-670)

Class 2, Lab. 6, Credit 4

EEEE-677 **Digital Filters and Signal Processing**
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 7-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. (EEEE-453 and consent of instructor)

Class 4, Credit 4

EEEE-687 **Power System Analysis**
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. (EEEE-531)

Class 4, Credit 4

EEEE-695 **Introduction to Audio Engineering**
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. (EEEE-453, EEEE-442, EEEE-472 or suitable equivalents)

Class 4, Credit 4

EEEE-696 Communication **Circuit Design**
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. (EEEE-442, EEEE-534, EEEE-472)

Class 3, Lab. 3, Credit 4

Graduate Courses

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.

EEEE-723 Semiconductor Physics
Registration #0301-723
An introductory course in semiconductor physics for engineering students. The emphasis in this course is 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

EEEE-724 Physics of Semiconductor Devices I
Registration #0301-724
A basic course dealing with the physics of semiconductor devices. Topics include evaporation, sputtering, epitaxial growth, diffusion, ion implantation, oxidation of silicon, photolithography, pattern generation, layout of silicon integrated circuits, resistors, MOS capacitors, isolation techniques, and inprocess measurement and testing. (EEEE-723)

Credit 4

EEEE-725 Physics of Semiconductor Devices II
Registration #0301-725
An intermediate level course in semiconductor device physics for engineering students. Limitations of bipolar and field effect transistors are studied. The physics of pnpn devices, solid state optical devices, interface devices, and others are also discussed. (EEEE-724)

Credit 4

EEEE-726 Analog IC Circuits
Registration #0301-726
A course in the analysis and design of bipolar and MOS analog integrated circuits. Topics include device models, amplifiers, current sources and active loads, output stages, operational amplifiers, and analog circuit design in MOS-LSI. Course will involve circuit design and computer simulation projects.

Credit 4

EEEE-727 VLSI Design
Registration #0301-727
Design of very large scale integrated circuits at the level of Mead and Conway's VLSI Design. Topics include MOS devices and circuits, n-channel MOS process, data and control flow in systematic structures, implementing integrated system design, system timing, and examples of LSI computer systems. (EEEE-724, -670, and a course in computer architecture)

Credit 4

EEEE-728 IC Operational Amplifiers
Registration #0301-728
Analysis of operational amplifier circuits using the ideal op amp; development of circuit models to predict non-ideal op amp characteristics; study of feedback systems, stability (using Bode plots), and compensation; direct coupled amplifiers and operational amplifier design; interpretation of manufacturers' specifications and basic applications with emphasis on practical aspects. (EEEE-442, -754, -755)

Credit 4

EEEE-730 Advanced Analog I.C. Design
Registration #0301-730
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 (EEEE-726)

Class 4, Lab. 0, Credit 4

EEEE-742 Advanced Microprocessor Software Design
Registration #0301-742
An introduction to the theory and application of top down design, structure, abstraction, segmentation, high level languages, and operating systems to real time programs for microprocessors. The student will become proficient in a structured high level language. Topics include: Structure diagrams, separate module compilation, data types, data structures, self documenting code! procedures, meaningful variable names, linkage with other languages, object code libraries, operating system calls, multitasking, concurrent and re-entrant programs, and symbolic debugging. (EEEE-665 or a high level programming language)

Credit 4

EEEE-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 macro-assemblers, 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. (EEEE-665)

Credit 4

EEEE-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. (EEEE-650)

Credit 4

EEEE-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. (EEEE-650)

Credit 4

EEEE-748 Microcomputers in Control and
Registration #0301-748 Instrumentation
The use of microcomputers in 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 networks. Lab work may include temperature, pressure, and optical controllers, stepper motor controllers, and robotics control Intel 8086 microcomputer is used. (EEEE-744)

Credit 4

EEEE-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.

The Z transform and the solution of difference equations. Relationship between the LaPlace and the Z transforms.

Credit 4 (Offered every fall)

EEEE-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 winter)

EEEE-756 Analytical Techniques III
Registration #0301-756
Vector Analysis; Gauss's law and Stake's theorem; curvilinear coordinates.

Random variables. Probability densities and distributions; functions of random variables; moments; parameter estimation; statistical decision theory.

Credit 4 (Offered every spring)

EEEE-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 RD&E 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)

EEEE-761 Modern 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. (EEEE-754, -755, -613)

Credit 4

EEEE-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. (EEEE-761)

Credit 4

EEEE-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. (EEEE-756, -761)

Credit 4

EEEE-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. (EEEE-754, -755)

Credit 4

EEEE-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. (EEEE-761)

Credit 4

EEEE-767 Power Semiconductor Circuits
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

EEEE-772, -773, -774 < Special Topics in
Registration #0301-772, -773, -774 Electrical Engineering
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)

EEEE-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, 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

EEEE-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. (EEEE-775, -471)

Credit 4

EEEE-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. (EEEE-775, -776, -777)

Credit 4

EEEE-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. (EEEE-754, -755, 677)

Credit 4

EEEE-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

EEEE-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

EEEE-782 Boundary Value Problems
Registration #0301-782
Techniques for solving boundary value problems. Numerical methods, analog and relaxation methods. Green's function, special methods making use of symmetries, images, inversion, and conformal mapping; introduction to integral equations. Wiener-Hopf and Watson transformations. Saddlepoint integration. Variational techniques. (EEEE-754, -755, -756)

Credit 4

EEEE-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. (EEEE-781)

Credit 4

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

Credit 4

EEEE-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

EEEE-786 Microwave Devices
Registration #0301-786
Theory of interaction between electron beams and electromagnetic waves. Microwave tubes: klystron, magnetron, traveling-wave tubes. Solid state devices: microwave transistors, tunnel diodes, Gunn diodes. IMPATT diodes LSA diodes.

Credit 4

EEEE-787 Radar Engineering
Registration #0301-787
Radar system and radar equations; electronic scanning radar systems, microwave radar antennas. Atmospheric effects in radio wave propagation, synthetic aperture radar. Signal detection and parameter estimation for radar applications. (EEEE-754, -755, -756)

Credit 4

EEEE-790 Random Signals and Noise
Registration #0301-790
Functions of two random variables. Mean square estimation. Orthogonality principle. Sequences of random variables. Central limit theorem. Random processes; correlation functions; spectrum of periodic functions and periodic random processes; spectral densities; the Gaussian random process; noise through linear systems. (EEEE-755, -756)

Credit 4 (F) Credit 1 (S)

EEEE-791 Topics in Signal Analysis and Processing
Registration #0301-791
Signal representation of orthogonal functions; analytic signals and Hilbert transforms; optimum filters (matched, maxium fidelity, Wiener); discrete representation of continuous signals (sampling theorems); the discrete Fourier transform; linear discrete filters; introduction to homomorphic signal processing. (EEEE-790)

Credit 4

EEEE-792 Advanced Topics in Signal Analysis
Registration #0301-792
A continuation of EEEE-791. Topics chosen from: signal and system parameter estimation pole-zero modeling; maximum likelihood methods, maximum entropy methods; Prony"s method; pencil of functions method; quantization effect in discrete processing techniques; spectral estimation; windowing; generalized transforms including Walsh-Hadamard. (EEEE-791)

Credit 4

EEEE-793 Error Detecting and Error Correction
Registration #0301-793
This course covers linear block codes and convolutional codes. The major linear block codes to be covered are Hamming, BCH, Golay, and Reed-Solomon codes. The fundamental structure of linear block codes will be developed and applied to performance calculations. The structure of cyclic codes will be developed and applied to encoders and decoders. The major error correction methods, including error trapping, majority logic decoding and the BCH algorithm will be developed and the Viterbi and sequential decoding algorithms will be studied. Questions of system performance, speed, and complexity will be examined. (EEEE-756)

Credit 4

EEEE-794 Information Theory
Registration #0301-794
An introduction to the fundamental concepts of information theory; entropy, equivocation, transinformation, and redundancy; coding for binary channels; measurement of signal parameters in the presence of noise; bandwidth vs. accuracy. (EEEE-756)

Credit 4

EEEE-795 Optical Engineering II
Registration #0301-795
A continuation of EEEE-776, Electro-optics, that emphasizes the application of wave optics to optical systems. Interference and interferometers. Thin films. Diffraction. Partial coherence. Fourier optics. Discussion of holophy, optical data processing, imaging and other topics of current interest. (EEEE-776)

Credit 4

EEEE-800 Graduate Paper
Registration #0301-800
This course number is used to fulfill the graduate paper requirement under the non-thesis option for the MS degree in electrical engineering. The student must obtain the approval of an appropriate faculty member to supervise the paper before registering for this course.

Credit 5

EEEE-890 Master's Thesis
Registration #0301-890
An independent engineering project or research problem to demonstrate professional maturity, preferably involving the reduction of theoiy to practice. A formal written thesis and an oral defense are required. The student must obtain the approval of an appropriate faculty member to guide the thesis before registering for the thesis. A thesis may be used to earn a minimum of 6 credits and a maximum of 12 credits. The usual number is 9 credits.

Credit variable

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 principles 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, SM AM-306) (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-516, Sp-415)

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. (F) (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 behavior science. (Sp) (Consent of instructor)

Class 4, Credit 4

EIEI-503 Simulation
Registration #0303-503
A first course in simulation emphasizing the role of the computer in developing simulation models. The SLAM simulation language is emphasized. (EIEI-202, SMAM-351 or equivalent) (Sp)

Class 4, Credit 4

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

Class 4, Credit 4

EIEI-520 Engineering Economics
Registration #0303-520
Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting. (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, QGERT, etc. (EIEI-401, 402 or consent of instructor)

Class 4, Credit 4

EIEI-512 **Reliability**
Registration #0303-512
Concepts or reliability, basic failure laws, reliability measurement, structural analysis reliability; repair problems, surveillance problems, maintenance problems. (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**
Registration #0303-715, -716 **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
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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 quantitative 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
Basic functional anatomy and physiology. Human body systems. Anthropometry. Applications on the design for man and man-machine systems. Work physiology. Industrial biomechanics.

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 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
Accident study of the human component in occupational systems. Product systems safety analysis. Approaches in accident prevention.

Credit 4

EIEI-740 Numerical Control and Manufacturing
Registration #0303-740
Numerical control is the technique of programming a machine (such as a mill) to manufacture a part with minimum operator interaction. Several levels of NC programming will be studied: manual programming, computer assisted programming and interactive graphics. Students will participate in extensive hands-on work using a mill and a lathe. In addition, the role that NC machines play in the Factory of the Past, Present, and Future will be discussed and analyzed.

Credit 4

EIEI-747 Microprocessor Applications
Registration #0303-747
Automated manufacturing processes demand effective computer-microprocessor interfacing. This course will provide the necessary knowledge of assembly language programming and digital hardware interfacing techniques. The role of macro-assemblers, high level languages and system software aids to develop efficient modular programs will be discussed. One or more specific manufacturing related applications will be implemented. Microprocessor architectures and interfacing to several hardware elements such as VART, PI A A/D, D/A and other LSI chips will be covered. A greater emphasis will be placed on software aspects such as modularity, data structures, interrupt handling, communication protocols to design efficient hierarchical control systems for Computer Integrated Manufacturing.

Credit 4

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

EIEI-771, 772, 773, 774, 775 Special Topics in Industrial
Registration #0303-771, -772, -773, -774, -775 Engineering
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 is to be determined by the student's faculty advisor and subject to of the Graduate Committee of the College of Engineering.

Credit variable

EENG-801 Design *for* Manufacture
Registration #0302-801
This is a required course in the manufacturing option of the master of degree program. The course is offered jointly by the Departments of Industrial and Mechanical Engineering and presents an overview of the factors influencing product design and the manufacturing cycle. Topics include component design and analysis, design for function and manufacturability, design for manual and automated assembly, methods and systems for computer-aided design and manufacturing, simulation of manufacturing systems, and the role of robotics in manufacturing. Students will gain hands-on experience with the RIT computer facilities, robots, and CAD/CAM laboratories as these relate to modern trends in the design for manufacture.

Credit **4** (TBA)

Mechanical Engineering

Required Courses

EMEM-201 Mechanical Engineering Graphics I
Registration #0304-201
This course is designed to introduce the student to the engineering 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 in engineering drawing. Students having two years of engineering or drawing in school or equivalent may take a qualifying examination to exempt this course.

Class 2, Lab. 4, Credit 4 (F,W)

EMEM-210 Engineering Design Graphics
Registration #0304-210
This course is designed to introduce the student to the engineering profession in general and also to develop skills in engineering graphical communication to meet industrial standards. Modern computer supported workstations are used by the students to learn this course work. The course is intended for students with little or no background in computer aided drawing and graphics.
Class 2, Lab 4, Credit 4 (T.B.A,)

EMEM-331 **Mechanics I**
Registration #0304-331
This course is intended for students majoring in electrical, and industrial engineering. Statics: Newton's laws, the principle of transmissibility of forces, couples, centroids, trusses, frames, machines, and friction. Introduction to strength of materials: axial stresses and strains, statically indeterminate problems, thin-walled pressure vessels, direct shear, torsion, and bending. (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 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 two credit-hour course is intended as an introduction to the principles of statics for non-mechanical engineering students with a view to providing adequate background for a subsequent course in dynamics. This basic course treats the equilibrium of particles and rigid bodies under the action of forces. Topics include forces, couples, equilibrium, centroids, 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 particles and rigid bodies under the action of forces. It integrates the mathematical subjects of calculus, vector algebra, and simultaneous algebraic equations with the physical concepts of Newton's laws. Topics covered include concepts of force and moment, trusses, frames, machines, shear force and bending moment diagrams and equations, friction, fluid statics, centroids and moments of inertia. (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. Hooke'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
This course introduces the students to the basic fundamentals of programming through the learning of the Fortran language. Topics covered include structured programming techniques using sequential IF-THEN-ELSE and DO WHILE structures. Various forms of the input/output are learned including formatted I/O and END-OF-FILE detection. Writing programs using Function and Subroutine subprograms is stressed. Proper documentation techniques along with efficient usage of the computer systems is also covered.

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 cutting processes, casting, forming, powder metallurgy, welding, and processing of plastics.

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
This is a basic course that introduces the classical theory of thermodynamics. After the complete first law analysis of air standard cycles (Carnot, Otto, Diesel, etc.), the Clausius and Kelvin-Planck 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. Also, the students are introduced to the properties of pure substances, and open 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 equations for stationary and moving control volumes. Inviscid Bernoulli and the Engineering Bernoulli equations, some applications. Incompressibleflow in pipes; Laminar and turbulent flows, separation phenomenon. Dimensional analysis: Buckingham's Pi-theorem, similitude, model studies. (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 3, Credit 4 (offered annually) Class 3, Credit 4 (offered annually)

EMEM-439 **Dynamics t**
Registration #0304-439
A basic course in the two-dimensional kinematics and kinetics of particles using a vector approach, with an introduction to three-dimensional particle motion. Newton's Laws, the Energy Method, and the Method of Impulse-Momentum are applied to various problems. (EMEM-336, SMAM-308)

Class 4, Credit 4 (W*, Sp. Su)

EMEM-440 **Numerical Methods**
Registration #0304-440
This course involves a study of the numerical methods for solving engineering problems using computers, and to interpret and analyze the numerical results obtained. Problems from student's background in statics, strength of materials, dynamics, mathematics and thermodynamics, for which analytical solutions are impractical, are formulated, equations are developed from first principles, and methods of numerical solutions are discussed. Topics include roots of algebraic and transcendental equations, solution of homogeneous and non-homogeneous systems of linear algebraic equations, numerical integration and differentiation, curve fitting, and ordinary differential equations. 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 **Mechanical Engineering Laboratory**
Registration #0304-501
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. (Fifth year standing)

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

EMEM-514 **Heat Transfer I**
Registration #0304-514
This is a basic course in the fundamentals of heat transfer by conduction, convection, and radiation together with application to typical engineering systems. Topics covered include one-dimensional steady state and transient heat conduction, radiation between black bodies and gray bodies, correlations for the Nusselt number in forced and natural convection, and an introduction to heat exchanger design by LMTD and NTU methods. (EMEM-413)

Class 4, Credit 4 (F, W)

EMEM-516 **Fluid Mechanics II**
Registration #0304-516
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, single and multipath pipe-line problems. Boundary layer concepts 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, streamlining. 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 shock waves. (EMEM-415, SMAM-306)

Class 3, Lab/Rec 2, Credit 4 (F, W)

'Extended Day Schedule

EMEM-543 **Dynamics II**
Registration #0304-543
This basic course in the two-dimensional kinematics and kinetics of rigid bodies uses a vector approach. Systems of particles are used to introduce the student to the concept of a rigid body. The mass moment of inertia is defined. Newton's Laws, the Energy Method, and the Method of Impulse-Momentum are applied to various problems. Euler's Equations are introduced and applied to three dimensional problems.

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 **Dynamics of Physical Systems**
Registration #0304-544
This basic course deals with the dynamics of mechanical, electrical, thermal, and fluid lumped parameter systems. Classical and mobility analogs that relate these systems are defined and used. Singularity functions, are introduced and used to force first and second order lumped parameter systems. The 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. LaPlace transforms are defined and used. 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 **Independent Study**
Registration #0304-599
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)

Class 4, Credit 4 (F, W)

EMEM-605 **Applications in Fluid Mechanics**
Registration #0304-605
This Group I course deals with specific design-oriented applications of fluid mechanics. The course will cover one of the following topics: (a) hydrodynamics, (b) dispersion and diffusion in the environment, (c) aerodynamics, and (d) two-phase flows. Students are required to design, and sometimes to build a prototype. Use of digital computer is encouraged in the design process. (EMEM-516, EMEM-514)

Class 4, Credit 4 (F, W)

EMEM-615 **Robotics**
Registration #0304-615
This is a Group I course in the fundamentals and applications of industrial robots. Topics include microprocessors, computer vision, sensors, gripper design, safety, economics, design for assembly, flexible manufacturing systems, and case studies. A major emphasis is placed on a term project involving an actual industrial problem. The project involves development and design. (Fifth-year standing)

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 modeling, 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-635 Heat Transfer II
Registration #0304-635
This Group I course deals with numerical methods in heat conduction, natural and forced convection, and boiling and condensation. The knowledge gained in these areas forms the basis for design projects which account for a significant part of the grade. The projects relate to design of heat transfer equipments such as shell and tube heat exchangers, compact heat exchangers, regenerators, boilers, evaporators, condensors etc., and/or design of experiments in heat transfer. The course is further supplemented by laboratory experiments. (EMEM-514)

Class 4, Credit 4 (Sp, Su)

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
This is a Group I design-oriented course in mechanical vibrations and noise control with emphasis on design applications and instrumentation. Free and forced vibrations of one-degree of freedom systems are covered including machinery unbalance, and isolation, Fourier Analysis, numerical and experimental 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
This Group I 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 machine plotting 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 deformations; 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-652)

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-635)

Class 4, Credit 4 (Sp)

EMEM-620 Introduction to Optimal Design
Registration #0304-620
The student is introduced to some basic optimizational 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-437)

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

EMEM-625 Creative Design of Mechanical Devices
Registration #0304-625 and Assemblies
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 effects in solving systems related design problems. The professionalism and ethics of engineering are discussed. The student is encouraged to work on an approved systems 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)

Elective Courses

EMEM-612 Gas Kinetics and Vacuum Engineering
Registration #0304-612
A basic course in the principles of statistical thermodynamics and the kinetic theory of gases with applications to the science and design of vacuum systems. Topics to be covered include the kinetic theory of gases, transport phenomena, molecular flow, and sorption of gases and vapors by solids. Following this introduction to the nature of gases, the course will focus on high-vacuum engineering. Topics will include 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-637 Laser Engineering
Registration #0304-637
Laser Engineering studies the applications of lasers as engineering tools. Background physics relevant to the operation of a laser and the interaction of light with matter is given. Safety regulations are discussed and specific applications in industry are covered.

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

EMEM-650 Gas Dynamics
Registration #0304-650
An advanced course in compressible fluid flows. One-dimensional isentropic flows through a nozzle, normal shocks, moving shocks, shock tubes, supersonic inlets, diffusers, wind tunnels. Oblique shocks and applications. Prandtl Meyer expansion fan and reflections of shocks. Two and three-dimensional compressible flows. Theory of characteristics. Linearized flows. Thin airfoil theory, supersonic nozzle design. (EMEM-516)

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
Hydrolic 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 thermodynamics 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-338)

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

EMEM-687 Engineering Economy
Registration #0304-687
This elective course deals with a study of cost concepts, nominal and effective interest rates, and selection among alternatives using present, annual, and future worth methods as well as rate of return methods. Depreciation and income taxes are also considered. (Fifth year standing)

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)

Graduate Courses

EENG-801 Design for Manufacture
Registration #0302-801
This is a required course in the manufacturing option of the master of engineering degree program. The course is offered jointly by the Departments of Industrial and Mechanical Engineering and presents an overview of the factors influencing product design and the manufacturing cycle. Topics include component design and analysis, design for function and manufacturability, design for manual and automated assembly, methods and systems for computer-aided design and manufacturing, simulation of manufacturing systems, and the role of robotics in manufacturing. Students will gain hands-on experience with the RIT computer facilities, robots, and CAD/-CAM laboratories as these relate to modern trends in the design for manufacture.

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
Stress-strain relations and formulation of boundary value problems. State of plane strain, state of plane stress. Solutions by potentials, Airy stress function. Torsion of bars with circular, elliptic, rectangular cross-sections. Stresses and displacements in thick cylinders, disks, and spheres. Contact stress problems. Energy principles. (Graduate standing)

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 and shells of revolution. (EMEM-685 or equivalent)

Credit 4 (T.B.A.)

EMEM-813 Theory of Plasticity
Registration #0304-813
The analysis of stress and strain. Criteria for yielding. Stress-strain relations of the theory of plasticity. Elastoplastic problems of spheres and cylinders. Torsion. Creep. (Graduate standing)

Credit 4 (T.B.A.)

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

EMEM-815 **Experimental Stress Analysis**
Registration #0304-815
Experimental methods of analysis of structural machine members, including strain gages and instrumentation, photoelastic methods, brittle coating, Moire fringe method, holographic techniques; and the hydrodynamic, electrical, and membrane analogs. Different methods will be demonstrated. (EMEM-694 or equivalent)

Credit 4 (T.B.A.)

EMEM-816 **Finite Elements**
Registration #0304-816
Development of finite element theory from variational principles. Applications in structural mechanics, heat transfer, and fluid mechanics. Two-dimensional applications to elastic continua considering plane stress, plane strain, and axisymmetric loading cases. Introduction to three-dimensional stress analysis. Features of large general-purpose computer programs. (EMEM-694 or equivalent, EMEM-440 or equivalent)

Class 4, 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
Vibration of discrete multi-mass systems using matrix methods. Normal mode theory, and matrix eigenvalue extraction procedures. Matrix forced response. Practical examples using two-and-three degrees of freedom. Vibration of continuous systems. Computer simulations. (EMEM-87I, EMEM-874)

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.)

EMEM-833 **Heat Exchanger Design**
Registration #0304-833
The course covers analytical models for forced convection through tubes and over surfaces, experimental correlations for the Nusselt number and pressure drop; design of single and multiple pass shell and tube heat exchangers; compact, baffled, direct contact, plate, and fluidized bed heat exchangers; radiators, recuperators, and regenerators. (EMEM-514)

Credit 4 (T.B.A.)

EMEM-838 **Ideal Flows**
Registration #0304-838
This graduate course introduces the students to the analysis of ideal flows from an advanced mathematical as well as engineering viewpoint. Steady acyclic motion, superposition of flows, vorticity dynamics; the theory of complex variables; airfoil and wing theories. (EMEM-871, EMEM-516)

Credit 4 (T.B.A.)

EMEM-848, 849 **Special Topics in Thermo Fluid Systems**
Registration #0304-848, -849
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 varible (maximum of 4 credits/quarter) (T.B.A.)

EMEM-964 **Production Tool Design**
Registration #0304-864
This is a course in the core group, CAD, of the manufacturing engineering option in the master of engineering degree program. Design of production tooling, jigs and fixtures for the economical production of manufacturable items. Consideration of cutting and forming force analyses, as well as locating, positioning and clamping requirements. Simulation of tool path motions on modern computer work-stations.

Credit 4 (T.B.A.)

EMEM-865 **Applications of the Finite Element Method**
Registration #0304-865 **Using NASTRAN**
This is a course in the core group, CAD, of the manufacturing engineering option in the master of engineering degree program. This course emphasizes the application of the finite element method to problems in the area of static and dynamic structural analysis, heat transfer, and analogous solutions. The industrial software package, NASTRAN, is used for these applications where the general structure, operating characteristics, and use of this complex program is presented. Topics include: the finite element method; shape factors, element formulations, and the NASTRAN element library; NASTRAN sequencing; general modeling methods (loads, constraints, material factors, mesh generation, interactive graphics, model conditioning, etc.); convergence, error analysis, and the "patch" test; vibration and heat transfer analysis, and analogous analysis such as acoustics, illumination, etc.

Credit 4 (T.B.A.)

EMEM-871 **Mathematics for Engineers**
Registration #0304-871
Topics include linear constant coefficient ordinary differential equations; partial differentiation, including the chain rule, Jacobians and optimization problems; multiple integration including change of coordinates and surface integrals; vector analysis, including the directional derivative, the gradient, the Divergence Theorem and Stokes' Theorem; LaPlace Transforms; and an introduction to Fourier Series and Integrals. (Graduate Standing)

Credit 4 (F)

EMEM-872 **Mechanics**
Registration #0304-872
Advanced dynamics and vibrations are emphasized. Newtonian vector mechanics and energy formulations are applied to two- and three-dimensional problems of single- and mult-degree of freedom. The concepts of Virtual Work, Hamilton's Principle, and Lagrange's equations are covered. The vibration of discrete multi-mass systems includes the formulation and eigen-value solutions by computer, and the method of finite elements are included. The vibration of continuous systems and discrete modeling is introduced. (EMEM-871 and EMEM-543)

Credit 4 (W)

EMEM-873 **Heat Transfer**
Registration #0304-873
This is an advanced course in conduction heat transfer. The formulation of the heat conduction equation is introduced using lumped, differential and integral approaches. Mathematical preliminaries of separation of variables technique. Superposition technique, Sturm-Louiville system, orthogonal functions, generalized Fourier series, Bessel and Legandre functions are treated with examples from heat conduction. Solutions of the two-and three dimensional steady heat conduction equations are obtained for different geometrical shapes. Multidimensional unsteady heat conduction problems are solved. (EMEM-514, EMEM-871)

Credit 4 (W)

EMEM-874 **Numerical Analysis**
Registration #0304-874
The course emphasizes both the development of the **current** numerical methods that are available to solve engineering problems and the use of the digital computer to actually implement these techniques. The methods are developed for: Algebraic and transcendental equations for single variable; systems of linear algebraic equations with both direct and iterative techniques of solution; systems of non-linear equations, interpolation and approximation theory; numerical differentiation and integration, initial value problems for ordinary differential equations; boundary value problems for ordinary linear and nonlinear differential equations. Extensive use of the computer will be required. (Graduate standing; knowledge of FORTRAN, experience in the use of digital computers)

Credit 4 (T.B.A.)

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 sponsoring faculty member and approved by the department head prior to the commencement of work.

EMEM-890 Thesis, Design Project, or
Registration #0304-890 Literature Search
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 Materials Science
Registration #1028-701
The course provides an understanding of the relationship between structure and properties for development of new materials. Topics include: atomic and crystal structure, crystalline defects, diffusion theories, strengthening mechanisms, ferrous alloys, cast irons, structure of ceramic and polymeric materials, and corrosion principles. (SCHG-208 or equivalent)

Class 4, Credit 4 (F)

SESM-710 Properties and Selection of
Registration #1028-710 Engineering Materials
This course is designed to acquaint the student with material structure and properties for engineering design selection purposes. The nature, structure and properties of polymeric materials, ceramics, plain carbon and alloy steels, cast irons, and nonferrous alloys are studied. In addition to material properties, their limitations, thermal and mechanical processing, and especially their selection and specification for engineering design is emphasized. (SESM-701 or equivalent)

Credit 4 (T.B.A.)

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

Energy Methods in Mechanics
Advanced Vibration Theory
Lubrication
Advanced Heat Transfer
Advanced Thermodynamics
Advanced Fluid Dynamics
Control Systems
Thermal Stresses

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

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.

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 course work also includes concentrated work in typography, photography, and art for reproduction methods and television. No special sequence required. Prerequisite for major in Graphic Design.

Lab. 9, Credit 4 (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, typography, etc. Media Center facility available for extension and application of studio experiences. (FADC-301, -302, -303 or equivalent)

Lab. 12, Credit 6 (offered each year)

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

Lab. 6, Credit 3 (offered each year)

FADC-501, -502, -503 **Graphic Design**
Registration #0402-501, -502, -503 **(Senior Major)**
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 identify, 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)

FADC-520 **Professional Design Business Practices**
Registration #0402-520 **and Ethics**
Ethical principles will be discussed along with sound business practices; setting up in business; invoicing and costing; the designer and the law; professional associations.

Class 3, Credit 3 (offered every other 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 4 (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. Each quarter concentrates on a specific topic of design study.

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 basic instruction in three dimensional computer graphics applications for designers.

Lab 6, Credit 3

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:
501 - Industrial: Product — Computer
Interior: Space — Computer
502 - Industrial: Product — Furniture
Interior: Space — Furniture
503 - Industrial: Product — Professional Practices
Interior: Space — Professional Practices

Lab. 18, Credit 9 (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)

FADF-241, 242, 243 **3-D Design**
Registration #0404-241, -242, -243
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)

FADF-261, 262, 263 **Drawing (Crafts Majors)**
Registration #0404-261, -262, -263
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)

FADF-321, 322, 323 **Design for Photo II**
Registration #0404-321, -322, -323
Emphasis upon problems which are related to visual phenomena, fundamentals, and communications. Expression through image making viewing and discussion.

Class 1, Lab. 2, Credit 2 (offered each year)

FADP-301, -302, -303 **Drawing and Painting**
Registration #0405-301, -302, -303 **(Sophomore Core)**
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. 9, Credit 4 (offered each year)

FADP-311, 312, 313 **Medical Illustration**
Registration #0405-311, -312, -313 **(Sophomore Major)**
Emphasis is placed upon drawing and the objective mastery of form and space from a variety of visual sources including the human figure during fall and winter quarters. For spring quarter carbon dust illustration techniques will be introduced, thus beginning a sequence of illustrative techniques leading to mastery of medical illustration.

Lab. 6, Credit 3 (offered each year)

FADP-320 **Color**
Registration #0405-320
One^quarter course dealing with the examination of basic color phenomena by visual comparison. Study the differences between light and pigment. Class problems exploring such relationships as intensity, vibration, temperature, after-image, spatial effects and image-ground distortion.

Class 3, Lab. 3, Credit 3 (offered each year)

FADP-321, -322, -323 **Illustration**
Registration #0405-321, -322, -323
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)

FADP-401, 402, 403 **Painting**
Registration #0405-401, -402, -403 **(Junior Major)**
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)

FADP-404, 405, 406 **Painting/Illustration Option**
Registration #0405-404, 405, 406 **(Junior Major)**
A three quarter sequence painting and illustration, (one day of each per week). **Painting:** Development of painting media and concepts. Emphasis placed upon individual solutions and expression. **Illustration:** Specific and structured problem solving offers the student the opportunity to develop skills and concepts in illustration, including scientific and technical illustration.

Lab. 12, Credit 6 (offered each year)

FADP-411, 412, 413 **Painting**
Registration #0405-411, -412, -413
An elective providing the opportunity for exploration of personal expression through a painting medium.

Lab. 6, Credit 3 (offered each year)

FADP-421, 422, 423 **Medical Illustration Applications**
Registration #0405-421, -422, -423 **(Junior Major)**
Development of range and mastery of medical illustration techniques. Laboratory sessions scheduled in bio-medical illustration. (Lab orientation sessions to be scheduled in operating room facilities.)

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

Medical Illustration Gross Anatomy
Dissection and study of the human body is presented with such topics as developmental comparative and applied anatomy. Emphasis is directed toward osteology radiographic anatomy, photography and of the cadaver.

Required of all students in the medical illustration program, offered through the University of Rochester Medical Center, with a tuition surcharge.

FADP-450 **Drawing Problems**
Registration #0405-450
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)

FADP-501, 502, 503 **Painting**
Registration #0405-501, -502, -503 **(Senior Major)**
The third year of advanced painting completing a major course of study in the fine arts. Concentrated studio production focused upon individual creative solutions. Individual and group presentations of work in an exhibition format is encouraged, as is the development of a visual portfolio of one's work. Advanced drawing incorporated into studio procedure.

Lab. 18, Credit 9 (offered each year)

FADP-504, 505, 506 **Painting/Illustration Option**
Registration #0405-504, 505, 506 **(Senior Major)**
Continuation of third-year painting and illustration. **Painting:** Emphasis is focused upon individual creative solutions. Individual and group presentations of work in an exhibition format is encouraged, as is the development of a portfolio. **Illustration:** Emphasis is on craft and problem solving, through such topics as book and juvenile illustration, research material and drawing approach. The student will be encouraged to expand in a personal direction and will be helped in the preparation of a portfolio.

Lab. 18, Credit 9 (offered each year)

FADP-511, 512, 513 **Painting**
Registration #0405-511, -512, -513
An elective that provides further exploration of personal expressive styles through a painting media.

Lab. 6, Credit 3 (offered each year)

FADP-531, 532, 533 **Advanced Medical Illustration**
Registration #0405-531, -532, -533 **(Senior Major)**
Advanced medical illustration techniques. Graphic design related to illustrative and photographic practice. Lab sessions to be scheduled in operating room facilities.

Jointly sponsored between RIT and the University of Rochester.

Lab. 18, Credit 6 (offered each year)

FADR-301, -302, -303 **Drawing and Printmaking**
Registration #0406-301, -302, -303 **(Sophomore Core)**
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 printmaking, including woodcut, etching and lithography. Prerequisite for major in Printmaking.
301 - Drawing — Media
302 - Drawing — Composition
303 - Drawing — Illustration

Lab. 9, Credit 4 (offered each year)

FADR-401, 402, 403 **Printmaking**
Registration #0406-401, -402, -403 **(Junior Major)**
A three quarter sequence in printmaking. Specific technical assignments, individual growth and development through personal statements is stressed in lithography, intaglio and relief printing. Expansion and development in combined and complex print forms are encouraged. A limited edition portfolio project is developed with the participation of all students.

Lab. 12, Credit 6 (offered each year)

FADR-404, 405, 406 **Printmaldng/Illustratlon Option**
Registration #0406-404, -405, -406 **(Junior Major)**
A three quarter sequence in printmaking and illustration, (one day of each per week). **Printmaking:** specific technical assignments, individual growth and development through personal statements is stressed in lithography, intaglio and relief printing. **Illustration:** Specific and structured problem solving offers the student the opportunity to develop skills and concepts in illustration, including scientific and technical illustration.

Lab. 12, Credit 6 (offered each year)

FADR-411,412, 413 **Printmaking**
Registration #0406-411, -412, -413
An elective providing the opportunity to explore personal statements through one of the following: lithography, etching, woodcut, papermaking.

Lab. 6, Credit 3 (offered each year)

FADR-501, -502, -503 **Printmaking**
Registration #0406-501, -502, -503 **(Senior Major)**
Continuation of third-year printmaking. Expanding the technical involvement in paper making, photo etching and photo litho. Opportunity is presented for involvement in developing a more concentrated and personal art form through any singular technique or combination. A limited edition portfolio project is developed with the participation of all students. Encouragement is offered for students to exhibit professionally in regional and national exhibitions. Emphasis is placed on preparing a strong professional body of prints.

Lab. 18, Credit 9 (offered each year)

FADR-504, 505, 506 **Printmaldng/Illustration Option**
Registration #0406-504, -505, -506 **(Senior Major)**
Continuation of third year printmaking and illustration. **Printmaking:** Expanding the technical involvement with paper making, photo etching and photo litho. The student has the opportunity to specialize in the direction of natural ability and interest. A limited edition portfolio project is developed with the participation of all students. **Illustration:** Emphasis is on craft and problem solving, through such topics as book and juvenile illustration, research material and drawing approach. The student will be encouraged to expand in a personal direction and will be helped in the preparation of a portfolio.

Lab. 18, Credit 9 (offered each year)

FADR-511, 512, 513 **Printmaking**
Registration #0406-511, -512, -513
An elective that provides further exploration of printmaking with emphasis on personal statement.

Lab. 6, Credit 3 (offered each year)

FADS-411, 412, 413 **Sculpture**
Registration #0407-411, -412, -413
The course develops formal sculptural concepts through a variety of processes and materials. Studio practice involving work in paper, wood, fabrics, metal, stone, clay, and plastics. This course is offered on the sophomore, junior, and senior level.

Lab. 6, Credit 3 (offered each year)

FADK-401, 402, 403 **Packaging Design II**
Registration #0440-401, -402, -403 **(Junior Major)**
The course progresses through a series of interrelated experiments, covering analysis and visual translation of package form and function, package structure, production processes, package trends, materials, and package graphics.

Lab. 12, Credit 6 (offered each year)

FADK-501, 502, 503 **Packaging Design III**
Registration #0440-501, -502, -503 **(Senior Major)**
The course will further investigate analysis and visual translation of package form and function, package structure, production processes, package trends, construction, materials and package graphics. A strong emphasis will be placed on preparation of a portfolio.

Lab. 18, Credit 9 (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 such as hand building, application of glazes. Stacking and firing of kilns. Ceramic Sculpture. The organization of the ceramic shop. Survey of pottery.

Lab. 15, Credit 5 (offered each year)

FSCC-251, 252, 253 **Ceramics Elective I**
Registration #0409-251, -252, -253
An elementary course in design and techniques in ceramics. Each quarter different techniques are taught including wheel, hand building, glaze, and decorating.

Lab. 6, Credit 3 (offered each year)

FSCC-300 **Ceramics Materials and Processes**
Registration #0409-300 **(Sophomore Major)**
Sequential course for three quarters providing intensive work on the potters wheel and individual clay and glaze problems. Emphasis on function and decorative techniques, ceramic raw materials, sources of supply, use and maintenance of equipment and glaze chemistry.

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, adaptation, and application. Designing for production and production problems. Mold-making, slip casting, and jiggering.

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/designer 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/craftsmen/designer.

Class 3, Credit 3 (offered each year)

FSCF-370 **20th Century Art**
Registration #0410-370
The development of the arts in the 20th century in the areas of painting, printmaking, sculpture, architecture, and the crafts with focus on their impact on the artist/craftsman/designer.

Class 3, Credit 3 (offered each year)

FSCF-380 **Contemporary Art**
Registration #0410-380
A study of the painting, printmaking, sculpture, architecture and crafts from the 1960s to the present year with focus on the current American scene.

Class 3, Credit 3 (offered each year)

FSCF-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 coldworking techniques: slump molds, lamination, non-glass surface decoration, etching, sandblasting, grinding, polishing.

Lab. 15, Credit 5 (offered each year)

FSCG-251, 252, 253 **Glass Elective I**
Registration #0411-251, -252, -253
A survey course emphasizing furnace glassblowing and stained glass as a means of personal expression and appreciation. A portion of the course is a basic investigation of the history, chemistry, techniques and technical aspects of glass.

Lab. 6, Credit 3 (offered each year)

FSCG-300 **Glass Materials and Processes**
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
Pre-requisite: Glass Elective 251,252, or 253. This course provides an opportunity for more advanced work in both hot and cold glass. Emphasis is placed upon individual expression with glass and may involve slumping, casting, blowing, cutting, polishing or sculptural construction.

Lab. 6, Credit 3 (offered 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)**
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, repousse 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)

FSCM-400 **Metalcrafts Materials and Processes**
Registration #0412-400 **(Junior Major)**
Sequential course for three quarters, introducing flatware, spinning and machine tool processes. Introduction to industrial manufacture and precious metal work in gold and platinum.

Lab. 15, Credit 5 (offered each year)

FSCM-500 Metalcrafts Techniques and Thesis
Registration #0412-500 (Senior Major)
Sequential course for three quarters, providing individual research in technique and design. A final presentation, to include a resume, photographs and renderings of work, is required.

Lab. 24, Credit 8 (offered each year)

FSCT-200 Textile Materials and Processes
Registration #0413-200 (Freshman Major)
Sequential course for three quarters, providing fundamentals of fabric design, yarn calculation, and pattern drafting. Analysis of equipment and problems. Practice in basic weaves. Experiment in design and weaving of sample warps of drapery, linens, upholstery, and suiting fabrics. Study of qualities and color combinations of various yarns. Yardage weaving. Printing procedures; silk screen techniques.

Lab. 15, Credit 5 (offered each year)

FSCT-251, 252, 253 Textile Elective I
Registration #0413-251, -252, -253
A basic course in design and techniques in textiles. Each quarter a different area of study is undertaken in basketry, stitchery and other non-loom processes.

Lab. 6, Credit 3 (offered each year)

FSCT-300 Textile Materials and Processes
Registration #0413-300 (Sophomore Major)
Sequential course for three quarters, providing an analysis of fabrics. Advanced pattern drafting. Study and analysis of fibers. Advanced techniques of weaving, with related problems in design. Continued experience in sample warps and yardage weaving. Practice in the use of various types of eight- to ten-harness looms. Experiments and research with novelty fibers. Independent study, papers, reports.

Lab. 15, Credit 5 (offered each year)

FSCT-351, 352, 353 Textile Elective II
Registration #0413-351, -352, -353
An elective course providing an opportunity for more advanced study in textiles. Each quarter a different area of study is undertaken in printing, basketry, non-looms, stitchery or tapestry.

Lab. 6, Credit 3 (offered each year)

FSCT-400 Textile Materials and Processes
Registration #0413-400 (Junior Major)
Sequential course for three quarters, providing an analysis of new development in fabrics both handwoven and power-loomed, and their appropriate use. The design of fabrics within specific price ranges, and for specific uses. Independent study, papers, reports.

Lab. 15, Credit 5 (offered each year)

FSCT-500 Textile Techniques and Thesis
Registration #0413-500 (Senior Major)
Sequential course for three quarters, covering the design of fabrics in selected fields such as household fabrics, fashion fabrics or accessories with concentration on items having production merit. A thesis is included.

Lab. 24, Credit 8 (offered each year)

FSCT-520 Business Practices for the Craftsperson
Registration #0413-520
Fundamental craft business practices, including setting up a business, basic record keeping, banking, pricing, government regulations, insurance, marketing, and studying operations.

Class 3. Credit 3 (offered every other year)

FSCW-200 Woodworking Materials and Processes
Registration #0414-200 (Freshman Major)
Sequential course for three quarters, covering function and care of hand and machine woodworking tools. Wood as a material: history, kinds, qualities, sources. Fundamental techniques of wood fabrication, including basic joinery, turning, and finishing.

Lab. 15, Credit 5 (offered each year)

FSCW-251, 252, 253 Wood Elective I
Registration #0414-251, -252, -253
An elementary course in design and techniques in woodworking. Hand and power tools will assist in the small scale making of wood objects.

Lab. 6, Credit 3 (offered each year)

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, either to 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)

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 Liberal Arts, and course descriptions are given under that heading with a Liberal Arts 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)

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 Graphic Design
Registration #0402-750 (elective, minor)
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 (Major)
Advanced creative problem-solving experiences relating to graphic design imagery. Formal design values are emphasized and utilized in communications applications. Studio involvement isdirected 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)
Exposure to computer graphic algorithms, design heuristics, design methodology, language data structures, and program structures for two-dimensional imagery. 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 Industrial and Interior Design
Registration #0403-750 (elective, minor)
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 Painting
Registration #0405-750 (elective, minor)
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-750 Illustration
Registration #0405-750 (elective, painting minor)
An elective exploring the art of illustrators, their relation to audience, publishers, and media. Studio problems will develop and expand basic concepts of illustration.

Class 3, Lab. 3, Credit 3 (offered each year)

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 pepared 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 Printmaking
Registration #0406-750 (elective, minor)
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 #0406-781 **(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.

Lab. 6, Credit 3 (offered each year)

FADM-783 **Medical Illustration**
Registration #0408-783 **Anatomical Studies (MFA Major)**
A study of pathological specimens and human dissection using colored pencil, pen and ink, carbon dust, and airbrush. Emphasis will be on rapid but accurate sketching and observation in the laboratory with a representation of form and structure in living tissue for the preparation of surgical procedures.

Lab. 6, Credit 3 (offered each year)

FADM-784 **Medical Illustration**
Registration #0408-784 **Operative Procedures (MFA Major)**
The application of illustrating and photographing in the operating room. The student will become familiar with the organization of operations and with his or her role as a medical illustrator. Sketches are to be drawn directly from the observation of surgery, consulting with the surgeon for accuracy of detail and development. The final preparation of the art work will be submitted for publication or portfolio.

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 #040 (2, 3, 5, 6, 8, or 32)-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 and participation in a graduate thesis show.

Lab. 27, Credit 3-14 (offered every quarter)

FASA-785 **Forms of Inquiry**
Registration #0420-785 **(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)

FASA-790 **Graduate Forum**
Registration #0420-790 **(Required for MFA)**
The presentation and discussion of issues in aesthetics, criticism, creativity and perception as they relate to art, design and craft will be undertaken. Points of view will be clarified through critical writing. Required for MFA; to be taken prior to Thesis.

Class 2, Credit 3

Graduate Courses

School for American Craftsmen

Ceramics and Ceramic Sculpture

FSCC-750 **Ceramics and Ceramic Sculpture**
Registration #0409-750 **(elective, minor)**
Basic instruction and experience in ceramic design, fabrication and production of ceramic forms is undertaken. This study provides ceramic technology and terminology and gives experience with clays along with fundamental forming techniques. The 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 techniques, materials and concepts. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.

Lab. 9-27, Credit 3-9 (offered every quarter)

Glass

FSCG-720 **Stained Glass**
Registration #0411-720 **(elective minor)**
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 each year)

FSCG-750 **Glass**
Registration #0411-750 **(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 electroplating, lamp working and sculptural construction. Course emphasis 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 considered relevant. The course is structured to provide a foundation for professional activity and to encourage exploration of personal concepts 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 **Metalcrafts and Jewelry**
Registration #0412-750 **(elective, minor)**
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 techniques.

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 **Weaving and Textile Design**
Registration #0413-750 **(elective, minor)**
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-750 **Business Practices for the**
Registration #0413-750, -85, -86 **Craftsperson**
Fundamental craft business practices, including setting up a business, basic record keeping, banking, pricing, government regulations, insurance, marketing, and studying operations.

Class 3, Credit 3 (offered every other year)

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 compliments 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 **Woodworking and Furniture Design**
Registration #0414-750 **(elective, minor)**
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 theory, 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, and/or production. 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 participation in the Graduate 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-313 Introduction to Fine Art Photography
Registration #0921-313
The meaning of fine art photography will be discussed and then explored by doing various fine art assignments which will lead the student to discover personal solutions to personal concerns. The faculty will provide surveys of fine art photographers, their work and the non-silver processes sometimes used. The class will be supplemented with field trips to museums, galleries, and artists' studios.

Class 3, Lab 4, Credits 5

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 or her environment through the medium of photography. Students design their own projects and work under the guidance of the professor. Traditional silver, as well as non-silver, photography techniques may be utilized. (PPHL-313)

Class 2, Lab 8*, Credit 4/Qtr.

PPHA-460 Photography for Printers
Registration #0921-460
A workshop in black-and-white and color photography for non-photography majors. Technical and aesthetic information will be given to enhance the students' 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, 506 Photo Media Workshop
Registration #0921-506, -507, -506
Photo Media Workshop emphasizes visual problem solving utilizing alternative photographic processes. The first quarter features work with emulsions on various surfaces; the second deals with visual books; and the third quarter covers generative systems including electrostatic, offset printing and other methods of altering images. The course is best when taken in order, but students may join 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-531 Picture Researching
Registration #0921-531
An introductory course surveying current practices, procedures, techniques and resources employed in picture researching for collections, exhibitions, publications, motion pictures, and television. Students explore the 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-535 Gallery Management
Registration #0921-535
A workshop involvement in the various aspects of a gallery operation including the preparation and display of photographs, arrangement for announcements and publicity and financial considerations.

Credit 1

PPHA-538 Photographic Careers Seminar
Registration #0921-538
This seminar examines career options available to photography graduates. Students develop skills in resume preparation, interview practices and techniques, and personal goal setting. Students attend three special sessions offered by the Center for Cooperative Education and Career Services.

Credits 3, Class 3

PPH A-551, 552, 553 Special Topics Workshop
Registration #0921-551, -552, -553
Topics of current or special interest designed to broaden and intensity the students ability to use photography as a means of communication and expression.

Class 1-2, Lab 4-15, Credit 3-9/Qtr.

PPHA-560 Semiotics and Advertising Photography
Registration #0921-560
An introductory course which emphasizes the application of selected semiotic principles to the practice of photography. Semiotics is the study of signs and symbols and what they signify.

Class 4, Credit 4

PPHA-599 Independent Study
Registration #0921-599
Learning experiences not provided by formal course structure may be obtained through use of an independent study contract.

Credits 1-9

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 4/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-705, 706 Graduate Seminar
Registration #0903-705, 706
The seminar provides an opportunity for all MFA students to develop a sense of community and to openly discuss matters of concern, to discuss each others photographs, to meet with visiting artists on campus and to participate in a thesis sharing from time to time.

Credit 2/Qtr.

PPHG-707, 708, 709 Film History and Aesthetics
Registration #0903-707, -708, -709
An extended comparative survey of the history and 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.

'Lab hours may not be scheduled and are to be completed in available time.

PPHG-719 **Preservation Issues with Fine**
Registration #0903-719 **Art and Historical Photographs**
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 4

PPHG-720,721,722 **Photographic Workshop**
Registration #0903-720, -721, -722
Each faculty member offers a different opportunity for students to explore the multiplicity of ways that photography can be used as a vehicle for expression and for communication. Visual research, group critiques, seminars, field trips, studio and laboratory practice are used.

Credit 4/Qtr.

PPHG-725, 726, 727 **Photography Core**
Registration #0903-725, -726, -727
Major emphasis is placed on the individual's learning to generate and intensify his or her personal statement through photography. Some of the projects are assigned while others are selected by the candidate. Work is critiqued weekly by the instructor.

Credit 4/Qtr.

PPHG-730, 731, 732 **Cinematography**
Registration #0903-730, -731, -732
Film making workshop, Individually planned studies in cinematography, as determined by faculty-student consultation, group critiques, seminars, studio and laboratory practice, field trips.

Credit 3-9/Qtr.

PPHG-733 **Animation and Graphic**
Registration #0903-733 **Film Production**
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: direct modification of the film surface, eel, ink and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is **not** required. No prerequisites.

Class 2, Discussion 1, Lab 2; Credit 4/Qtr. (Fall, Winter)

PPHG-734 **Animation and Graphic**
Registration #0903-734 **Film Production**
A continued introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a number of approaches to single-frame film making in addition to those covered in PPHG-733. Some techniques covered in the course are: Three-dimensional animation; optical printing; computer animation; and hand-drawn sound. Screenings of professionally-made films will illustrate each technique. Proficiency in drawing is **not** required. PPHG-733

Class 2, Discussion 1, Lab 2; Credit 4/Qtr. (Winter, Spring)

PPHG-735 **Animation and Graphic**
Registration #0903-735 **Film Production**
This course provides practice in all phases of single-frame film production. Students produce a 16mm 90-second graphic film with sound utilising one or more techniques learned in the preceding two quarters. (PPHG-734)

Class 2, Discussion 2, Lab 2; Credit 4/Qtr. (Spring, Fall)

PPHG-740, 741, 742 **Photographic Museum Practice**
Registration #0903-740, -741, -742
Museum internship workshop, still or motion picture; research, assigned projects, seminars in history, function and administration of museums, with emphasis on photographic curatorial duties; practice in exhibition planning and development; field trips. This cannot be selected as a minor concentration.

Credit 4/Qtr.

PPHG-750, 751, 752 **Special Topics Workshop**
Registration #0903-750, -751, -752
Advanced topics of current or special interest designed to broaden and intensify the student's ability to use photography as a means of communication and expression.

Credit 3-9/Qtr.

PPHG-753 **Photographic Workshop for Teachers**
Registration #0903-753
A graduate course concerned with the art and craft of teaching photography in a formal and informal setting. Emphasis is on the practice of teaching photography based on accepted learning principles.

Credit 6/Qtr. (Summer)

PPHG-755 **Applied Sensltometry**
Registration #0903-755
This course presents relevant sensitometric and photographic theory, principles and practices in a manner sensitive to the background and needs of a fine art photographer. *
Credit 4.

PPHG-756 **Zone System Principles**
Registration #0903-756
An applied course of selected sensitometric statistical and perceptual principles to the understanding and practice of the Zone System. The principles are taught so that they can be generalized and transferred to the understanding and practice of other image-forming systems such as film making, video, graphic arts printing, screen printing, etc.

Credit 4

PPHG-760 **Perception & Photography**
Registration #0903-760
An advanced course which provides an applied psychological framework for the ways we select, code, organize, store, retrieve and interpret visual images and explores how photographs relate to art and perception.

Credit 4

PPHG-762, 763, 764 **Alternative Processes**
Registration #0903-762, -763, -764
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-767, 768, 769 **Contemporary Issues**
Registration #0903-767, -768, -769
A study of current issues relevant to fine art photography, how they relate to broader historical/cultural issues, and how they might suggest future directions.

Credits 2/Qtr.

PPHG-877 **Museum Internship**
Registration #0903-877
Experiential learning is provided in collections management, cataloguing and classification, exhibition preparation and exhibitions, research and critical writing.

Credits 1-8/Qtr.

PPHG-799 **Independent Study**
Registration #0903-799
Learning experiences not provided by formal course structure may be obtained through the use of an independent study contract.

Credits 1-9

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

Biomedical Photography

PPHB-201, 202, 203 Biomedical Photography I
Registration #0901-201, -202, -203
Basic photography course for biomedical photographers with emphasis on theory, craftsmanship and visual communication. Patient photography, close-up and other photography as a foundation for future biomedical photography.

Class 4, Lab 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 photomacrography, photomicrography, hospital photography techniques, infrared and ultraviolet radiation, biological field studies. (PPHB-203)

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. Student will produce slide presentations and exhibition displays as well as anotomical demonstrations using cell animation techniques.

Lab. F-4, W-4, S-6, Credit 3/Qtr.

PPHB-401, 402 Advanced Photography in
Registration #0901-401, -402 Biomedical Communications
Sophisticated and creative applications of photography serving the needs of the scientific community. Students explore a variety of specialized photographic techniques and a variety of philosophies. Assignments are performed which are similar to those encountered in biomedical and research institutes. (PPHB-303)

Class 2, Lab 4, Credit 4/Qtr.

PPHB-421 Scanning Photomacrography
Registration #0901-421
Scanning photomarography is a technique which provides a universal depth of field in a photomacrograph while producing an axonometric projection at the same time. A thin sheet of light is projected onto a three-dimensional subject at a right angle to the optical axis of the camera lens within the depth of field to be photographed. The subject is then precisely moved along this optical axis while the camera shutter is open. Out-of-focus areas remain in darkness and are not recorded during the time the illuminated strip is exposed. Students will learn the principles and applications of this technique, producing images of exceptional clarity in black and white as well as color. The precise and often unique disciplines required to make these images prepare the student for other scientific photographic tasks as well as fulfill an existing need for scanning photomacrographs in the biological sciences.

Class 1, Lab 6, Credit 4

PPHB-501, 502, 503 Senior Thesis Production
Registration #0901-501, -502, -503
An investigation, planning, organization and production of an audiovisual presentation, a learning package or an informational program for a biomedical communications client.

Class 2, Lab 8, Credit 4/Qtr.

PPHB-551, 552, 553 Special Topics in Photography
Registration #0901-551, -552, 553
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper level students.

Credit variable.

PPHB-599 Independent Study
Registration #0901-599
A student proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper level students with a G.P.A. of 3.0 or greater.

Credit variable

PPHB-781 Medical Illustration Advanced Photography
Registration #0901-781 (MFA Major)
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 4/Qtr.

Film and Television

PPHF-201 Structuring the Moving Image and Conceptual
Registration #0902-201-01 (Film majors only) Film Production
#0902-201-02 (Elective/non-majors only)
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 Professional Photographic Illustration students, and other students by special permission)

Class 3, Lab 4, Credit 5 (Fall)

PPHF-202 Narrative Film Production
Registration #0902-202-01 (Film majors only)
#0902-202-02 (Electlve/non-majors only)
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 (Winter)

PPHF-203 Fiction and Dramatic Short Film Production
Registration #0902-203-01 (Film majors only)
#0902-203-02 (Elective/non-majors only)
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 (Spring)

PPHF-204-01 (Film majors only) **History and Aesthetics**
PPHF-204-02 (Elective/non-majors only) **of the moving Image (Fiction Feature)**

Fall, (3 Credits)

PPHF-205-01 (Film Majors only) **History and Aesthetics**
PPHF-205-02 (Elective/non-majors only) **of the Moving Image (Documentary)**

Winter (3 Credits)

PPHF-206-01 (Film majors only) **History and Aesthetics**
PPHF-206-02 (Elective/non-majors only) **of the Moving Image (Animated and Experimental)**

Spring
Registration #0902-204, -205, -206
A survey of the moving image from the early beginnings and the present. Emphasis is on determining the unique characteristics of a medium and genre, how those characteristics are used by the image maker to create interpretive and expressive imagery, and, how that imagery is influenced by the culture that produces it and effects those that view it. (No prerequisites)

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 #0902-208
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 (Fall)

PPHF-310 **Materials and Processses of the Moving Image II**
Registration #0902-310
A technical survey of the tools and materials used in video production. (PPHF-210, PPHF-203)

Credit 2 (Fall)

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 (Fall)

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 producing 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. (311 or permission of instructor)

Class 2, Lab 4, Credit 4 (Winter)

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 (Spring)

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 **Introduction to Animation and Graphic**
Registration #0902-324 **Film Production I**
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: direct modification of the film surface, cell, ink, and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is **not** required. No prerequisites.

Class 3, Lab 2, Credit 4 (Fall)

PPHF-325 **Introduction to Animation and Graphic**
Registration #0902-325 **Film Production II**
A continued introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a number of approaches to single frame film making in addition to those covered in PPHF-334. Some techniques covered in the course are: three-dimensional animation; optical printing; computer animation; and hand-drawn sound. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is **not** required. Prerequisite: PPHF-324.

Class 3, Lab 2, Credit 4 (Winter)

PPHF-326 **Animation and Graphic Film Production**
Registration #0902-326
This course provides practice in all phases of single frame film production. Students produce a 16mm 60-second film with sound utilizing one or more techniques learned in the preceding two quarters. Prerequisite: PPHF-325.

Class 3, Lab 2, Credit 4 (Spring)

PPHF-404 **Senior Project Seminar**
Registration #0902-404
A required course for 3rd year film/video majors and is 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 (Spring)

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 (Fall)

PPHF-411 **Visualization and Commercial**
Registration #0902-411 **Film Production**
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-203 or permission of the instructor)

Class 2, Lab 6, Credit 5 (Fall)

PPHF-412 **Film Planning and Studio Operations**
Registration #0902-412
Introduction to studio crew 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 (Winter)

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 (Spring)

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 (Fall)

PPHF-432 **Film Directing**
Registration #0902-432
An indepth 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 (Spring)

PPHF-434 **Advanced Video**
Registration #0902-434
A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing & store, computer imaging and animation are some of the topics covered. (PPHF-203, -310)

Class 3, Credit 3

PPHF-442 **Film/Video Internship**
Registration #0902-442
This course is designed to provide the students with on-the-job experience in the field of Film/Video. The student will seek and acquire a school approved internship position in a business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the internship coordinators will assist the student in evaluating the experience. The coordinator should be the faculty member most familiar with the student's internship field.

Credits 1-6/Qtr. (Fall, Winter, Spring)

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 (Fall)

PPHF-542 **Senior Production II (Film/Television)**
Registration #0902-542
Continuing the senior project shooting phase to completion. Production teams meet as sections with faculty whose experience matches the kind of production involved. (PPHF-541)

Credit 6 (Winter)

PPHF-543 **Post Production (Film/Television)**
Registration #0902-543
Completion of senior projects. Includes a review of post production techniques. (PPHF-542)

Credit 4 (Spring)

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 (Fall, Winter, Spring)

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

PPHG-207, 208, 209 **Still Photography**
Registration #0903-207, -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.

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 shooting 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) (Summer)

PPHL-301, 302, 303 **History and Aesthetics of Photography**
Registration #0904-301, -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, callitypes, ambrotypes, etc. Student projects are designed to illuminate phases of photographic history best understood by personal visual exploration.

Class 3, Credit 3/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 craftmanship, 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-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-434, 435, 436 **Advertising Photography**
Registration #0904-434, 435, 436
A course built strictly to the standards of professional photography. Only those students who seriously aspire to be professional craftspeople should enroll. The assignments are specific and vary from strictly commercial to advertising illustration. In addition, the student is encouraged to specialize in the direction of his or her own natural ability and interests. Approximately 2/3 of the photography will be in color (PPHL-203, 311)

Class 2, Lab 7, 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 **and Commercial Photography I**
A course in visual problem solving with photography. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered.

Class 4, Studio 5, Credit 5/Qtr.

'Lab hours may not be scheduled and are to be completed in available time.

PPHL-451,452 **Basic Portrait Photography**
Registration #0904-451, 452
Introduction to basic professional portraiture, the study of the art of lighting (indoors and outdoors), posing, composition, makeup, camera techniques, mounting and communication. (PPHL-213)

Lecture 3, Studio 2, Credit **4** (Fall & Winter)

PPHL-453 **Advanced Portrait Photography**
Registration #0904-453
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)

PPHL-461 **Studio Operations**
Registration #0904-461
A one-quarter business course for all photography school students. This course will cover basic business concepts necessary for the operation of a small studio or free-lance business on a practical level. Job hunting, self-promotions, business promotions, bookkeeping, and legal aspects of business will be addressed.

Lecture 2, Credit 2 (Winter only)

PPHL-505 **History of Applied Photography**
Registration #0904-505
A chronological investigation into many areas of applied photography, including advertising, documentation, illustration, news, portraiture, scientific, and travel. The works of major photographers and the influence of specific publications and events upon the style and use of photography will be examined.

Class 3, Credit 3

PPHL-516, 517, 518 **Narrative/Documentary/**
Registration #0904-516, 517, 518 **Editorial Photography II**
This course will explore and expand the use of the photographic image in the narrative/documentary and editorial point of view. Emphasis will be upon publication and professional use of the image.

Class **4,** Field 5, Credit 5/Qtr.

PPHL-541, 542, 543 **Contemporary, Illustrative**
Registration #0904-541, 542, 543 **and Commercial Photography II**
A course that brings together the artistic and technical input of the first three years of the program and directs the student towards the application of the acquired skills through a series of professionally oriented assignments.

Class **4,** Studio 5, Credit 5/Qtr.

PPHL-551 **Special Topics**
Registration #0904-551
Advanced topics of current or special interest, varying from quarter to quarter, selected from the field of professional photographic illustration. Special topics announced in advance. (Not offered every quarter. Consult coordinator of the Professional Photographic Illustation Program)

Credit Variable

PPHL-599 **Independent Study**
Registration #0904-599
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper level students with a G.P.A. of 3.0 or greater.

Class, Credit: variable

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 photographies 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 to 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 Photographic Processing and Finishing Management program.

Credit 1 (Fall only)

PPHM-211,212, 213 **Introduction ot Photofinishing Technology**
Registration #0905-211, -212, -213
This course is designed to provide Photographic Processing and Finishing Management students with a thorough knowledge of the basic photographic process so that they will have an understanding of how photographic products work. Included will be units of study on film characteristics, optics, photographic chemistry, sensitometry and color theory. Each of these areas will be related to the practice of picture making.

Class 2, Lab 4, Credit 4/Qtr.

PPHM-300 **Production Processing and Finishing**
Registration #0905-300
A 10-week summer course which provides an opportunity for students who have completed basic photography to gain an understanding of all aspects of production processing and finishing. They will be involved with machine processing on a full production basis. A hands-on-type of learning experience will be the method most often employed in this course. (Permission of the instructor)

Class 2, Lab 30, Credit 12 (Summer)

PPHM-301 **Film Processing**
Registration #0905-301
Part of a three-quarter sequence of student involvement in automated processing and finishing on a full production basis. This course covers the theory and practice of film processing. (PPHM-213, PPHS-203, or PPHT-213)

Class 2, Lab 8, Credit 4

PPHM-302 **Automated Printing**
Registration #0905-302
Part of a three-quarter sequence of student involvement in automated processing and finishing on a full production basis. This course covers the theory and practice of automated printing. (PPHM-213, PPHS-203, or PPHT-213)

Class 2, Lab 8, Credit 4

PPHM-303 **Custom and Professional Finishing**
Registration #0905-303
Part of a three-quarter sequence of student involvement in automated processing and finishing on a full production basis. This course covers the theory and practice of custom and professional printing. (PPHM-213, PPHS-203, or PPHT-213)

Class 2, Lab 8, Credit 4

PPHM-310 **Survey of Production**
Registration #0905-310 **Processing and Finishing**
Provides the non-photographic processing and finishing major with an opportunity to become knowledgeable in the operational procedures and services of a processing and finishing laboratory (PPHM-203)

Class 2, Credit 2 (Spring Only)

PPHM-313 **Introduction to Color**
Registration #0905-313 **Science and Appearance**
A survey course exploring the basic principles of color perception, the interaction of light and objects, the effects of illumination on color appearance, the specification of illuminating sources, colorimetry, and instrumentation used for colorimetry and photographic quality control.

Class 4, Credit 3

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 optics, mechanisms 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 **Photographic Process Control**
Registration #0905-401, -402,
Statistical methods of studying repetitive processes, with special application to photographic processing; methods of obtaining data about process, 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-430 **Technical Writing**
Registration #0905-430
This introduction to technical writing will review the fundamentals of good syntax, punctuation and usage as well as provide the student with writing exercises designed to increase the student's proficiency in technical report writing. In addition to stressing the structural elements of scientific and technical literature, each student will learn to use the RIT VAX system for word processing.

Class 2, Lab 2, Credit 3

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-420 **Applied Statistical Quality Control**
Registration #0905-420
An introduction to the use of applied statistics for the purpose of controlling repetitive manufacturing processes. Topics to be addressed include: process capability studies, conformance to specification, control charts for variables and attributes, process control and product and sampling plans. Emphasis will be placed on the use of these techniques in the photofinishing industry.

Class 2, Lab 2, Credit 3

PPHM-501,502,503 **Senior Seminar in Production Processing**
Registration #0905-501, -502, -503 **and Finishing Management**
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 visitations, 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, (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 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-303)

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, (senior standing)

Lab. 3, Credit 1 (Winter only)

PPHM-551, 552, 553 Special Topics in Photographic Processing
Registration #0905-551, -552, -553 and Finishing Management
A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered in the regular curriculum. Available to upper level students.

Credit variable

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

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, geometrical optics, instrumentation and applied photography.

Credit 9 (Summer only)

PPHS-201, 202, 203 Photography for Scientists and Engineers
Registration #0907-201, -202, -203
An introduction to the theory and applications of radiation-sensitive materials and systems. Physical properties of photographic materials, characteristics of radiation, geometrical optics, and photographic instrumentation, sensitometric properties of photo-sensitive materials, tone reproduction, processing chemistry, and fundamentals of black-and-white and color photography.

Dlass 4, Lab 3, Credit 5/Qtr.

PPHS-205, 207 Imaging and Photographic Science for
Registration #0907-205, -207 Microelectronic Engineers I, II
An introduction to the field of Imaging and Photographic Science as is relevant to Microelectronic Engineering. Studies in the physical and chemical properties of radiation, photosensitive materials with specific reference to silver-halide, diazo and photoresist systems, sensitometry, tone reproduction, image quality, geometrical optics and photographic instrumentation.

Class 2, Lab 2, Credit 2/Qtr.

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-215 Imaging and Photoscience for Microelectronic
Registration #0907-215 Engineers I (Transfer)
This course contains the material in PPHS-205 which deals with the physical and chemical properties of radiation and chemistry and sensitometric behavior of silver-halide, diazo and photoresist imaging materials. For transfer students. (First 7 weeks of the quarter)

Class 3, Lab 3, Credit 2

PPHS-216 Imaging and Photoscience for Microelectronic
Registration #0907-216 Engineers 11 (Transfer)
This course contains the material in PPHS-207, specifically, an introduction to geometrical optics, optical instrumentation, tone reproduction and the measure of image quality.

Class 3, Lab 3, Credit **1**

PPHS-225 Statistics for Microelectronic
Registration #0907-225 Engineers (Transfer)
This course contains the material in PPHS-433 and PPHS-434. For transfer students.

Class 5, Credit 5

PPHS-433, 434 Statistics I, II
Registration #0907-433, -434
A study of applied statistics involving those areas of direct concern in the design, analysis, and evaluation of integrated circuit processing (with an emphasis on the photolithographic process).

Class 4, Credit 4

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-313 Introduction to Colorimetry
Registration #0907-313
An introduction to how the interaction of light, matter, and the visual system create the sensation of color. Topics include color physics; color measurement including spectrophotometry, spectroradiometry, and colorimetry; color perception including introductory color vision theory, color mixing principles, and color order systems; the CIE system; and instrumental and visual color difference evaluation. Accompanying laboratory will concentrate on instrumental measurements.

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 imaging and photographic science 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-409 Color Appearance and Technology
Registration #0907-409
An indepth course dealing with the proper methodologies to quantify the chromatic and surface properties of objects. Topics stressed include colorimetry, glossimetry, color tolerancing, metrology problems, visual scaling techniques using color order systems, and the effects of viewing and illuminating conditions on color appearance. Accompanying laboratory will concentrate on visual measurements and experimental techniques. (PPHS-313or PPHT-313and instructor's approval)

Class 3, Lab 4, Credit 4

PPHS-411 Statistical Inference
Registration #0907-411
An introduction to the theory and application of statistical methods. The course begins with a discussion of events and sample spaces along with fundamental probability concepts. The mathematical foundations of discrete probability functions and continuous probability density functions are developed. The concept of moments is presented along with moment generating functions as a means for studying the properties of probability functions. The concepts of central tendency and dispersion of probability functions are introduced. Fundamental examples of random processes encountered in imaging systems are used to illustrate the mathematical and statistical techniques developed. FORTRAN programming assignments are required. (SMAM-305, SMAM-306, ICSP-220)

Class 2, Lab 2, Credit 3

PPHS-412 Design of Experiments
Registration #0907-412
Introductory hypothesis testing of means and variances is developed in the context of developing an evaluation of experimental objectives. The concepts and fundamental theoretical background behind linear regression analysis is presented. Techniques of analysis of variance are introduced as a method for evaluating the precision of a regression model. Analysis of variance is then developed as a general experimental tool. Methods of experimental error propagation are developed. Programming assignments are required. Statistical software packages are presented and analysis problems using the BMDP system are assigned. Advance topics such as spline fitting, simplex analysis, and principal components are discussed. (PPHS-411, FORTRAN experience)

Class 3, Credit 3

PPHS-413 Statistical Quality Control
Registration #0907-413
The statistics of process control are introduced using examples from the photographic and imaging industries. Techniques such as control charts are examined from both a theoretical and a practical point of view. Attribute and acceptance sampling techniques are discussed including MILSTD-105D and CSP-1 sampling statistical techniques are developed including techniques to measure subjective image quality. Programming assignments may be required. (PPHS-412)

Class 3, 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-441 Advanced Microlithography
Registration #0907-441
A study of the characteristics of image-forming and image-recording elements and their matching for optimum performance. Spread and transfer functions, Partical coherence in image systems, limitations imposed by the wave and particle nature of radiation. Interferometric evaluation techniques. Comparison of optical, X-ray and electron beam imaging. Techniques and instruments for the exposing and evaluation of images. (EMCR 540, PPHS 543, 573)

Class 3, Lab 3, Credit 4

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-303)

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 image-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, SPSP313)

Class 3, Credit 3/Qtr.

PPHS-541 Fundamentals of Optics
Registration #0907-541
An introduction to the principles of optics which form the basis for further study in the field. Topics include one and two-dimensional vibrations, wave motion, superposition of waves, interference and interferometry, single, double, and multiple slit diffraction, and polarization. Lenses, mirrors, prisms, diffraction gratings, lasers and other radiation sources are described as fundamental components in optical systems. (SPSP-313)

Class 3, Lab 3, Credit 4.

PPHS-543 Optical Engineering
Registration #0907-543
An introduction to the characteristics of optical components and their combination into instrument and imaging systems. Radiation Sources. Refracting and reflecting optical components. Stops, pupils and the propagation of energy through optical systems with both image forming and image recording elements. Radiation measurement techniques and apparatus. Discussion of lenses, cameras, collimators, telescopes, alignment and measurement apparatus, and other instruments. Limitations on system performance. (PPHS-541)

Class 3, Lab 3, Credit 3

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-561, 563, 565 Microelectronic Chemistry I, II, III
Registration #0907-561, -563, -565
Selected topics from organic, polymer, physical, and photographic chemistry important to the understanding of silver-halide, diazo and photo resist materials. (EMCR-340, PPHS-207, PHS-543)

Class 3, Lab 3, Credit 4.

PPHS-571,572 Photomicrolithography
Registration #0907-571, -572
A course relating imaging and photographic science principles in optics, photographic and conventional chemistry and image evaluation to the field of photomicrolithography for integrated circuit and other microelectronic device fabrication.

Class 3, Lab 4, Credit 4

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

PPHS-660 Seminar/Research
Registration #0907-660
An investigation of a problem in microelectronic processing. Seminars by experts from the various phases of the microelecronics industry. (EMCR-650)

Class 1, Lab 3, Credit 2.

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 Remote Sensing & Image Analysis
Registration #0907-761 (Introduction)
An introduction to radiometric concepts as they relate to remote sensing. The emphasis is on aerial imaging systems, photo interpretation and photogrametry. Techniques for quantification of air photos are introduced.

Class 3, Lab 4, Credit 4

PPHS-762 Remote Sensing and Image Analysis
Registration #0907-762 (Quantitative Analysis)
Techniques for quantification of aerial and satellite images are considered with emphasis on radiometric processing. Thermal infrared image collection, recording and analysis for surface temperature measurement are treated in detail. Atmospheric propagation phenomena in the visible and infrared are treated in terms of their impact on aerial and satellite systems.

Class 3, Lab 4, Credit 4

PPHS-763 Remote Sensing and Image Analysis
Registration #0907-763 (Digital Multispectral Techniques)
Analysis of digital remotely sensed images is treated with emphasis in multispectral analysis techniques. This includes consideration of multivariate discriminate analysis and principal components for material identification and analysis. Special topics area such as radar, Frauenhaffer line discriminator, hierarchical classifiers, etc. will also be treated.

Class 3, Lab 4, Credit 4

PPHS-771 Color! metry
Registration #0907-771
An in-depth course exploring colorimetry, the quantitative specification of color. The emphasis is on the spectral characterization of chromatic stimuli using modern instrumental methods and deriving the relationships between appearance attributes and instrumental data. Advantages and disadvantages of various imaging systems will be evaluated using many available color metrics. The course will introduce the use of computers in colormetric applications. (PPHS-409)

Class 3, Lab 3, Credit 4

PPHS-772 Advanced Colorimetry
Registration #0907-772
A detailed treatment and evaluation of specialized current problems and topics of color science, appearance, and technology. Topics include turbid media theory, computer colorant formulation for subtractive imaging systems, luminescent materials, and current research in color science. (PPHS-734)

Class 3, Credit 3

PPHS-773 Colorimetric Instrumentation
Registration #0907-773 and Standardization
This course will cover current methods in precisely measuring the spectral properties of object colors and of radiation sources. Proper procedures in calibration, standardization, data analyses, instrument maintenance, and standards selection will be presented. The use of standard reference materials in optical metrology will be explored. (PPHS-735, and PPHS-413 or PPHS-722)

Class 2, Lab 6, Credit 4

PPHS-890 Research and Thesis Guidance
Registration #0907-890
Thesis based on experimental evidence obtained by the candidate in an appropriate field as arranged between the candidate and hisor her adviser.

Credit 9, minimum for MS

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 7

PPHT-205 Photography For Non-Photo Majors
Registration #0920-205
A course in basic photographic techniques for non-photography students. The material will assist the student in understanding the controls of light and film. Emphasis is placed on the use of photography in the student's career field. A 35mm camera is required.

Class 4, Credit 4

PPHT-210 Materials and Processing of Photography
Registration #0920-210
An intensive 10-week summer course for students entering a transfer program in biomedical photographic communications or technical photography. This course replaces PPHT-211, 212, 213.

Credit 6 (Summer)

PPHT-211, 212, 213 Materials and Processing of Photography
Registration #0920-211, -212, -213
A basic study of the technology of photography, with emphasis on applications to real photographic problems. Among the topics studied are image formation and evaluation, photosensitive materials, exposure, processing, tone reproduction, visual perception, color theory, variability, quality control, and photographic effects. An independent study project is required.

Class 3, Credit 3/Qtr.

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 photographic processing constitutes 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 wil 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, color filters, the Ostwald, Munsell, and CIE color notation systems, illumination for 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
Equipment and methods used for the measurement of color will be discussed and demonstrated in the laboratory. Topics covered include light sources, radiometry, spectrophotometry, color order systems, and reproduction of color. Pascal programming will be presented and programming assignments will be required. (PPHT-321 or equivalent)

Class 3, Lab 4, Credit 5

PPHT-321 Applied Computing for Technical Photography
Registration #0920-321
Current timesharing computer facilities will be introduced with emphasis on specific hardware and software packages available on these facilities including word processing. Introductory material on Pascal programming will be presented. Programming assignments will be required. Enrollment will be limited to Technical Photography students or by permission of the instructor.

Class 2, Credit 2

PPHT-340 Introduction to Scientific and Technical
Registration #0920-340 Applications of Photography
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. Open to all RIT students.

Class 2, Lab 4, Credit 4 (Fall)

PPHT-341 Introduction to Corporate and Special Interest
Registration #0920-341 Publications of Photography
A survey of this type of publication with particular emphasis on the photographic problems involved. Skill building assignments to improve competence and an introduction into the problems of the art director, editor, printer, layout person, and writer from the basis of the course content. (PPHL-313)

Class 2, Lab 8*, Credit 4

PPHT-395 Photo Electronics Workshop
Registration #0920-395
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

PPHT-401, 402, 403 **Photo Instrumentation**
Registration #0920-401, 402, 403 **Applications Seminar**
This course covers photographic topics which emphasize scientific and technical applications where photography functions as a tool of measurement or visualization of events which are beyond the range of normal photographic equipment.

Class 1½, Lab 4, Credit 4

PPHT-404, 405, 406 **Seminar in Corporate and**
Registration #0920-404, 405, 406 **Special Interest Publications**
A survey of this type of publication with particular emphasis on the photographic problems involved. Skill building assignments to improve competence and an introduction into the problems of the art director, editor, printer, layout person, and writer for the basis on the course content or faculty approval. PPHT-312, PPHL-313

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 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, Credit 9 (Summer only)

PPHT-411 **Preparation of Visuals**
Registration #0920-411
Study of the£asic principles and techniques of effective visual communication and design; including charts, graphs, creative 35mm slide techniques, graphic design, and mechanical art requirements for printing. Assignments are compatible with situations in graphic design and AV studio facilities.

Class 2, Lab 4, Credit 3

PPHT-412 **Photomacrography/Photomicrography**
Registration #0920-412
Basic principles of photomacrography and photomicrography with major emphasis on illumination techniques and image formation, with lectures, demonstrations, and projects.

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. Labs will give hands-on experience with the construction and playback of transmission, reflection, and focused image hologram types.

Class 2, Lab 4, Credit 4

PPHT-425, 426, 427 **Nature Photography**
Registration #0920-425, 426, 427
Students will learn the fundamentals of professional nature photography as exhibited by such magazines as **Audubon** and **National Wildlife.** Topics include selection and care of equipment, use of strobes, adapting to adverse weather conditions, sales of photographs, copyright law, free-lancing, and more.

Class 2, Field 4, Lab 4*, Credit 4/Qtr.

PPHT-431 **Architectural Photography**
Registration #0920-431
An image-making course for advanced students with a specific interest in architectural exterior 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 Photographic Technology programs or permission of the instructor.

Class 4, Credit 4 (Fall, Winter, Spring)

PPHT-441 **Introduction to Dye Transfer**
Registration #0920-441
An introduction to the Dye Transfer process using pan matrix film with emphasis on the understanding of its theoretical principles, and on the mastery of basic transfer techniques. This includes the preparation of transfer prints from the student's color negatives. PPHT-312 or equivalent)

Class 1, Lab 6, Credit 4

"Lab hours may not be scheduled and are to be completed in available time.

PPHT-442 **Advanced Dye Transfer I**
Registration #0920-442
A continuation of the Dye Transfer Process with emphasis on the understanding and mastery of masking and color separation (analysis) of a color transparency. The synthesis is accomplished by the making of a dye transfer print. (PPHT-441, PPHT-312 or equivalent)

Class 1, Lab 6, Credit 4

PPHT-443 **Advanced Dye Transfer II**
Registration #0920-443
This quarter of the Dye Transfer program is devoted to variations of standard techniques and further extension of improvement of procedures. Difficulty of procedure will determine number of assignments required. (PPHT-442 or equivalent)

Class 1, Lab 6, Credit 4

PPHT-444 **Reversal Color Printing**
Registration #0920-444
A one-quarter course on color reversal printing procedures, printing and processing. The student will gain proficiency in using reversal print material. (PPHT-312 or PPHL-207 or Faculty Approval)

Class 1, Lab 4, Credit 3

PPHT-446, 447, 448 **Advanced Color Printing I, II, III**
Registration #0920-446, 447, 448
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 is required. (Permission of the instructor)

Lecture 1, Lab 6, Credit 4/Qtr.

PPHT-501 **High-Speed/Time-Lapse Photography**
Registration #092-501
This is a course in the theory and practice of photographic systems designed to permit analysis of events of very short or of extended duration. Included are operational characteristics of time-lapse cameras, sequencing and timing control devices, time magnification relationships. Also, characteristics of intermittent and rotating prism cameras, rotating mirror and drum cameras, synchronization systems and timing controls and high speed flash and spark gap systems. Students gain experience not only in the use of basic equipment but also in proper planning, set-up and data reduction techniques through a series of practical experiments.

Class 2, Lab 4, Credit 3

PPHT-502 **Introduction to Research**
Registration #0920-502
This course leads to a completed Proposal in preparation for the Senior Project (PPHT-503). It guides the students in preparing formal proposals for their research projects, including selection of topics, searching the literature, and proposal evaluation.

Class 1, Credit 1

PPHT-503 **Senior 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

PPHT-511 **Co-op/Intemship Seminar**
Registration #0920-511
This course is designed to prepare third year Technical Photography students for internships and career decisions. Classroom instruction and outside work will be aimed towards helping the student effectively utilize the internship experience. Topics such as resume preparation, interviewing techniques, application procedures, career tracking, and internship evaluation will all be addressed in the course. Students completing the course will gain a thorough understanding of the internship process and be better prepared for career decisions.

Class 3, Credit 4 (offered annually) Class 3, Credit 4 (offered annually)

PPHT-512 Co-op/Internship
Registration #0920-512
This course is designed to provide students with on-the-job experience in the field of technical photography. After completing the prerequisite Co-op/Internship Seminar (PPHT-511), the student will seek and acquire a school approved internship position in business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the internship coordinator will assist the student in evaluating the experience. (PPHT-511)

Credit 3

PPHT-551, 552,553 Special Topics in Technical Photography
Registration #0920-551, -552, -553
A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered in the regular curriculum. Available to upper level students.

Credit variable

PPHT-599 Independent Study
Registration #0920-599
A student proposed advanced project sponsored by a faculty member. Approval of the proposal by the department chairman and the school director required. Available to upper level students with a G.P.A. of 3.0 or higher.

Credit variable

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 the Income Statement and the Balance Sheet and discussion of inventory valuation, depreciation, financial ratios, financing considerations, and financial statement analysis. The course requires students to complete a computerized practice set simulating record keeping and analysis of an accounting cycle.

Class 3, Credit 3

PPRM-301 Application of Computers to the Graphic Arts
Registration #0910-301
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. The first week will be devoted mainly to writing techniques, and the second week to the design techniques.

Credit 3 (Summer)

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. Currently this course meets with PPRM-403 and has exactly the same contents. Students cannot receive credit for 0910-310 and 0910-403.

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 Reproduction Technology
Registration #0910-340
The course will cover printing methods using electrostatic technology as practiced on high speed 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, and 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.

Class 3, 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; completing the estimate. (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; printing trade customs; multi-color offset presses and signature-related bindery operations; signature imposition; camera, flat 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

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 risk, Markov chains, waiting line analysis, game theory, simulation. These topics are considered without emphasis on mathematics beyond college algebra.

Class 4, Credit 4

PPRM-415 **Advanced Ink and Color**
Registration #0910-415
Further study of ink and color with emphasis on relationship to printing processes and print qualities. Study of inks for special purposes as well as ink-jet and electrostatic printing. New types of inks such as acrylic ink, water based inks, etc. New ideas in inks such as IR drying. Study of materials used in ink manufacturing and the effects on printing processes and print qualities. Study of color with emphasis on color gamut system and problems in process color printing. Study of ink-paper relationship. Further study of ink rheology and other physical properties. The course will deal with inks for all the processes. (PPRT-315 or permission of instructor)

Credit 4 (Summer)

PPRM-420 **Electronic Communications in the Printing and**
Registration #0910-420 **Publishing Industries**
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. Prerequisite: 1016-204 College Algebra & Trigonometry

Class 4, 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 **Conference Management and Leadership**
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 of 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 are required.

Credit 4 (Summer)

PPRM-502 **Financial Controls II**
Registration #0910-502
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-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 and MS DOS operating systems, data structures, disk file handling techniques, and the creation of good error handling subroutines. (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 supervision including 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
A study of the organization of the United States labor force through the impact of national legislation and the construction of the same by and National Labor Relations Board decisions. Study includes rights of employees, their free choice of representation, collective bargaining behavior, settlement of disagreements, right to strike, and future modification of the field.

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 in Publishing**
Registration #0910-515
A comprehensive review of United States Law Supreme Court decisions as they relate to the unique rights granted to the graphic arts industry. Cases cover Article I, section 8of the United States Constitution and the First and other amendments thereto.

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 on a "one-time" basis special topics not normally covered in the curriculum. 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

PPRM-599 **Independent Study**
Registration #0910-599
Student selects and develops, with approval from a faculty sponsor, an independent study project of his or her own design. Project and amount of credit assigned must have final approval from the director of the School of Printing. (Generally seniors with qualifying grade point average)

Credit 1 to 5

Technical Courses

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; utilization of various input systems.

Class 2, Lab 3, Credit 3

PPRT-203 **Layout and Printing Design I**
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 with assistance in 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.

Class 2, Lab 3, Credit 3

PPRT-205 **Gravure**
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
Reproduction Photography is the basic course in image conversion which is presented as a problem-solving model against which all new and emerging image conversion systems can be evaluated. Photo chemistry, optics, sensitometry, halftone theory and tone reproduction are examined as systems components on a basic (math/science) level. This systems overview prepares the student to make sound business decisions regarding technologies to be used for the purpose of image conversion.

Class 2, Lab 3, Credit 3

PPRT-207 **Printing Plates**
Registration #0911-207
An introductory course in the theory and practice of platemaking for letterpress, flexographic, lithographic and gravure printing processes. A heavy emphasis is placed upon the interfacing of available light-sensitive systems with electronic imaging technology.

Class 2, Lab 3, Credit 3

PPRT-208 **Lithographic Press**
Registration #0911-208
A first course in sheet fed offset press technology covering; role of sheet fed presses in the industry, basic design of press divisions and comparisons, comparison of sheet fed offset with web offset and other printing processes. Lab work consists of hands-on instruction of proper press operation on small offset presses.

Class 2, Lab 3, Credit 3

PPRT-209 **Screen Printing I**
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 fundamental methods and techniques of copy preparation. It stresses the assembly of copy for various printing specialty areas and compares their likenesses and differences. Lectures cover all aspects of copy as used in making the "mechanical" and how the "mechanical" relates to the entire production system.

Class 2, Lab 3, Credit 3

PPRT-301 **Typography II**
Registration #0911-301
The student is expected to be able to design and produce finished typographic projects. Only the requirements and restrictions for each program are given to the student, who can interpret them any way, as long as it is within the prescribed limitations. Critiques will be held when each project is completed. Topics included in the lectures are: Typographers, and a look at their work; Typographic Style; Typographic Trends; review of Design Concepts; Typographic Movements; and Private Presses. The serious student of Typography will find this a challenging course.

Class 2, Lab 6, Credit 4

PPRT-302 **Composition Systems**
Registration #0911-302
A detailed study of photocomposition with emphasis on the systems approach. Format planning and development plus coding structures are utilized for typographic problems. Specialized computer typesetting hardware and software are analyzed for composition systems with digital storage.

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 and Halftone Analysis
Registration #0911-306
An in depth analysis of the halftone process as it relates to the measurement and reproduction of tones for the major printing processes. The emphasis is placed on a scientific analysis of a complete system of halftone sensitometry and process control.

Class 2, Lab 3, Credit 3

PPRT-308 Lithographic Press Problems
Registration #0911-308
An advanced course in the theory, practice, and problems of offset presswork. Furdher development of technical knowledge of materials and equipment. Practice in running process color work.

Class 2, Lab 6, Credit 4

PPRT-309 Screen Printing II
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, container press capable of printing cylindrical, conical and flat objects, and making positives and stencils with GSP Graphix 2.

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 understand printing production planning from design to finish. Topics include preparing production specifications for image assembly, printing and finishing. Laboratory experiments cover the operation of modern, 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 in black and white as well as color image assembly. Lab projects are assigned with the purpose of covering a wide variety of layouts requiring different techniques and often the creation of necessary contact or duplicating films of the roomlight variety. In addition to standard practices the student also works with the latest model line-up tables, a Micromodifierfor spreads & chokes and receives basic instruction in electronic page make-up (Autoprep 5000). Other automated prepress imposition systems are covered 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 mechanicals, "keyline" mechanicals, use of photographic and typographic copy. Relation to production is stressed by shooting copy on camera, stripping and proofing; proper instructional specification writing. Design and production of individual 4-color process preseparation. (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 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; how a computer can be used in creating designs for newspaper pages.

Class 2, Lab 3, Credit 3

PPRT-320 Newspaper Production I
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 Mailroom
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. A study of readership and how it relates to newspaper circulation.

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. Open to students in the Newspaper Production Management program only.

Class 2, Lab 3, Credit 3

PPRT-324 Newspaper Composition
Registration #0911-324
A study of the electronic information handling for composition, layout, and pagination techniques used in the publishing of newspapers, with emphasis on the systems approach.

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) (Offered once each year)

Class 2, Lab 3, Credit 3

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 pre-press operations, and the production of special inserts. 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 course to the skills of bookbinding and contemporary preservation procedures used to save our printed heritage. Content will cover methods and techniques used in handbookbinding, including sewing, adhesive binding, gilding and boxmaking. Basic conservation skills are taught. Library binding and enduse requirements of bound products are studied and tested in order to obtain thorough knowledge of the physical requirements of bound books. Course is designed for those who value good craftsmanship and have an interest in binding books. No pre-requisite is required. However, a good dexterity 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 from 1640
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, Lab 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 their own objectives and satisfaction.

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 III
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 structures class sessions - more individual initiative required. Pre-requisite PPRT-313 or 213 and 303 and instructor permission. (PPRT-313)

Class 2, Lab 6, Credit 4

PPRT-406 Color Separation Systems
Registration #0911-406
A study of the basic color theory, materials and methods used in the graphic arts for the reproduction of good quality color. Topics include color separation systems, color quality control, productivity, scanners, and electronic image manipulation systems.

Class 2, Lab 3, Credit 3

PPRT-410 Properties of 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 and paperboard, 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 Arte
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, materials 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, Credit 3

PPRT-501 Development of Printing Types
Registration #0911-501
Historical Development, Identification, and Classification A lecture course that looks at the historical development of the typefaces that we use everyday. Classification methods are discussed and analyzed. With slides we look at representative typefaces, learn their visual characteristics for identification. Who the designers are and the foundries, etc., that created them.

Course 3, Credit 3

PPRT-506 Electronic Color Imaging and Color Control
Registration #0911-506
An analytical study of color reproduction systems will give data to produce good quality color reproductions consistently. Requirements and capabilities of electronic pre-press integrated color systems will be studied to help in the design and management of a color system whether it be in-house or part of a network. (PPRT-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 Printing**
Registration #0911-560 **Graduate Study**
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 for the photography major with the emphasis placed on the problems involved in achieving optimum tone and color reproduction from their photographs. A general understanding of the printing industry, basic printing processes, line and halftone photography, tone reproduction and color separation techniques are covered through lecture and laboratory experiences.

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**
Registration #0911-594
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
An applications workshop which covers printing requirements in relation to computer systems configurations; applications of computers to management and production control problems; investigation of computer-oriented production control techniques.)PPRM-301)

Credit 4

PPRT-701 **Research Methods in the 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 electrostatics; electrolysis, magnetism and lasers; study of hybrid systems and the significance and application of interdisciplinary methods. The Neugebauer and color correction equations.

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

PPRT-708 **Introduction to Systems Analysis**
Registration #0911-708
Problems of systems analysis in printing operations for the highest quality product at the minimal cost including optimal floor designs and methods of study. (PPRM-301)

Credit 4

PPRT-709 **Trends in Printing Technology**
Registration #0911-709
A study of the forces which have influenced the development of printing with emphasis upon the technological factors involved; examinations of the relationships of aesthetics and craft concepts to modern industrial techniques. Projection of future industry trends are developed.

Credit 4

PPRT-711 **Tone and Color Analysis**
Registration #0911-711
A study of the methods and instrumentation necessary for the evaluation of printed materials for product quality assurance. The ultimate objective being the optimization of the production processes and the control of those processes.

Credit 4

PPRT-713 **Phototypography Procedures**
Registration #0911-713
Utilizing phototypesetting equipment, the student shall learn to develop typographic skills necessary to plan and mark-up typesetting jobs so that the end results will closely match the original concept. Coding, format planning and development shall be taught so that the student will feel at ease in the creation and completion of the projects. The lectures include the aesthetics and the technical information on phototypesetting equipment. Mark-up; system analysis of equipment; and front end systems.

Credit 4

PPRT-722 **Ink, Color and Substrates**
Registration #0911-722
A study of the physics of light and color basic color theory, color measurements and color systems. Included are applications of color theory to the graphic arts. The chemistry and physics of ink and substrates, and their interaction, are covered. Emphasis is given to the problem of ink, color and substrates in each printing process.

Credit 4

PPRT-850 **Research Projects**
Registration #0911-850
Individual research projects in which independent data is collected by the student, followed by analysis and evaluation. A comprehensive written report is required. Consent of advisor is required.

Credit variable 1-4

PPRT-890 **Research and Thesis Guidance**
Registration #0911-890

An experimental survey of a problem area in the graphic arts.

Credit 8

College of Liberal Arts

Criminal Justice

GCJC-201 **The Criminal Justice System**
Registration #0501-201
The principles of the criminal justice system; administration and management within various agencies, including the relationship of the police to the courts; the courts to the probation, correction and parole functions. Consideration will also be given to specific problems within the branches of the criminal justice system.

Class 3, Credit 4 (offered annually)

GCJC-203 **Criminology**
Registration #0501-203
A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, theories of criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime.

Class 3, Credit 4 (offered annually)

GCJC-204 **Public Administration**
Registration #0501-204
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 administering of public institutions, will be offered to the student. (GCJC-201)

Class 3, Credit 4 (offered annually)

GCJC-206 **Administrative Concepts in Law Enforcement**
Registration #0501-206
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**
Registration #0501-207
The course is designed to introduce the student to the basic organizations of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, will be discussed within the context of historical and contemporary philosophy. Attention will also be focused on decision making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness will be surveyed. (GCJC-201)

Class 3, Credit 4 (offered annually)

GCJC-301 **Concepts in Criminal Law**
Registration #0501-301
The subject matter of this course consists of an introduction to the fundamental principles upon which substantive criminal law is based. The basic characteristics and requirements of criminal conduct are examined. Included in the scope of this course are the following topics: the nature of criminal conduct, the meaning of criminal mental state, the requirement of concurrence between action and intent, and the requirement of legal causation. The elements of the principal defenses to criminal liability, such as insanity, entrapment, and self-defense, are also discussed. (GCJC-201)

Class 3, Credit 4 (offered annually)

GCJC-302 **Organized Crime**
Registration #0501-302
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-304 **The Judicial Process**
Registration #0501-304
Judicial process is designed to provide the student with an over-view of the structure and function of the Federal and State Court systems. Emphasis will be placed on the relationship between the Federal and State Courts, judicial review, judicial decision making, and the Courts as interpreters of constitutional rights. (GCJC-201)

Class 3, Credit 4 (offered annually)

GCJC-306 **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.

Class 3, Credit 4 (offered annually)

GCJC-401 **Scientific Methodology**
Registration #0501-401
This course provides a foundation in the uses of quantitative social science research methods with special reference to utilization of data bases and examples from criminal justice, human services and public policy. Stress will be on the deducting hypotheses from theoretical frameworks, identification of the relationships among variables, establishment models, creation of null hypothesis, quantitative methods of data collection and analysis using both parametric nonparametric 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 & Field Seminar**
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.

Class variable, Credit **4** each (offered annually)

GCJC-405 **Major issues in the**
Registration #0501-405 **Criminal Justice System**
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, unreasonable 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 on sufficient demand)

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)

GCJC-415 Domestic Violence
Registration #0501-415
This course is designed for social work students, criminal justice students, and professionals who are interested in examining the problems related to domestic conflict and violence. Included will be a study of the dynamics of violence as reflected in child abuse, incest, marital rape, spouse and parental abuse, and violence among siblings.

Credit 4 (usually offered summers for one week)

GCJC-416 Forensic Photographic Evidence
Registration #0501-416
Basic photographic techniques applicable to the law enforcement profession or other investigative applications. The course will cover photographic fundamentals as they apply to the investigative photographer. This will lead to the more involved techniques of the police and fire photographer. Topics include photographing homocides and other deaths, tool mark and document photography, court presentations, surveillance and identification photography, and arson investigation.

Class 3, Credit 4 (offered annually)

GCJC-505 White Collar Crime
Registration #0501-505
An examination of the extent and character of white collar crime, with special emphasis upon business and professional deviance. (GCJC-201, 203)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-506 Evidence
Registration #0501-506
This course is designed to provide the student with an awareness of what types of evidence are admissible in a criminal trial. The course includes a comprehensive analysis of the most frequently used rules of evidence. There are readings and discussions pertaining to the nature of real, testimonial, hearsay, and circumstantial evidence. The course examines rules concerning the cross-examination of witnesses, exceptions to the exclusion of hearsay evidence, the burden of proof, the provinces of the judge and of the jury, legal presumptions and the exclusion of illegally obtained evidence (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-510 Counseling in the Criminal
Registration #0501-510 Justice System
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 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)

GCJC-511 Alternatives to Incarceration
Registration #0501-511
The course analyzes possible sentencing options available to the criminal courts as well as pre-adjudicatory alternatives for both adults and juvenile offenders. The variety of dispositions evaluated include; probation, parole, half-way houses, work-release, study-release, prison furloughs, pre-trial release, pre-probation alternatives (fines, suspended sentences, conditional discharge, and a variety of diversion programs). Special emphasis is placed on a critical evaluation of the alternatives as they compare to the more traditional methods of handling offenders. Field trips and guest lecturers from non-traditional programs are typically included in the course. (GCJC-207) (GCJC-411)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-512 Minority Groups and the
Registration #0501-512 Criminal Justice System
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)

GCJC-514 Planning and Change in the
Registration #0501-514 Criminal Justice System
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) (GCJC-401)

Class 3, Credit 4 (offered annually) Class 3, Credit 4 (offered annually)

GCJC-516 **Court Administration**
Registration #0501-516
A course designed to explore the management aspects of the court and court process. There is a focus on the structure of the several levels of court that typically exist in modern urban America. Related to this structure are the various other criminal justice agencies that interact with the court at various stages of the process. In addition, operational problems such as the bail process, record keeping, jury service and selection methods, and calendar management will receive significant attention.

Class 3, Credit 4 (offered on sufficient demand)

GCJC-517 **Comparative Criminal Law**
Registration #0501-517
The course examines, in a comparative analysis, the criminal system and the penal methods of Europe and the United States. Major emphasis will be given to the issues of intent, criminal responsibility, individual and public interests, purposes and modes of prevention, repression and punishment, methods of trial, punishment and pardon. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-518 **Criminal Justice/Community Relations**
Registration #0501-518
This course examines the goals and objectives of agencies operating within, or directly related to, the criminal justice system in relation to mutual expectations, the community and the agency, in the delivery of services. Emphasis will be on intergroup responsibilities in exploring strategies to reduce conflict in the solving of public problems within the sphere of the criminal justice system. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-520 **Sentencing Process**
Registration #0501-520
This course is intended to provide the student with a broad overview of the law of sentencing and the alternatives presently available in this area. Emphasis will be placed on the traditional methods of punishment now available in the courts, including, but not necessarily restricted to; fines, imprisonment, probation and suspended sentences. The course will also look to the power of the court in exercising its discretion in the sentencing process. (GCJC-201, 207,304)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-522 **Victimless Crime and the Law**
Registration #0501-522
The course is designed to familiarize the student with many of the implications and ramifications of efforts to control "victimless" crimes. Course discussions concentrate on the illegal activity associated with prostitution, gambling, homosexuality, drug use and pornography. In this course the social, moral, legal and practical consequences of legalizing such activities are examined and evaluated (GCJC-201, 203, 301)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-523 **Crime and Violence**
Registration #0501-523
This course focuses on the outbreak and increase of violent crime and criminal trends in the United States as one of the more serious realities of this century. In addition to an historical review, contemporary problems are explored, covering such topics as violence in the streets, terrorism, riots, vigilantism, and the role of various criminal justice agencies in attempting to control these problems. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-525 **Institutional Security**
Registration #0501-525
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 area 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, fire, 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 area of security that are not" otherwise covered directly or in depth in established security courses. Topics are expected to vary from offering to offering.

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 Willful 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
This course explores social work as a profession, the various fields in which social workers practice and the differing philosophies of human services and social work approaches. Also covered are strategies for developing self-awareness and professional self-assessment.

Class 3, Credit 4 (F)

GSWS-211 **Structure and Function of Social Welfare**
Registration #0516-211
Examines the provision of social services in five major fields of social welfare: public welfare, traditional voluntary agencies, voluntary social movements mental health 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. (GSWS-302, or concurrent)

Class 3, Credit 4 (W)

GSWS-215 **The Family From a Social Work**
Registration #0516-215 **Perspective**
The course is designed to give the social work student a basic understanding of the family as client. Students will look at the family from the perspective of an outside observer whose purpose is to analyze family interaction to assess problems and plan interventions. Emphasis will be on the contemporary American family including its structure, functions and roles of family members and the family's role in society. (GSSP-210, 440; GSSS-210)

Class 3, Credit 4 (F)

GSWS-302 **History of Social Welfare**
Registration #0516-302
This course is designed to acquaint the student with the historical roots of our present system of social welfare, emphasizing its development in the United States, and the concurrent development of social work as a profession. It will examine the value bases of a particular era as reflected in the social welfare programs of that time and their effects on people. (GSWS-210, or concurrent)

Class 3, Credit 4 (F,W)

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. Involves analysis of data using computer statistical package. Attention will be given to programs for minority groups, the disabled, the elderly, youth, persons with mental health problems and other special populations. (Third year standing, GSWS-534)

Class 3, Credit 4 (Spr)

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 forthe later development of practice skills in working with groups. (Third year standing; GSSS-210)

Class 3, Credit 4 (W)

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 instruction. 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, data-collection and 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 the three-course sequence. (GSWS-210, 211, 302, 315, 356 or concurrent)

Class 3, Credit 4 (Spr)

GSWS-412 **Assessment and Problem Solving**
Registration #0516-412 **(Methods II)**
See GSWS-411 (GSWS-411, 534; corequisite with GSWS-421, 433)

Class 3, Credit 4 (F)

GSWS-413 **Intervention Strategies**
Registration #0516-413 **(Methods III)**
See GSWS-411 (GSWS-412, 421, 433; corequisite with GSWS-422, 434, 535)

Class 3, Credit 4 (W)

GSWS-421 **Field Instruction I**
Registration #0516-421
Field instruction I and II comprise a 20-week, 30-hour per week supervised field placement. Under the guidance of an instructor, the student is placed in a cooperating social, governmental, health or educational agency in order that s/he may gain direct experience with its organization, programs and client services. Closely supervised work at the agency is supplemented by seminars designed to integrate theory and practice. (GSWS-411, 534; corequisite with GSWS-412, 433)

Field 300, Credit 5 (F)

GSWS-422 **Field Instruction II**
Registration #0516-422
See GSWS-421. (GSWS-412, 421 and 433; corequisite with GSWS-413, 434, 535).

Field 300, Credit 5 (W)

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, 534; corequisite with GSWS-412, 421)

Class 3, Credit 4 (F)

GSWS-434 **Managing Community Services**
Registration #0516-434
A seminar taken during the second term of field placement. Topics include special management concerns of public and private not-for-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, 421 433; corequisite with GSWS-413, 422, 535)

Class 3, Credit 4 (W)

GSWS-532 **Professional Seminar**
Registration #0516-532
For social work students who have completed field instruction. 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, social activism, lobbying and career-planning are covered. The course is seen as a capstone for integrating practice skills, the value base of the profession and knowledge about human behavior and the social environment. (GSWS-413, 422, 434, 535)

Class 3, Credit 4 (Spr)

GSWS-533 **Policy and Planning Processes**
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, 434, 535)

Class 3, Credit 4 (Spr)

GSWS-534 **Computer Applications to Social Woric Research**
Registration #0516-534
Introduction to the methodology of research as it applies to social work practice. Using the library as a professional research tool, the course covers how to critically read published research, the basic use of computers to calculate statistics, creating and editing data files, electronic communication and report writing and editing. Content includes hypothesis formulation, collection of data, measurements, and non-parametric statistics. (GSWS-210, SMAM-309)

Class 3, Credit 4 (Spr)

GSWS-535 **Advanced Social Work Research**
Registration #0516-535
For social work students who are in their second quarter of field instruction. A second course in research methodology following GSWS-534, building upon the content introduced in that course and emphasizing the formulation of research, the writing of research proposals and the ethics of research. (GSWS-412, 534; corequisite with GSWS-413, 422, 434)

Class 3, Credit 4 (W)

Social Work Electives

GSWS-212 **Self-Awareness in the Helping Role**
Registration #0516-212
This course helps to develop students' helping skills in essentially three broad areas: 1) Skills in noticing or observing; 2) Observing one's professional use of self in the helping relationship and evaluating the appropriateness of such behavior; 3) Observing the client and evaluating the effect one's response has on him/her.

Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills. (GSWS-210)

Class 3, Credit 4

GSWS-213 **Gerontology**
Registration #0516-213
An introductory study of the second half of the life span with a design to increase understanding of the processes of social accommodation, socialization and social change of the aged as they interact with the community and others. *(Social Work Concentration: Gerontology)* (GSSP-210, GSSP-210, 440)

Class 3, Credit 4 (offered annually)

GSWS-214 **Drug Abuse**
Registration #0516-214
This course is designed to familiarize the social work student with the many varieties of dry drugs, drug abuse, drugs and the social scene. Emphasis is placed on a variety of treatment modalities to be used by the social worker when working with drug abusers. *(Social Work Concentration: Alcoholism and Substance Abuse)*

Class 3, Credit 4 (offered on sufficient demand)

GSWS-313 **Sexism and Sexual Identity in**
Registration #0516-313 **Social Work Practice**
This course is designed to sensitize social work students to sexism as it occurs in contemporary culture. The course will focus on gender identity and specific problems and issues related to the worker-client relationship.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-314 **The Social Worker as Advocate**
Registration #0516-314
This course will examine the role of social workers in advocating with and on behalf of clients and others in their efforts to negotiate or bring about needed change in institutions or policies of our society. Discussion of the forces in the social, economic and political environment today that directly affect poverty, racism and related urban crises will be related to examining techniques for achieving change.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-320 **Alcoholism: Physiology and Psychology**
Registration #0516-320
This course presents the chemistry of alcohol and its effect on the body and brain as well as signs, symptoms, addiction and withdrawal. The study of normal and abnormal personality development and the psychological and social mechanisms of alcohol use and alcoholism in our society are emphasized. *(Social Work Concentration: Alcoholism and Substance Abuse)*

Class 3, Crdit 2 or 4 (F)

GSWS-321 **Alcoholism: Interventive Skills and Techniques**
Registration #0516-321
Teaches a variety of interventive skills to those giving care to alcoholics, their families and communities. Emphasis is on the method of use of these skills. Role play, videotaping and case study will be included. **Social Work Concentration: Alcoholism and Substance Abuse.** (Second-year standing)

Class 3, Credit 2 or 4 (W)

GSWS-322 **Alcoholism: Rehabilitation Modalities**
Registration #0516-322 **and Community Resources**
The course analyzes symptoms and diagnosis of the alcoholic and current methods of rehabilitation. Explores structure, function and use of community resources. (Second-year standing)

Class 3, Credit 2 or 4 (Spr)

GSWS-330 **Rural Social Services**
Registration #0516-330
The course will identify the historical development, cultural makeup, family life styles and work habits of the nation's migrant population and the rural poor. The course will examine and critically analyze the differences between the migrants and the rural poor and compare them to the characteristics of the urban poor found in contemporary American cities. The manner by which governmental policies and service-delivery systems directed to the rural areas reflect the economic, political, and social conditions during which they are developed will be subjects of concern. The skills of generic rural social work compared to urban intervention strategies will also be discussed.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-340 **Deafness: Fundamental Aspects**
Registration #0516-340
This course is designed to provide the student with a basic understanding of deafness. This overview includes how we hear, techniques for diagnosis, the etiology of deafness, as well as an historical perspective of how education tor the deaf has developed with its various philosophies. Language acquisition and modes of communication are explored as well as the social, psychological and vocational development of deaf persons.

This is the first course in a deafness sequence that will provide a knowledge base for the development of interactive social work practice skills in subsequent courses in this concentration. *Social Work Concentration: Deafness and Disabilities*

Class 3, Credit 4 (W)

GSWS-341 **Psychosocial Implications of Deafness**
Registration #0516-341
The purpose of this course is to provide the student with an indepth examination of the psychosocial implications of deafness *for the individual.* The various systems with which the deaf individual interacts as well as within which s/he interacts, will be examined for their relevance to the development and functioning of the individual. The course also examines how the individual and these systems impact and influence each other. This system will include family, school, service-delivery systems and society. *Social Work Concentration: Deafness and Disabilities. (GSWS-340)*

Class 3, Credit 4

GSWS-342 **Deafness: Intervention Strategies**
Registration #0516-342
The purpose of this course is to build skills in applying the knowledge base developed in the prerequisite course to case situations. Students demonstrate collection and recognition of pertinent information, and development and implementation of appropriate intervention plans. Legal and political issues as well as methods of assessing local resource networks are considered. Professional roles and intervention goals are discussed as they relate to interfacing systems, including individual, family, school, medical, mental health, rehabilitation, and employment. *Social Work Concentration: Deafness and Disabilities.* (GSWS-340)

Class 3, Credit 4 (F)

GSWS-357 **Mental Health and Mental Illness from**
Registration #0516-357 **a Social Work Perspective**
This course is designed to give social work students a basic understanding of mental health, mental illness and mental retardation from a social work perspective. The role of the social worker in working with individuals and their families will be included. Students will also be given a general understanding of our current mental health systems. (GSWS-210, GSSP-210, 440)

Class 3, Credit 4 (Spr)

GSWS-360 **Social Work with the Disabled**
Registration #0516-360
This course provides an examination of psychosocial aspects of disabilities. The course stresses the effects of disability on the individual's development and functioning and the attendant stress on the family and society in attempts to respond to her/his needs. Interventive strategies and critical times for intervention by the social worker are examined. *Social Work Concentration: Deafness and Disabilities*

Class 3, Credit 4 (Spr)

GSWS-370 **Child Protective Services**
Registration #0516-370
This course centers around an examination of the concepts and knowledge in the field of child abuse and neglect. Topics will include: definition of abuse and neglect, an historical perspective, possible causes and effects of abuse, intervention strategies, statutes and legislation, prevention approaches, child abuse services in New York State, provision of service, role of the social worker, and future concerns in this problem area. *Social Work Concentration: Families and Children.*

Class 3, Credit **4** (offered on sufficient demand)

GSWS-380 **Social Work and the Law**
Registration #0516-380
The main purpose of the legal orientation of the course is to provide the student with the opportunity to develop a workable vocabulary and understanding of some of the basic legislative processes and law that effect the practice of social work. Focus around significant issues and points of law that have in the past, and still do impact the delivery of services. *Social Work Concentration: Legal Social Work.* (Junior standing)

Class 3, Credit **4** (offered on sufficient demand)

GSWS-431 **Social Work Management**
Registration #0516-431
The course focuses on many of the knowledge, attitudinal and skill areas required for the management of social welfare agencies. These include the traditional management skills, their relationship to the not-for-profit sector and the unique requirements of management in the not-for-profit sector. *Social Work Concentration: Social Work Management*

Class 3, Credit **4** (offered on sufficient demand)

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. *Social Work Concentration: Social Work Management*

Class 3, Credit **4** (offered on sufficient demand)

GSWS-455 **Contemporary Issues in Social Work**
Registration #0516-455
This course is designed to offer students an opportunity to examine and discuss contemporary issues in the field of social work. Course content will vary from quarter to quarter depending on current issues and student interest. Areas related to expressed student interest, faculty expertise and developments in the field will be examined. Specific readings will be assigned with classroom discussions, special speakers, films, field trips or role plays included depending on the nature of the issues being addressed.

Class 3, Credit **4** (offered on sufficient demand)

GSWS-466 **Employee Assistance Programs**
Registration #0516-466
An overview of Employee Assistance Programs: planning, development, program implementation, policy and procedures, on-going monitoring and evaluation. Includes comparisons of various program models with corresponding advantages and disadvantages.

The course is designed specifically for professionals whose knowledge of EAP's would be of benefit in their present positions.

Class 3, Credit 2 (offered on sufficient demand)

GSWS-467 **Employee Assistance Programs:**
Registration #0516-467 **Treatment Approaches**
The course will assist participants in identifying and establishing working arrangements with appropriate treatment/counseling service providers; identification will include diagnostic or treatment centers appropriate for referral of troubled employees having problems including alcohol, drugs, mental health, family, financial, legal, gambling and stress. On-site visitation will be included. The course is designed for professionals already working in the fields of Employee Assistance, Personnel benefits, human resources, human development, counseling, social work and psychotherapy.

Class 3, Credit 2 (offered on sufficient demand)

GSWS-509 Services for Children and Their Families
Registration #0516-509
This course is designed to give social work students a beginning knowledge of social work services to children and their families. Specific services included are preventive services, homemakers, day care, protective services, foster care, adoption, unmarried parents, institutional care and mental health services. The development of each type of service will be discussed as well as the reasons why each service is needed and for what type of situation. The social worker's role in each area will also be considered. *Social Work Concentration: Families and Children*

Class 3, Credit 4 (offered annually)

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. Use will be made of case studies and role playing to further develop the students' skills in this area. (GSWS-413, 422, 434, 535)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-513 Advanced Intervention with Families
Registration #0516-513
This course is for students who have completed the methods sequence and field instruction 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 in intervention with families. *Social Work Concentration: Families and Children.*

(GSWS-215, 413, 422, 434, 535)

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 alternate methods of practice are analyzed, such as locality development, social planning and social action. The course will investigate specific applications of community intervention theory to political influence processes, coalition, neighborhood associations and regionalization. (GSWS-315, 413, 422, 434, 535)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-523 Advanced Intervention with Groups
Registration #0516-523
This course examines social treatment as one form of group work practice. There are different service procedures and approaches which center on the use of client groups, and each may have utility in pursuing distinct service objectives. The course will investigate the scope, techniques and function of the group work concept as practiced in such diverse settings as social service agencies, business, correctional institutions and communities. (GSWS-356, 413, 422, 434, 535)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-525 Grant Writing
Registration #0516-525
This course is designed to provide the student with a series of readings and experiential exercises necessary for writing a grant proposal. Focus will be on funding sources which provide money for social welfare programs and for research into social work. *Social Work Concentration: Social Work Management*

Class 3, Credit 4 (Sum)

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 or other field work away from the Rochester area.

Credit variable (F, W, Spr, Sum)

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 communication, 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-444 Technical Writing
Registration #0502-444
This course is 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 command of standard 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. 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-502 Group Communication and
Registration #0502-502 Problem Solving
This course will acquaint students with the general body of theory and research concerning small group communication; enable them to prepare informational and problem-solving group discussions; aid them in developing skills in conference participation and leadership and improve their ability to observe, analyze and evaluate the group process. A major emphasis in the course will be on systematic methods of group problem-solving and decision making.

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 Newswriting
Registration #0502-517
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 Creative Writing
Registration #0502-518
Students are introduced to the craft of writing poems, stories, scripts, and personal essays.

Class 3, Credit 4 (offered annually)

GLLC-519 Advanced Creative Writing
Registration #0502-519
Students who have completed Creative Writing or who have satisfied the instructor, normally by presentation of a writing sample, of their readiness to undertake the course will be given an opportunity to explore in depth a literary genre, subject or theme chosen by the individual student in conference with the instructor. The acceptability of the student's project will be determined on the basis of its intrinsic literary merit and its potential value to the student's development as a writer.

Class 3, Credit 4 (offered occasionally)

GLLC-520 College Vocabulary Skills
Registration #0502-520
Application to the process of vocabulary building of the various disciplines of language study will be provided. Included among these will be applications 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 Intercultural Communication
Registration #0502-521
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 Rhetoric of Social Change
Registration #0502-522
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 Beginning German I
Registration #0502-530
This course will introduce students with no prior exposure to the language to some 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 first course of a three-course sequence, the course may be taken separately.

Class 4, Credit 4 (offered annually)

GLLC-531 Beginning German II
Registration #0502-531
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. (0502-421 or equivalent)

Class 4, Credit 4 (offered annually)

GLLC-532 Beginning German III
Registration #0502-532
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. (0502-422 or equivalent)

Class 4, Credit 4 (offered annually)

GLLC-533 Beginning Spanish I
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. Although this is the first course of a three-course sequence, the course may be taken separately.

Class 3, Credit 4 (offered annually)

GLLC-534 Beginning Spanish II
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. (0502-431 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-535 Beginning Spanish III
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. (0502-432 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-536 American Sign Language I
Registration #0502-536
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-537 Beginning Japanese I
Registration #0502-537
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course will introduce students with no prior exposure to the language to elementary spoken Japanese. Although this is the first course of a three-course sequence, it may be taken separately. Prerequisite: Permission of the Foreign Language Coordinator.

Class 3, Credit 4 (offered annually)

GLLC-538 **Beginning Japanese II**
Registration #0502-538
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course is designed to give students further control of elementary spoken Japanese. Although this is the second of a three-course sequence, the course may be taken separately. Prerequisite: Japanese I or equivalent.

Class 3, Credit 4 (offered annually)

GLLC-539 **Beginning Japanese III**
Registration #0502-539
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course is designed to give students more advanced control of spoken elementary Japanese. Although this is the third course of a three-course sequence, it may be taken separately. Prerequisite: Japanese II or equivalent.

Class 3, Credit 4 (offered annually)

GLLC-540 **Beginning Chinese I**
Registration #0502-540
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course will introduce students with no prior exposure to the language to elementary spoken Mandarin. Although this is the first course of a three-course sequence, it may be taken separately. Prerequisite: Permission of the Foreign Language Coordinator.

Class 3, Credit 4 (offered annually)

GLLC-541 **Beginning Chinese II**
Registration #0502-541
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course is designed to give students further control of elementary spoken Mandarin. Although this is the second of a three-course sequence, the course may be taken separately. Prerequisite: Chinese I or equivalent.

Class 3, Credit 4 (offered annually)

GLLC-542 **Beginning Chinese III**
Registration #0502-542
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course is designed to give students more advanced control of spoken elementary Mandarin. Although this is the third course of a three-course sequence, it may be taken separately. Prerequisite: Chinese II or equivalent.

Class 3, Credit 4 (offered annually)

GLLC-543 **Beginning Arabic I**
Registration #0502-543
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course will introduce students with no prior exposure to the language to elementary spoken Arabic. Although this is the first course of a three-course sequence, it may be taken separately. Prerequisite: Permission of the Foreign Language Coordinator.

Class 3, Credit 4 (offered occasionally)

GLLC-544 **Beginning Arabic II**
Registration #0502-544
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course is designed to give students further control of elementary spoken Arabic. Although this is the second of a three-course sequence, the course may be taken separately. Prerequisite: Arabic I or equivalent.

Class 3, Credit 4 (offered annually)

GLLC-545 **Beginning Arabic III**
Registration #0502-545
This course is offered in a modified self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP).

The College of Liberal Arts is a member of NASILP and uses course material and examiners accredited by NASILP.

This course is designed to give students more advanced control of spoken elementary Arabic. Although this is the third course of a three-course sequence, it may be taken separately. Prerequisite: Arabic II or equivalent.

Class 3, Credit 4 (offered annually)

GLLC-553 **Creative Interpretation in Sign**
Registration #0502-553
Creative approaches to the interpretation of selected literary classics (prose, poetry, fiction, drama) through the visual medium of sign (sign language and sign-mime).

Class 3, Credit 4 (offered annually)

GLLL-332 **Literature**
Registration #0504-332
The students study some of the great literary works of our culture to enrich their lives and reinforce their analytical abilities. The students read representative poems, dramas, and narratives drawn from the Ancient, Medieval-Renaissance, and Modern Periods.

Class 3, Credit 4 (offered quarterly)

GLLL-337 **Literature: Poetry & Drama**
Registration #0504-337
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 and dramas, 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 winter)

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 literature courses in the student's career.

Class 2, Credit 2 (offered spring)

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/Theatre 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 a study of a collection of short stories with critical commentary in order to provide source materials on the nature and development of this genre. 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 literature, 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 also be taken as an elective. (0504-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-445 **Great Authors**
Registration #0504-445
The course provides extended study of the works of a specific great author (to be listed in the sub-title) as selected by the instructor for each section of the course. Students can take any single section of this course as part of the Literature Concentration or as an elective. Additional sections can be taken for elective credit. Prerequisite: 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 boader 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 portrayed by writers from biblical times to our own day. The literature will be supplemented by readings from such disciplines as psychology, philosophy, history and theology. This course is part of the Perspectives on Religion Concentration and 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 worldview 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 playwrights' works within respective periods.

Class 3, Credit 4 (offered annually)

GLLL-504 **Shakespeare: Comedy and History**
Registration #0504-504
Several of 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-507 **Modem World Drama**
Registration #0504-507
Reading modern plays from Europe, America, and the Third World reveals both style and content that function to depict, from a variety of perspectives, the condition of the individual in the modern world.

Class 3, Credit 4 (offered annually)

GLLL-508 **20th Century World Fiction**
Registration #0504-508
Reading 20th century short stories and novels from the East, West and Third World reveals, in addition to stylistic innovation and excellence, a variety of perspectives, values, and problems that contribute to the delineation of contemporary global civilization.

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 contemporary 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)

GLLL-517 **Literature of the Bible**
Registration #0504-517
A close and rapid reading of selected Old and New Testament books to show the range and variety of literary genres and styles in the Bible.

Class 3, Credit 4 (offered occasionally)

GLLL-522 Mark Twain and the American Dream
Registration #0504-522
The course will consist of readings from the bitter comic writings of the last part of Twain's career, focusing on his philosophy of total determinism, his disenchantment with the "damned human race" and its institutions of government, his trust in and later disillusionment with industrialism, and his romantic nostalgic desire to return to an idyllic pre-civil War existence.

Class 3, Credit 4 (offered annually)

GLLL-524 Contemporary Film
Registration #0504-524
A study of contemporary world films, to be drawn from those presently showing in the Rochester area (theaters, television, film festivals). Emphasis will be on both technical and aesthetic aspects of the films.

Class 3, Credit 4 (offered annually)

GLLL-527 Shakespeare: Tragedy and Romance
Registration #0504-527
A generous sample of Shakespeare's tragedy and romance plays is investigated to reveal their literary excellence and their theatrical power. Reference is made to the poems; to the sources of the plays; to the world of Shakespeare's time, its intellectual preconceptions, political stresses, and religious rivalries, and to the theatre and its traditions.

Class 3, Credit 4 (offered annually)

GLLL-528 Great World Novels
Registration #0504-528
A careful reading and analysis of novels selected from the best examples of the genre. The novels are selected to exhibit a wide range of techniques of narration, methods of characterization, and approaches to plot construction.

Class 3, Credit 4 (offered occasionally)

GLLL-531 American Literature of the 192ffs and 193ffs
Registration #0504-531
A study of American writers of the 20th century with particular attention to the beginnings of realism, naturalism and symbolism.

Class 3, Credit 4 (offered annually)

GLLL-535 Technology In American Literature
Registration #0504-535
A study of 19th and 20th century American literature (short stories, an essay, **poems,** and novels) commenting upon the **impact** of technology upon society. The works selected reflect mostly the **sceptical** response of American **writers** to the technological **Utopia.**

Class 3, Credit 4 (offered annually)

GLLL-538 The Nightmare of Technology:
Registration #0504-538 Studies in 19th Century British Writing
A study of 19th century British prose and poetry. Attention will be devoted to the effects of industrialism on a changing English society. The course will study in general the various social problems confronting 19th century England, and how various writers responded to these problems through their writing.

Class 3, Credit 4 (offered occasionally)

GLLL-539 The Romantic Vision
Registration #0504-539
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)

GLLL-542 Literature of Violence
Registration #0504-542
An evaluation of the promoting forces, the types, and the effects of violence as it occurs in literary themes from different periods and backgrounds.

Class 3, Credit 4 (offered annually)

GLLL-545 The Deaf in Fiction
Registration #0504-545
A study of the literature of deafness, with special emphasis on literary works which identify and illuminate "the deaf experience."

Class 3, Credit 4 (offered annually)

GLLL-548 Modem Poetry
Registration #0504-548
A close examination of poems of important English and American poets of the 19th and 20th centuries, including several living poets.

Class 3, Credit 4 (offered annually)

GLLL-550 Jonathan Swift and the Age of Satire
Registration #0504-550
Vicious satirical writings of Jonathan Swift and other early 18th century authors will be read and analyzed, focusing on the intrigue and scandals marking the political and religious environment of the age.

Class 3, Credit 4 (offered alternate years)

GLLL-551 World Literature in English
Registration #0504-551
The course will cover short stories and novels written in English by Australian, African, Asian, and West Indian authors. The selection will be discussed against the background of the social, political, and cultural milieu in which the authors worked.

Class 3, Credit 4 (offered occasionally)

GLLL-556 Athens & Rome: The First Modems
Registration #0504-556
A trip to the beginnings of our culture and an exploration of the first artistic expressions of "modern" sensibility, primarily through reading of the chief authors of Classical Greece and Rome.

Class 3, Credit 4 (offered occasionally)

GLLL-557 Chaucer and His Times
Registration #0504-557
A close reading of the major poetry of Geoffrey Chaucer and The Pearl Poet in modern English Translation, and a brief introduction to the history of the English language.

Class 3, Credit 4 (offered occasionally)

GLLL-560 Art of the Cinema
Registration #0504-560
A critical examination of certain films as an integral part of modern culture.

Class 3, Credit **4** (offered annually)

GLLL-561 Rites of Passage
Registration #0504-561
A survey of literary works providing a variety of insights into growing up, especially from adolescence into young adulthood, which take the reader from the humorously reminiscent to the devastatingly brutal and which provide the reader with a better understanding of and appreciation for this phase of life.

Class 3, Credit 4 (offered occasionally)

GLLL-562 Literature of Suspense
Registration #0504-562
An introduction to stories of mystery and suspense whose literary mode has aesthetic merit; whose plots, characters, and/or settings are uniquely entertaining, and whose authors have evolved rare styles of story telling.

Class 3, Credit 4 (offered occasionally)

GLLL-563 Myth, Legend, Folklore
Registration #0504-563
Scholarly investigation into the rationale, origins and sources of myths, legends and folklore of the western world and the affect these primary forms have had on our literature.

Class 3, Credit **4** (offered annually)

GLLL-564 The Epic
Registration #0504-564

Advanced study of great representative works in the epic mode.

Class 3, Credit 4 (offered annually)

GLLL-565 Black Literature
Registration #0504-565
The course traces the literary contributions of selected black writers in the various genres from its roots in the African heritage through slavery to the present day.

Class 3, Credit 4 (offered annually)

GLLL-566 **Viking Myth and Saga**
Registration #0504-566
Reading the myths, sagas, and folktales of the Viking world reveals the values of a people that created the world's oldest extant democratic society. Both women and men fiercely defend their honor and their freedom, willing to risk death rather than to bow in submission. The sagas are analyzed as compelling narrative structures and as document of a culture that continues significantly to shape Western civilization.

Class 3, Credit 4 (offered occasionally)

GLLL-567 **Ibsen: Drama and Film**
Registration #0504-567
Reading and/or viewing ten plays of Henrik Ibsen, the father of modern drama, enables attentive examination of values and structures of modern society that form and formulate the lives of women and men. Ibsen argues that the possibility of individual freedom and creativity can only be won by seeing beyond and acting in despite of formidable forces. The texts and films are analyzed for visual as well as verbal information.

Class 3, Credit 4 (offered occasionally)

GLLL-568 **Landscape in American Literature**
Registration #0504-568

Advanced study of great American landscape literature.

Class 3, Credit 4 (offered occasionally)

GLLL-569 **Dramatic Tragedy**
Registration #0504-569
A critical examination of representative dramatic tragedies from ancient Greece to the modern era. In examining the texts, we will analyze the individual vision of each play, the relationship of the play to the cultural context in which it was produced, and the common characteristics that define the genre.

Class 3, Credit 4 (offered occasionally)

Science and Humanities

GSHF-213 **Fine Arts: Visual Arts**
Registration #0505-213
The course will develop ability in perceiving worth in objects of art through consideration of fundamental concepts in painting, sculpture, and architecture, involving analysis, interpretation and principles of aesthetics.

Class 3, Credit 4 (offered quarterly)

GSHF-214 **Fine Arts: Musical Arts**
Registration #0505-214
An introduction to music as a fine art. The course is designed to develop skills in listening, evaluation, and analysis through an examination of music's forms, constituent elements, and stylistic and historical development.

Class 3, Credit 4 (offered quarterly)

GSHF-215 **Fine Arts: Film Arts**
Registration #0505-215
This course will develop ability to view analytically and evaluate the film arts, both still and moving (motion) pictures, through consideration of their technologies, histories, aesthetics and critical writings.

Class 3, Credit 4 (offered quarterly)

GSHF-441 **American Architecture**
Registration #0505-441
A survey of American Architecture from the seventeenth century to the present. Stress will be placed on a visual as well as a historical and social analysis. 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-442 **Music in the United States**
Registration #0505-442
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 American 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 distinguishes painting of the colonies and of the United States from its European counterpart. This course is part of the American Artistic Experience Concentration and 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-446 **American Film**
Registration #0505-446
This course will develop an understanding of theories, styles and in American trends film through a historical and sociological study of the medium. 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 manuscript illumination, sumptuous objects, and church architecture (including associated sculpture, mosaics, paintings and stained glass).

Class 3, Credit 4 (offered occasionally)

GSHF-509 **Impressionism to Analytical Cubism**
Registration #0505-509
This course deals with the historical and stylistic aspects of the avant-garde painters of the second half of the 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 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. Mannerist and Early Baroque paintings will be discussed from the point of view of the Renaissance style to investigate concepts of stylistic continuity, evolution, and change. Paintings will also be discussed within their cultural and political contexts.

Class 3, Credit 4 (offered occasionally)

GSHF-536 **Music and the Stage**
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)

GSHF-538 **Bach and the Baroque**
Registration #0505-538
This course is devoted to a study of Johann Sebastian Bach, his life and times, and his music in the context of Baroque styles and aesthetics. Compositions from each of the major periods of his creative life will be examined and discussed, particularly as they serve the social and religious purposes for which they were written, and as they reveal the psychology of so-called "Rhineland mysticism."

Class 3, Credit 4 (offered occasionally)

GSHH-301 **History: Modem 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: Modem 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**
Registration #0507-440 **Its Institution**
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 betaken 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**
Registration #0507-443 **History Since 1600**
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 Hisory, 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 Modem 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 #0507-483
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 and 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 the lives of Americans in various communities (such as families, working, ethnic and political communities) from 1850 to the present.

Class 3, Credit 4 (offered annually)

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 11, 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 and their cultural characteristics.

Class 3, Credit 4 (offered occasionally)

GSHH-505 Japan in the Modem 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 World at War 1914-45
Registration #0507-507
This course aims to give continuity (interpretation of cause and effect relationships) to the major developments of the period 1914-1945. 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-514 Race and Society
Regisn.

Class 3, Credit 4 (offered occasionally)

GSHH-519 United States-Latin America
Registration #0507-519 Diplomatic Relations
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 and culture of the Italian Americans from the colonial period to the present. Stresses their role in the arts, business, politics, the Church, and the labor movement. Italian history is studied as it relates to the Italians in America.

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-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 **In American History**
The course will analyze how well 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-552 **War & Crises, 1945-Present**
Registration #0507-552
World backdrop for American foreign policy and relations from 1945 to the present, dealing with the Greek Civil War, the Chinese Civil War, the Korean War, the American assumption of Western leadership in the Cold War, economic warfare, the Cuban crisis, war in Southeast Asia, the roles of Presidents 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:**
Registration #0507-553 **Patterns in Recent**
American History 1945 to the Present
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)

GSHH-555 **The History of the Soviet Union**
Registration #0507-555
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 Khrushchev and his successors, and current developments in the Soviet Union.

Class 3, Credit 4 (offered annually)

GSHH-556 **The Renaissance World**
Registration #0507-556
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 occasionally)

GSHH-557 **Communism, Fascism & Democracy**
Registration #0507-557 **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)

GSHN-211 **Science, Technology and Values**
Registration #0508-211
This course explores the concepts and effects of science and technology in society, analyzes the relationship between science and technology, examines how each has come to play a major role today, and looks at how science and technology have been affected by our values. Science and technology are often assumed to be value free, yet people, guided by individual and societal values, develop the science and technology. In turn, the choices people make among the opportunities provided by science and technology are guided by their individual values.

Class 3, Credit 4 (offered quarterly)

GSHN-440 **History of Science**
Registration #0508-440
This course presents a study of the origins, nature, and development of Western science, and its social, economic, and cultural context. This course is part of the Social impacts of Science and Technology Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-441 **Science and Technology Policy**
Registration #0508-441
This course will examine how local, state, Federal, and international policies are developed to influence innovation, the transfer of technology, and industrial productivity in the United States and other selected nations. This course is part of the Social Impacts of Science and Technology Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-442 History of American Technology
Registration #0508-442
This course presents an examination of the cultural context of American technology and its influence on American social, economic, political, and cultural institutions. This course is part of the Social Impacts of Science and Technology Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-443 Face of the Land
Registration #0508-443
This course is a case study in the relationship of technology and society, focusing on the interaction of land, people and technology. By considering the natural landforms of the United States and other countries as appropriate, students will see how the nature of land determines its value. As technological innovations are made and introduced, old relationships with the land are altered, sometimes irreversibly. Through this study students have a concrete example of the positive and negative effects of technology on the social structure. This course is part of the Social Impacts of Science and Technology Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-444 Social Consequences of Technology
Registration #0508-444
Modern society is increasingly based on technology. With each advance due to technology, unanticipated problems are also introduced. Society must define and solve these problems or the advances may be diluted or lost. In this course we will study several interactions between technology and the world in which we live. We will investigate how various technologies developed and compare the expected effects of the new technologies with the actual results. This course is part of the Social Impacts of Science and Technology and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-481 Man, Nature and Technology
Registration #0508-481
This course seeks to make students aware of the environmental consequences of modern technology by investigating to what degree various technological systems conflict with the basic ecological principles. This course is part of the Environmental Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-482 Energy and the Environment
Registration #0508-482
In this course we will look at the current situation, its environmental implications, and try to determine how we got here, why we got here, and where we may be able to go in the next 20-50 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)

GSHN-483 Environmental Values
Registration #0508-483
We seek to identify, interpret, and trace the values associated with concern for the environment, and the factors that induced change in these values. Concern with the environment is not a new concept; its history reaches to ancient times, but the values related to this concern have drastically changed. Understanding environmental values helps one become a better prepared participant in the environmental decision making. This course is part of the Environmental Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-484 Environmental Legislation, Regulation,
Registration #0508-484 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)

GSHN-503 Technology and the Individual
Registration #0508-503
A study of the effects on the life of the individual due to the acceleration of technological change.

Class 3, Credit 4 (offered occasionally)

GSHN-506 Space, Time and Reality
Registration #0508-506
In this course we learn the conceptual development of the 20th century theories of time and space with major emphasis on their applications in the present decade. These views, which grew out of the rigorous, mathematical logic of relativity theory arid quantum theory, represent one of the most profound revisions of intellectual thought in human history. We learn how any vestige of an absolute frame of reference in space and time, and how cause and effect and strict determinism were demolished and how probability was introduced by means of these theories.

Class 3, Credit 4 (offered occasionally)

GSHN-507 Community Energy Planning
Registration #0508-507
This course is designed to allow the student to understand the concepts underlying community energy self-reliance, how to analyze a community's energy supply and consumption, and how to evaluate possible energy futures for a community based as much as possible on conservation and alternative energy strategies.

Class 3, Credit 4 (offered occasionally)

GSHN-508 Special Topics in Environmental Studies
Registration #0508-508
This course will be offered periodically as an elective. The topic and specific content and methods will vary from year to year or term to term. The course will allow an indepth examination of a problem or area that is relevant to the other environmental studies courses.

Class 3, Credit 4 (offered occasionally)

GSHN-509 Special Topics in the Social Impacts of
Registration #0508-509 Science and Technology
This course will be offered periodically as an elective in the area of the social impact of science and technology. The topic and specific content and methods will vary from year to year or term to term. The course will allow examination of a special problem or area that is relevant to the other courses in this area of study.

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)

GSHP-445 Social and Political Philosophy
Registration #0509-445
An examination of some of the main problems of social and political philosophy through an analysis, comparison and critical examination of various views concerning the natures of individuality and society, the relations between them and the dependence of one on the other. This course is part of the Philosophy Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-483 The Biblical Tradition
Registration #0509-483
An examination of Judaism and Christianity as they are presented in the Old and New Testaments. This course is part of the Perspectives on Religion Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-515 Philosophy of Law
Registration #0509-515
An introduction to philosophical analysis centering on the nature, extent and justification of law, the nature of legal thought, and the problems and theories of justice.

Class 3, Credit 4 (offered annually)

Social Science

GSSA-210 Cultural Anthropology
Registration #0510-210
This course is a study of the nature, method, and scope of human culture—the patterns of thought and behavior with which mankind makes decisions, criticisms, choices, and judgments in order to satisfy the needs of life and experience.

Class 3, Credit 4 (offered quarterly)

GSSA-440 Culture in Crisis
Registration #0510-440
The Chinese proverb "may you be cursed to live in interesting times" sets the tone for this course. Change in all subsystems of human culture is the hallmark of the 20th century. The stress and strain that accompany change challenge every traditional way of life in the world today. From peasant revolutions and millenarian movements, to the feminist activism of the past generation, causes and consequences are explored in historical and cross-cultural perspective. This course is part of the Social Change in a Technological Society Concentration and may also be taken as an elective. (0510-210 or 0515-210)

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
Registration #0510-501 In Subcultural Diversity
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 Americansociety 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 forbearers, 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-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 quarterly)

GSSE-440 Urban Economics and Public Policy
Registration #0511-440
Urban economics is the application of economic analysis to spatial relationships in densely populated (urban) areas. The first part of the course develops economic models which explain the location behavior of consumers and businesses in cities. The second part of the course is issue-oriented, applying the insights gained in the first part to a number of urban problems. This course is part of the 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 domestic business fluctuations on international trade and finance of each country. Though the course is basically a theory course in economics, the applied aspects of international trade and finance are emphasized. This course is part of the Economics Concentration and 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 consideration of current macroeconomic theory and policy application in the context of the U.S. economic problems, e.g., tax-based incomes policies, wage-price controls. This course is part of the Economics Concentration and 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. (0511-210 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 on sufficient demand)

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
This course is the study of monetary behavior and the role of monetary institutions in the modern economy. The course includes consideration of monetary theory, the development and current characteristics of monetary institutions in the American economy, and the use of the tools of monetary analysis to evaluate alternative monetary policies. The course will conclude with an evaluation of the neo-Keynesian and Monetarist positions. (0511-210 or 0511-301 or equivalent).

Class 3, Credit 4 (offered occasionally)

GSSE-524 Industrial Organization
Registration #0511-524
This course is the study of the structure, conduct, and performance of contemporary American industry. The course involves the application of the tools of microeconomic analysis and empirical evidence to aid in understanding the behavior of modern industry. In addition the course considers the historical determinants of contemporary market structure and the public policy measures designed to preserve a competitive market structure. (0511-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSE-525 Economics of the Less Developed Countries
Registration #0511-525
This course introduces the students to the economic problems of the less developed countries (LDC). Students study the historical causes of underdevelopment, the development gap between developed and underdeveloped countries, and the theories and policies aimed at accelerating the rate of growth in LDC. In addition, the role of international organizations in the economic development of LDC is discussed. (0511-210 or 0511-301 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSE-526 Research Methods for Economics
Registration #0511-526
This course develops the skills used by the applied economist in computer-based research. Exercises and research projects for the course will be chosen to illustrate the kind of problems actually dealt with by the contemporary applied economist. (0511-302, 0601-210, 0106-352)

Class 3, Credit 4 (offered occasionally)

GSSM-211 American Politics
Registration #0513-211
This course is a study of the American national political system, its theoretical foundations and institutions, and the contemporary issues which confront it.

Class 3, Credit 4 (offered quarterly)

GSSM-215 Ideology and the Political Process
Registration #0513-215
This course examines major ideological concepts and how these are operationalized through the political processes of various governmental structures.

Class 3, Credit 4 (offered occasionally)

GSSM-440 International Relations
Registration #0513-440
This course critically analyzes the structure and principles of the international system with emphasis on the tensions between the imperatives of power politics and the requirements of law and justice. This course is part of the International Relations Concentration and may also be taken as an elective. (0513-211 or 0513-215or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-441 Politics in China
Registration #0513-441
This course is designed to provide the students with the political dynamics of the People's Republic of China. Major emphasis will be given to the historical background, major aspects of the political system, and the foreign relations of China. 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-442 Government and Politics of the USSR
Registration #0513-442
This course examines various aspects of the Soviet political system with particular emphasis on the communist party apparatus, governmental institutions, political leadership and contemporary issues in the USSR. This course is part of the International Relations Concentration and may also betaken as an elective. (0513-211 or 0513-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-443 Foreign Policy of the Soviet Union
Registration #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
Registration #0513-444
This course is an examination of the origins and evolution of the Cold War with the major emphasis upon the Soviet-American rivalry in the post World War II era. This course is part of the International Relations Concentration and 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
Registration #0513-450
This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. It will illustrate differences in state governments by comparing other states to New York, and will use the Rochester area for comparisons with local governments found elsewhere. This course is part of the American Politics Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-451 The Legislative Process
Registration #0513-451
This course examines the role of the legislature in the U.S. political process. The primary emphasis will be the study of the U.S. Congress, but some attention 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
Registration #0513-452
This course is a study of the role of the presidency in the American Political System. Among the topics to be considered are: the nomination and election process, evolution, expansion and limitation of presidential powers, factors in decision making, and the various leadership functions performed by the American Presidency. This course is part of the American Politics Concentration and 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
Registration #0513-453
A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures and philosophies shaping the development and implementation of foreign policy. This course is part of the American Politics Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-454 Political Parties & Voting
Registration #0513-454
Political parties are a crucial part of the Democratic process. Parties serve as a critical link between citizens and their Government, as parties promote policies favored by their voters. This course studies parties; their history, their future and their role in the Democratic process. Its overall emphasis is on the degree to which parties perform, or fail to perform, as links between citizens and Government. This course is part of the American Politics Concentration and may also be taken as an elective. (0513-211 or 0513-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-455 Politics and Public Policy
Registration #0513-455
This is a course in the politics of the policy process. The basic questions of the course are: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government implement public policy? How does government evaluate public policy? This course is part of the American Politics Concentration and 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
Registration #0513-504
An examination of the major political, social, and economic developments affecting the United States in the 20th century. Emphasis will be placed upon the reactions of the various presidential administrations to conditions in both the domestic and foreign fields.

Class 3, Credit 4 (offered annually)

GSSM-510 Comparative Politics
Registration #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-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)

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 way religions use education, ritual, rewards, punishment, symbols and other mechanisms of social control and cohesion formation to build and nurture their flocks, in addition it will examine the ways in which religious organizations and their individual members reconcile conflicts between religious and secular norms, world views, loyalties and problem solving strategies. Finally it will suggest how psychological processes such as identity information, attribution, self actualization, brainwashing, conflict, denial, projection, and repression may be applied and misapplied in efforts to understand religious belief and behavior. This course is part of the Perspectives on Religion Concentration and 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 our sensory systems analyze it to produce complicated perceptions of the world around us. Many complex perceptual phenomena draw upon explanations at the physiological, psychological and cognitive levels. (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 every-day 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, hypothesis, 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)

GSSP-522 Psychology of Art
Registration #0514-522
An introduction to psychological research in the area of cognition (thinking, perception, memory) and the application of these findings to the study of art. Also included will be a critical examination of certain theories of personality and abnormality in terms of their relevance to the understanding of the artistic process. Emphasis will be on the areas of painting, sculpture, ceramics, photography and film. (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-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 Social Change In a Technological Society 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 Social Change In a Technological Society 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-444 Dynamics of Social Change
Registration #0515-444
Few people need to be more prepared to deal with social change than professionals in technical fields. In this culture, technology is often at the center of change and technical people are expected not only to cope with change but to help guide it. The purpose of this course is to help RIT students to understand and to deal with change rather than to simply react to it. This course is part of the Social Change In a Technological Society Concentration and may also be taken as an elective. (0515-210 or 0510-210 or equivalent)

Class 3, Credi5 4 (offered annually)

GSSS-445 Television and Social Change
Registration #0515-445
This course will analyze how television and other modern media affect social and cultural change. It will emphasize historical development, structure, organization, function and effects of mass media in society. Issues to be discussed will include: ethnicity, race, age and sex-role stereotyping; the consequences of broadcasting violence; children and the media; the business of television; economic control; the "entertainment" industry; the production of culture; the global reach of television and its consequences. This course is part of the Social Change in a Technological Society Concentration and may also be taken as an elective. (0515-210 or 0510-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSS-446 Health and Society
Registration #0515-446
This course is a survey of the sociological aspects of health and illness. Some areas of study will be the definition, causes (etiology) and cure of disease in various societies and social groups. Also included will be a discussion of the epidemiology of disease, access to, and delivery of health care in contemporary U.S. society, problems of patient care and the study of mental illness and death and/or dying. This course is part of the Social Change in a Technological Society Concentration and may also be taken as an elective. (0515-210 or 0510-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSS-480 Women in Contemporary U.S. Society
Registration #0515-480
This sociology course will examine three major social institutions which shape the lives of women in contemporary U.S. society: the family, the workplace, and political structure. This course is part of the Women's Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSS-506 Social Inequality
Registration #0515-506
The study of social inequality is a survey course which will examine different dimensions of stratification in the U.S. and elsewhere. Explanations for the existence of inequality will be addressed at: individual, group and institutional levels.

Class 3, Credit 4 (offered annually)

GSSS-507 Complex Organizations
Registration #0515-507
This course analyzes the structure and dynamics of a wide variety of social organizations (government bureaucracies, corporations, and voluntary groups). Topics discussed will include theories of organization, organizational processes, technological impact, and organizational change and development. An examination of the internal Operation of large organizations will include sources of power and authority, modes of communication, division of labor **as** well as tension, stress and strain.

Class 3, Credit 4 (offered annually)

GSSS-508 **Aging and Society**
Registration #0515-508
This course considers concepts, issues, and research techniques in the behavioral and biological aspects of aging. It examines the interaction of group processes in the family and community which influence society's attitudes toward the aging process. It further examines the cultural, environmental and institutional changes as they relate to an increasing population of older people.

Class 3, Credit 4 (offered annually)

GSSS-509 **Social Policy**
Registration #0515-509
An examination of social policy formulation in a variety of contexts from local government to national government. Special attention will be given to the strategies, choices and priorities in the formulation of social policy. The course will deal with historical development of social policies including the issues of health, aging, poverty, family and children. The course will also examine the question of how social values and economy influence policy development.

Class 3, Credit 4 (offered annually)

GSSS-510 **Juvenile Justice**
Registration #0515-510
The philosophical, historical and operational aspects of the juvenile justice system; evaluation of the social and personal factors related to juvenile delinquency; the role of police, the courts, corrections and community programs in delinquency prevention, control and treatment.

Class 3, Credit 4 (offered annually)

GSSS-511 **Population & Society**
Registration #0515-511
Study of demographic variables of mortality, fertility, and migration as they affect the rise and quality of population.

Class 3, Credit 4 (offered annually)

GSSS-513 **Criminology**
Registration #0515-513
A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, theories of criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime.

Class 3, Credit 4 (offered annually)

GSSS-514 **The Urban Experience**
Registration #0515-514
This sociology course analyzes social and spatial characteristics of cities and considers reasons for urban development, ecological factors, types and networks of settlements, and urbanism as a way of life. It also examines the issues of neighborhoods, subareas, "ghetto" enclaves, metropolitan regions, urban social and political structures, problems, services, and planning.

Class 3, Credit 4 (offered annually)

GSSS-524 **Applied Sociology**
Registration #0515-524
This course is an effort to provide the student with useful sociological knowledge applicable to solutions of practical problems. The inventory of problems is not fixed beforehand, and the specific course content reflects the problems either already encountered by students or very likely to represent a significant portion of their anticipated professional concern upon graduation. (Admission with instructor's approval only)

Class 3, Credit 4 (offered annually)

GSSS-526 **Hispanic American Culture**
Registration #0515-526
This course is an effort to study the social experiences and conditions of Hispanic Americans and the degree to which they have been assimilated into the mainstream dominant culture. Various Hispanic groups will be studied with the goal of defining and outlining their differences and similarities. The Puerto Ricans in the Northeast and the Mexican-Americans in the Southwest will be specifically selected for analysis. The course will help students to better understand the problems faced by Hispanic Americans by looking at specific socio-economic indicators such as: their access to health care, to job opportunities, to educational institutions, and to the degree that Hispanics have "progressed" in the United States.

Class 3, Credit 4 (offered annually)

GSSS-527 **Black Culture**
Registration #0515-527
This course is designed to analyze past, present and future social policies, programs and practices from their actual effects and predictable effects on Black people. These analyses and solutions will include particular emphasis on how the Black community has been forced to develop mechanisms for coping with the debilitating effects of poverty, environmental deprivation, and institutional racism. The course is designed to present a systematic means of facilitating change in people's attitudes and behaviors.

Class 3, Credit **4** (offered annually)

GSSS-569 **Human Sexuality**
Registration #0515-569
This course is designed to be sex positive in its approach to the study of human sexual behavior. It will focus upon basic physiology, sexual awareness, sexual development throughout the life cycle, sex roles, sexual myths, legal and social issues, pre-marital and marital sexual behavior, and alternative sexual choices. Frequently these issues raise questions of sexual attitude and value and these will be examined and clarified.

Class 3 + 2 hr. weekly seminar, Credit **4** (offered bi-annually)

GLAI-501 **Senior Seminar**
Registration #0520-501
This course enables students to sharpen and demonstrate their ability to define a research task or problem, gather and evaluate scholarly evidence and present their findings in a paper or project. While the content and focus of the seminar will change from year to year, it will always direct student attention toward a broad issue or aspect of contemporary culture and equip them to understand that subject more fully, investigate one facet of it in depth, and provide an advanced experience of problem-solving and value clarification.

Class 1, Credit 2 (offered quarterly)

Independent Study
A student may register for an independent study project subject to the approval of the faculty sponsor, student's department, the academic committee of the College of Liberal Arts and the dean of the College of Liberal Arts and providing that she or he has a minimum GPA of 2.7 at time of application. An independent study project is not a substitute for a course. It enables the interested student and his or her faculty sponsor to coordinate their efforts on subjects and topics that range beyond the normal sequence of course selection.

Credit variable (offered annually)

Service Courses

Service courses are required courses offered by the College of Liberal Arts for specific professional departments. These courses may not be taken as liberal arts electives.

GLAA-201 **Aerospace Studies:**
Registration #0519-201 **The Development of Air Power**
This course is a study of air power from balloons and dirigibles through the jet age; a historical review of air power employment in military and nonmilitary operations in support of national objectives; and a look at the evolution of air power concepts and doctrine.

Class **4,** Credit **4** (offered annually)

GLAA-401, 402 **Aerospace Studies:**
Registration #0519-401,402 **National Security Forces in Contemporary American Society**
The course is a study of U.S. national security policy which examines the formulation, organization and implementation of national security; the context of national security; the evolution of strategy; the management of conflict and civil-military interaction. It also includes blocks of instruction on the military profession, officership, and the military justice system. The course is designed to provide future Air Force Officers with a background in U.S. national security policy so they can effectively function in today's Air Force.

Class **4-5,** Credit **9** (for two quarters)

GLAI-201 **Seminar. Academic Fields of Study**
Registration #0520-201 **(Tech. & Lib. Studies)**
This seminar is designed to introduce students to 'the full array of degree programs offered by RIT." Although it is part of a student's exploration of career possibilities, the focus will be on **fields of study** necessary for particular careers rather than on the ultimate "career activity" itself. The presupposition is that interest in a "field of study" is necessary to career success, but also that any one field of study can lead to a variety of career choices.

Class 1, Credit 1 (offered annually)

GLLC-402 **Conference Techniques**
Registration #0502-402
Basic theories of conference techniques including leadership, participation, types, and functions of public and private conferences and their evaluation. Student participation in training, problem solving, and informational-developmental conferences.

Class 4, Credit 4 (offered annually)

GLLC-404 **Communication with the Handicapped**
Registration #0502-404
An examination of the communication difficulties with the handicapped: specifically the deaf, blind and others with physical handicaps. To include interpersonal, family, social and rehabilitation modes of communication. (Introduction to Psychology)

Class 3, Credit 4 (offered occasionally)

GSSE-301 **Principles of Economics I**
Registration #0511-301
This is the first course in a two quarter sequence designed to introduce the student to the basic principles of economics. This course will focus on basic economic concepts and macroeconomics. Topics of primary interest include economic methodology, the economizing problem, capitalist ideology, supply and demand, national income accounting, income determination, inflation, money, and the role of government in the economy. Other topics in basic economics will be selected by the instructor.

Class 3, Credit 4 (offered quarterly)

GSSE-302 **Principles of Economics II**
Registration #0511-302
This is the second course in a two quarter sequence designed to introduce the student to the basic principles of economics. This course will focus on microeconomics. Topics of primary interest include market structure, supply and demand analysis involving elasticity, the theory of cost in the short and long run, perfect competition, monopoly, monopolistic competition oligopoly, marginalist distribution theory, the labor market, and general equilibrium analysis. Other topics in microeconomics will be selected by the individual instructor.

Class 3, Credit 4 (offered quarterly)

GSSE-303 **Principles of Economics III**
Registration #0511-303
A further elaboration of the elementary principles of economic analysis introduced in Principles of Economics I and II. Particular emphasis will be placed on the application of these principles to the decision making process of the firm. (0511-302)

Class 3, Credit 4 (offered annually)

GSSE-527 **Seminar In Applied Economics**
Registration #0511-527
A senior-level course emphasizing applications of economic analysis and quantitative methods to economic decision-making. Cases will be drawn from both the private and public sectors of the economy. (Limited to BS in economics degree seniors)

Class 3, Credit 4 (offered occasionally)

GLLZ-200 **Basic Communications**
Registration #0518-200
Students will gain an understanding of deafness, plus basic skills which will permit communication with a segment of the deaf population.

Class 3, Credit 4 (offered on sufficient demand)

GLLZ-201, 202, 203 **Manual Communication, I, II, III**
Registration #0518-201, -202, -203
A course designed to provide the student with the basic vocabulary of frequently used signs and the American manual alphabet.

Class 3, Credit 4 (offered on sufficient demand)

Graduate Courses

GLLL-702 **Film and Society**
Registration #0504-702
An inquiry concerning the relationship between motion pictures and society that will use historical, humanistic, and social science research to achieve an understanding of movies as a social force, industry, and art form.

Class 3, Credit 4 (offered occasionally)

GSHF-702 **Film History and Criticism**
Registration #0505-702
A critical examination of key aspects of film criticism and of the development of film as an art. The emphasis of the course will be historical, with the development of cinema being traced through major films by important directors. There will be an opportunity to pursue individual interests.

Class 3, Credit 4 (offered occasionally)

GSHF-703 **American Architecture**
Registration #0505-703
An examination of American architecture from the 17th century to the present designed for the graduate level of study. Emphasis will be placed on American building art in the late 19th and 20th centuries.

Class 3, Credit 4 (offered occasionally)

GSHF-705 **Theories of Aesthetics and Art Criticism**
Registration #0505-705
A course of the art-oriented graduate student centering on the student's search for a supportable and reliable basis for making value judgments about works of art as well as introducing the student to major concepts in aesthetics.

Class 3, Credit 4 (offered occasionally)

GSHF-707 **Cubism to the Present**
Registration #0505-707
Cubism as a way of seeing and as an expression of 20th century thinking. Differences and similarities with art forms of earlier eras and other cultures will be discussed.

Class 3, Credit 4 (offered on sufficient demand)

GSHF-708 **Oriental Art**
Registration #0505-708
A seminar exploring the philosophical and cultural perspectives underlying traditional Far Eastern art as a prelude to examining selected topics in Indian, Chinese and Japanese art. Emphasis will be placed on the application of research techniques and critical methods of an individually selected area of interest which may serve as a foundation for continuing study.

Class 3, Credit 4 (offered occasionally)

GSHF-711 **20th Century American Art**
Registration #0505-711
An investigation of American art from the Civil War to the present. Emphasis will be placed on the visual arts but many references will be made to music and architecture.

Class 3, Credit 4 (offered occasionally)

GSHF-712 **Arts and Crafts in Tribal Societies**
Registration #0505-712
A study of the function of "primitive" art and the techniques of its production, including the use of clay, stone, fibers, bark, wood, bronze, gold, etc. Hair styling, body painting and scarification will also be discussed.

Class 3, Credit 4 (offered occasionally)

GSHF-713 **Contemporary Issues in Art**
Registration #0505-713
This course offers the graduate art student the opportunity to investigate those aspects of 20th century art that question the very nature of art and the role of the artist in today's and tomorrow's society.

Class 3, Credit 4 (offered occasionally)

GSHF-714 **Art Vision and Concept**
Registration #0505-714
Though the course will develop chronologically from the Renaissance to the present, emphasis will be placed on a close analysis of (1) selected works of art, including paintings, sculpture and architecture, and (2) the development of the unique oeuvre of selected artists. Topics chosen for study will be limited in number but treated in depth. Topical choices will be based on richness and import of the formal and/or conceptual content embodied therein. Some background in the history of art is helpful but not necessary.

Class 3, Credit 4 (offered occasionally)

GSHF-715 **Picasso**
Registration #0505-715
The impact of Picasso and his circle on 20th century art. Their affinities with modern scientific and philosophical attitudes will also be discussed.

Class 3, Credit 4 (offered occasionally)

GSHF-716 **Rembrandt**
Registration #0505-716
A detailed analysis of the art and times of the Baroque master. Emphasis will be placed on the development of his style and technique, on his and other artists' relationship to their society and to the character of the Baroque outlook.

Class 3, Credit 4 (offered occasionally)

GSHF-717 **Music Literature**
Registration #0505-717
A comparison of various musical styles from the 17th to the 20th century with emphasis on music's relationship to the other fine arts and its socio-cultural environments. Representative composers include Bach, Beethoven, Chopin and Stravinsky.

Class 3, Credit 4 (offered on sufficient demand)

GSHP-705 **Seminar in Aesthetics**
Registration #0509-705
A range of questions will be addressed in the seminar. What is it to perceive something aesthetically? Are there any essential or defining properties shared by all works of art? Are our evaluations and interpretations of art works objective or subjective? Are an artist's intentions relevant factors in critical arguments? Understanding how answers to these questions are constrained by features of actual art works will be an important part of discussion.

Class 3, Credit 4 (offered occasionally)

GSHP-706 **The Philosophy of Mind**
Registration #0509-706
An investigation into concepts concerning mental experience. The basic question is "What is consciousness?" The question hides some presuppositions and raises many further questions. Can we be conscious of consciousness? What does it mean to be conscious? Is there a mind-brain identity? Can we describe mental experiences in non-mentalistic terms? Can computers think? It will be the business of this course to explore these and other related questions and to see what progress has been made in attempting to answer them.

Class 3, Credit 4 (offered occasionally)

GSSM-701 **Country Risk Assessment**
Registration #0513-701
An interdisciplinary introduction to the methods and procedures of country risk assessment. Practice in developing a country risk assessment will be offered in order to familiarize the student with the role of international environment analysis (political stability analysis) in the operations of business and financial institutions planning investments or operations abroad.

Class 3, Credit 4 (offered occasionally)

College of Science

Biology

SBIB-201 **General Biology**
Registration #1001-201
Characteristics and origin of life; basic principles of modern cellular biology including cell organelle structure; chemical basis and functions of life including enzyme systems, respiration and photosynthesis; nutrient procurement in plants and animals.

Class 3, Credit 3 (F)

SBIB-202 **General Biology**
Registration #1001-202
A study of the physiological processes of gas exchange, internal transport, osmoregulation, excretion, and hormonal control in plants and animals; nervous system and behavior in animals.

Class 3, Credit 3 (W)

SBIB-203 **General Biology**
Registration #1001-203
A study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology.

Class 3, Credit 3 (S)

SBIB-205,206,207 **General Biology Laboratory**
Registration #1001-205, 206, 207
Laboratory work to complement the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve ability to make, record and interpret observations. (Corequisite SBIB-201, 202, 203)

Lab. 3, Credit 1 (F-205, W-206, S-207)

SBIB-250 **Introduction to Biotechnology**
Registration #1001-250
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**
Registration #1001-301
Biology of invertebrate animals with reference to classification, structure, function, and ecology. (One year of general biology or permission of instructor)

Class 2, Lab. 6, Credit 4 (offered upon sufficient request)

SBIB-302 **Vertebrate Zoology**
Registration #1001-302
Morphology, physiology, behavior, classification, and ecology of chordates. (One year of general biology)

Class 3, Lab. 3, Credit 4 (offered upon sufficient request)

SBIB-303 **Comparative Vertebrate Anatomy**
Registration #1001-303
A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)

Class 3, Lab. 3, Credit 4 (offered upon sufficient request)

SBIB-304 **Botany**
Registration #1001-304
Distribution of the major groups of plants and their adaptations to their particular environment. (One year of general biology or permission of the instructor)

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

SBIB-305 **Physiology and Anatomy**
Registration #1001-305
An integrated approach to the structure and function of the nervous, endocrine, integumentary, muscular and skeletal systems. Laboratory exercises include histological examination, anatomical dissections and physiology experiments with human subjects. (One year of general biology, SCHG-217 or permission of instructor)

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

SBIB-306 **Physiology and Anatomy**
Registration #1001-306
An integrated approach to the structure and function of the gastrointestinal, cardiovascular, immunological, respiratory, excretory and reproductive systems with an emphasis on the maintenance of homeostasis. Laboratory exercises include histological examinations, anatomical dissections and physiological experiments using human subjects. (SBIB-305 or permission of the instructor)

Class 3, Lab. 3, Credit 4 (S)

SBIB-310 **Plant Physiology**
Registration #1001-310
Physiological phenomena in the growth and development of higher plants. Water relationships, photosynthesis, translocation, mineral nutrition, growth, hormonal control and reproduction. (One year of general biology and one year of organic chemistry)

Class 3, Lab. 3, Credit 4 (S)

SBIB-320 **Histology**
Registration #1001-320
Detailed studies on the structure and function of normal human tissues. (One year of general biology)

Class 3, lab. 3, Credit 4 (F)

SBIB-330 **Small Animal Laboratory Techniques**
Registration #1001-330
A course designed to prepare the student for small animal handling; biological administrations and preparations, minor surgery and autopsies. (3rd, 4th, 5th year status and permission of the instructor)

Class 1, Lab. 3, Credit 3 (S)

SBIB-340 **General Ecology**
Registration #1001-340
Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments. A study to include such ecological factors as energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, bio-geography and representative ecosystems. (One year of general biology)

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

SBIB-350 **Molecular Biology**
Registration #1001-350
The study of the structure, function, and organization of proteins, nucleic acids and other biological macromolecules. (One year of general biology)

Class 3, Lab. 3, Credit 4 (S)

SBIB-360 **Horticulture**
Registration #1001-360
A basic introduction to horticulture with a study of the interconnections of plants, gardens and their environment and discussion relating to applications of principles to indoor and outdoor gardening, (co-requisite 1001-361)

Class 3, Credit 3 (offered upon sufficient request)

SBIB-361 **Horticulture Laboratory**
Registration #1001-361
Experiments relating to the basic principles of horticulture, (co-requisite 1001-360)

Lab. 3, Credit 1 (offered upon sufficient request)

SBIB-402 **Immunology**
Registration #1001-402
Investigation of the basic concepts of immunology (antigens, antibodies, immunologic specificity, antibody synthesis, and cell-mediated immunity) and the applications of immunology to infectious diseases, allergic reactions, transplantations, tumors, autoimmune diseases, immunosuppression and tolerance. (One year of general biology, one quarter of organic chemistry)

Class 3, Credit 3 (F, W)

SIBI-403 **Cell Physiology**
Registration #1001-403
Functional cytology, cellular water and electrolyte homeostasis, exchange of materials across cell membranes, regulation of cellular metabolism and control of cell growth. (SCHO-334, SBIB-350)

Class 3, Lab. 3, Credit 4 (W, S)

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)

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
Ecology, structure, life cycle metabolism, pathology and control of human parasites. Insects, protozoa, nematodes, flukes and tapeworms of medical importance. Chemotherapy and immunology of human parasites. Emphasis on recognizing human parasites.

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 (W, S)

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
Designed to acquaint each student with the basic methods employed in the production of hybridoma cell lines and monoclonal antibodies. To include preparation of viable cell suspensions, cell culture fusion techniques, cloning, and monoclonal antibody production and characterization. (SBIB-445, 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
A study of the physics, chemistry and biology of inland waters. The course will emphasize the physical and chemical properties of water and how these properties effect the associated biological communities. Planktonic, benthic and littoral communities will be considered. Field trips to streams and lakes will be conducted to gather physical, chemical and biological data. (SBIB-340 or permission of instructor)

Class 3, Lab. 3, Credit 4 (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 (offered upon sufficient request)

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 (offered upon sufficient request)

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 departmental writing requirement)

Class 2, Credit 2, (W, S)

SBIB-559 **Special Topics - Biology**
Registration #1001-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary course and have specified prerequisites, contact hours and examination procedures.

Class 3, Credit 4 (offered annually) Class 3, Credit 4 (offered annually)

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, W, S)

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. Chemotherapy 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-720 **Introduction to Pharmacology**
Registration #1001-720
A survey of the pharmocodynamic properties and physiological effects of drugs used clinically to treat disease. Emphasis will be placed on anti-cancer drugs, antibiotics, and drugs which affect the central and peripheral nervous system. (SBIB-305,306 or equivalent, SCHO-233)

Class 3, Credit 3 (S)

SBIB-721 **Introduction to Pharmacology Laboratory**
Registration #1001-721
Laboratory work to accompany the lectures in Introduction to Pharmacology. (Corequisite SBIB-720)

Lab 3, Credit **1** (S)

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 emphasized 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 culturing, 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. SCHC-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. SCHC-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 spectroscopic methods, potentiometric and spectrometric titrations. Electrodeposition and pH measurements included in lab. SCHC-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; Raoults 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. (SCHC-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. (SCHC-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. (SCHC-253)

Lab. 4, Credit I (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**
Registration #1010-541, -542, -543
Faculty directed student projects or research usually involving laboratory work and/or calculations that could be considered of an original nature. (SCHC-402)

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-210 **Chemical Topics for Computer Engineering**
Registration #1011-210
Electrochemistry, as well as other chemical properties of metals, is covered after a review of thermodynamics including entropy, free energy and the Second Law of Thermodynamics. The chemical properties of metals to be covered include structures of metal complexes, magnetism and color.

Class 1, Credit 1 (W)

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.

(225-F, Lab. 3, Credit 1)
(226-W, Lab. 3, Credit 1)
(227-S, Lab. 6, Credit 2)
(offered every year)

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) (W)

SCHG-272 **Chemistry of Water**
Registration #1011-272
Chemistry of water analyses, including solids, pH, alkalinity, acidity, chloride, phosphate, BOD, COD, nitrogen, metals, radioactivity, residual chlorine and chlorine demand. Polymers and synthetic adhesives will also be covered.

Class 3, Credit 3 (offered every year) (F)

SCHG-275 **Chemistry of Water Lab**
Registration #1011-275
Laboratory to be taken concurrently with SCHG-271. General chemistry and volumetric techniques will be covered.

Lab. 3, Credit 1 (offered every year) (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) (F)

SCHG-281 **Chemistry for Printers I**
Registration #1011-281
Aspects of general chemistry of widest application to graphic arts technology: definitions of terms, basic concepts and chemical laws; stoichiometry and moles; electronic structure of the atom.

Class 3, Credit 3 (F)

SCHG-282 **Chemistry for Printers II**
Registration #1011-282
Aspects of general chemistry of widest application to graphic arts technology: properties of solutions and inorganic materials; acids and bases; oxidation-reduction; nuclear chemistry.

Class 3, Credit 3 (W)

SCHG-283 **Chemistry for Printers III**
Registration #1011-283
Aspects of organic chemistry of widest application to graphic arts technology: photochemistry, inks, paper, and toxicology in the pressroom.

Class 3, Credit 3 (S)

•Not acceptable for science credit tor College of Science ma/or.

SCHG-285 **Chemistry for Printers I Lab**
Registration #1011-285
Laboratory to accompany SCHG-281. Laboratory experiments in general chemistry; quantitative techniques.

Lab 2, Credit 1 (F)

SCHG-286 **Chemistry for Printers II Lab**
Registration #1011-286
Laboratory to accompany SCHG-282. Laboratory experiments in general chemistry; quantitative techniques.

Lab 2, Credit 1 (W)

SCHG-287 **Chemistry for Printers III Lab**
Registration #1011-287
Laboratory to accompany SCHG-283. Laboratory experiments in areas which are involved in the graphic arts industry.

Lab 2, Credit 1 (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, sources of energy, air and water pollution, medicines and drugs in addition to the chemical laws and structure of the atom.

Class 4, Credit 4 (F, W, S)

SCHO-231, -232 **Organic Chemistry**
Registration #1013-231, -232
Survey of the structure names, reactions, and synthesis of the ma|or 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 alkynes. 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. (SCHO-43l)

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 SCHO-436)
Lab. 6, Credit 2 (offered every year) (435-S, SR, 436-F, W)

SCHO-437 **Systematic identification of**
Registration #1013-437 **Organic Compounds**
A laboratory course utilizing chemical and spectural (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-340 **Introduction to Physical Chemistry**
Registration #1014-340
Properties of gases, kinetic theory of gases, energy and the first law; thermochemistry; entropy and the second and third laws; introduction to Helmholtz and Gibbs free energy, gas equilibrium (SCHC-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 statics; Heitler-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)

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. I n 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 **Glassblowing 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)

Graduate Courses

SCHA-711 **Instrumental Analysis**
Registration #1008-711
Theory, applications and limitations of selected instrumental methods in qualitative, quantitative, and structural analysis. Topics covered include mass spectroscopy, nuclear magnetic resonance, electrochemistry, surface methods and new analytical methods. (SCHA-312)

Class 3, Credit 3 (offered every year) (F, W)

SCHA-720 **Instrumental Analysis Lab**
Registration #1008-720
Lab accompanying SCHA-711. Experiments include AA, fluorimetry, coulometry, ^{13}C and ^{1}H NMR, polarography. Assignments depend on student background. SCHA-711 is a corequisite.

Lab. 6, Credit 2 (offered every year) (F, W)

SCHB-702 **Biochemistry - Biomolecular Conformation**
Registration #1009-702 **& Dynamics**
Introduction to biological chemistry. Chemical structures, reactions, molecular organization and physiological functions of the molecular components of cells: amino acids, proteins, enzymes, enzyme kinetics, co-enzymes, biochemical thermodynamics, carbohydrates and lipids, membrane structure, and active transport. Emphasis is on the structure-function relationships of biomolecules, their solution behavior and dynamics. (SCHO-433 and SCHP-340 or SCHP-742)

Class 3, Credit 3 (offered every year) (F, W)

SCHB-703 **Biochemistry—Metabolism**
Registration #1009-703
Bioenergetics principles; catabolism of carbohydrates, fatty acids and amino acids; photosynthesis, biosynthesis of carbohydrates, lipids, and nitrogenous compounds; metabolic diseases. (SCHB-702)

Class 3, Credit 3 (offered every year) (F, W)

SCHB-704 **Biochemistry—Nucleic Acids**
Registration #1009-704 **and Molecular Genetics**
The biochemistry of inheritance, expression of genetic information, protein biosynthesis, differentiation, viral and bacterial infection and the "origin of life." (SCHB-702)

Class 3, Credit 3 (offered every year) (S)

SCHC-772 **Special Topics**
Registration #1010-772
Advanced courses which are of current interest and/or logical continuations of the course already being offered. These courses should be structured as ordinary courses and should have specified prerequisites, contact hours and examination procedures.

Class variable, Credit variable (offered every year)

SCHC-877 **External Research**
Registration #1010-877
Industrial internship research.

Credit 1-16 (offered every year)

SCHC-870 **Chemistry Seminar**
Registration #1010-870

Credit 1 (offered every year)

SCHC-879 **Research and Thesis Guidance**
Registration #1010-879
Hours and credits to be arranged. Chemical research in a field chosen by the candidate, subject to approval of the department head and advisor.

Credit variable (offered every year)

SCHC-899 **Independent Study—Chemistry**
Registration #1010-899

Credit variable (offered every year)

SCHI-762 **Inorganic Chemistry I:**
Registration #1012-762 **Composition & Structure**
Techniques for determining composition and structure, nomenclature and symbolism of inorganic compounds, modern electronic theories of composition, bonding, geometry, magnetic, electrical, mechanical and spectral properties of inorganic compounds (main group and transition elements). (SCHO-433, SCHP-442)

Class 3, Credit 3 (offered every year) (S, SR)

SCHI-763 **Inorganic Chemistry II:**
Registration #1012-763 **Stability & Reactivity**
Acid-base and other classifications of inorganic reactions; thermodynamic and kinetic aspects of controlling inorganic reactivity at both the laboratory and industrial level; nonaqueous solvent systems; use of isoelectronic and pseudoatom concepts in synthesis design. (SCHI-762, SCHP-442)

Class 3, Credit 3 (offered every year) (F, W)

SCH1-764 **Inorganic Chemistry III:**
Registration #1012-764 **Chemical Periodicity**
An integrated survey of descriptive inorganic chemistry (including industrial applications and geochemical origins) based on the periodic table and the structure and reactivity concepts developed in SCHI-762 and SCHI-763. (SCHI-762, -763).

Class 3, Credit 3 (offered every year) (S, SR)

SCHI-765 **Preparative Inorganic Chemistry**
Registration #1012-765
Laboratory oriented course designed to illustrate the characterization techniques presented in SCHI-762 and the various synthetic applications of thermodynamics and kinetics presented in SCHI-763. (SCHI-762; SCHI-763 may be taken concurrently)

Class 1, Lab. 6, Credit 3 (offered every year) (F, W)

SCHO-730 **Chemical Toxicology**
Registration #1013-730
Xenobiotic mechanism, chemical carcinogenesis, drug-induced toxicology, environmental and genetic toxicology, teratology and bioassay/biometrics. (SCHO-433)

Class 3, Credit 3 (offered upon sufficient request)

SCHO-736 **Spectrometric Chemical Identification**
Registration #1013-736 **of Organic Compounds**
Theory and application of proton and carbon nuclear magnetic resonance, infrared, mass spectrometry, and ultraviolet spectra as applied to organic structure determination. (SCHO-433)

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, electrocyclic reactions. (SCHO-433 and SCHP-443)

Class 3, Credit 3 (offered every year)

SCHO-832 **Stereochemistry**
Registration #1013-832
Advanced treatment of steric relationships and stereoisomerism in organic compounds. (SCHO-433, SCHP-443)

Class 3, Credit 3 (offered upon sufficient request)

SCHO-833 **Heterocyclic Chemistry**
Registration #1013-833
The preparation, properties, and reactions of heterocyclic systems, especially heteroaromatic rings. (SCHO-433)

Class 3, Credit 3 (offered upon sufficient request)

SCH0-835 **Organic Chemistry of Polymers**
Registration #1013-835
Introduction to the chemistry of synthetic, high molecular weight polymers and a survey of their diverse structures and properties. Mechanisms of condensation, free radical and ionic polymerization. (SCHO-433)

Class 3, Credit 3 (offered upon sufficient request)

SCHP-741 **Chemical Thermodynamics**
Registration #1014-741
A study of the basic fundamentals of thermodynamics and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases will be calculated based on spectroscopic data. (SCHP-443 and SMAM-306)

Class 3, Credit 3 (offered every year)

SCHP-742 **Survey of Physical Chemistry**
Registration #1014-742
A study of the fundamental principles of physical chemistry for clinical chemistry and biotechnology students. Kinetic-molecular theory, quantum mechanics, spectroscopy, thermodynamics and kinetics are presented with applications to the life sciences. This course may also serve as a review of physical chemistry for MS chemistry students. Not acceptable for BS in chemistry.

Class 3, Credit 3 (offered upon sufficient request) (W)

SCHP-743 **Chemical Kinetics**
Registration #1014-743
Methods of investigating the kinetics of chemical reactions and the theories used to interpret their results. Focus on homogeneous reactions in gas and liquid phases. Discussions of references from recent chemical literature. (SCHP-443)

Class 3, Credit 3 (offered alternate years)

SCHP-744 **Quantum Mechanics**
Registration #1014-744
Matrix formulation of quantum mechanics; variation and perturbation methods, group theory molecular orbital energies of complex molecules; calculation of vibrational frequencies and selection rules for complex molecules. Emphasis on use of spectroscopy and quantum chemistry to obtain chemical information. (SCHP-442)

Class 3, Credit 3 (offered alternate years)

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**
Registration #1016-201, -202, -203 **Analytic Geometry**
A sequence of courses covering essential skills and concepts in such topics as solutions of equations, graphing, exponents and radicals, logarithms, trigonometric 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**
Registration #1016-205, -206, -207 **for Computing I, II, III**
Topics in discrete mathematics, including logic, sets, relations, functions, combinatorics, graphs and trees, probability and queueing theory, with 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, polynomial and rational functions with applications to supply and demand, cost, revenue, and profit functions. Additional topics include matrices, linear programming, and mathematics of finance. (3 years of high school mathematics)

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-226 **Calculus for Management Science**
Registration #1016-226
A course stressing applications of calculus concepts to solving problems in business and economics. Topics include the limit concept, differentiation, partial differentiation and, integration. (SMAM-225)

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) (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, W, S, SR)

SMAM-307 **Differential Equations II**
Registration #1016-307
Second quarter course in ordinary differential equations which includes power series solution to ordinary differential equations about ordinary and regular singular points; Legendre's 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
An introduction to elementary techniques of statistical description and inference. Topics include descriptive statistics, probability, estimation of parameters, hypothesis testing, and simple linear regression. The statistical software package MINITAB will be used to introduce students to the use of computers in statistical analysis. (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, SR)

SMAM-318 **Boundary Value Problems**
Registration #1016-318
The course includes: power series solutions of ordinary differential equations about ordinary and regular singular points; Fourier series; separation of variables solution of the wave equation, the heat equation and LaPlace's equation in rectangular and polar coordinates. (SMAM-306)

Class 4, Credit 4 (offered every year) (S)

SMAM-319 **Data Analysis**
Registration #1016-319
This course will study the statistical principles of presenting and interpreting data. Topics covered will include: descriptive statistics and displays, random sampling, the normal distribution, confidence intervals, and hypothesis testing. The statistical software package MINITAB wi 11 be used to introduce students to the use of computers in statistical analysis. (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, SR)

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 block 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
A brief discussion of preliminaries leading to the concept of analyticity. Complex integration. Cauchy's integral theorem and integral formulas. Taylor and Laurent series. Residues. Real integrals by complex methods. (SMAM-305)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-431 **Matrix Algebra**
Registration #1016-431
An introduction to the basic concepts of linear algebra, with an emphasis on matrix manipulation. Topics will include Gaussian elimination, matrix arithmetic, determinants, Cramer's rule, vector spaces, linear independence basis, null and column space of a matrix, eigenvalues, and numerical linear algebra. Various applications will be interspersed throughout the course. (Prerequisite SMAM-306)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-432 **Linear Algebra**
Registration #1016-432
A further development of the basic concepts of linear algebra, including orthogonality. Topics will include similarity, linear transformations, diagonalization, inner products, Gram-Schmidt, quadratic forms, and various numerical techniques. Several applications of these ideas will also be presented. (SMAM-431)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-451, 452 **Mathematical Statistics I, II**
Registration #1016-451, -452
451: Brief review of basic probability concepts and distribution theory; mathematical properties of distributions needed for statistical inferences; classical and Bayesian methods in estimation theory and mathematical justification of standard test procedures. (SMAM-352)
452: Chi-square test; Neyman-Pearson theory of hypothesis testing; non-parametric methods; sufficient statistics and further topics in statistical inference. (SMAM-451)

Class 4, Credit 4 (offered every year) (451-F, W; 452-S, SR)

SMAM-454 **Research Sampling Techniques**
Registration #1016-454
This course provides a basis for understanding the selection of the appropriate tools and techniques for analyzing survey data. Topics include: design of sample surveys, methods of data collection, a study of standard sampling methods, and a discussion of specific industrial sampling methods. (SMAM-353, SMAM-355)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-457 Nonparametrlc Statistics
Registration #1016-457
This course provides an in depth study of inferential procedures that are valid under a wide range of shapes for the population distribution. Topics include: tests based on the binomial distribution, contingency tables, statistical inferences based on ranks, runs tests, and randomization methods. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-465 Linear Programming
Registration #1016-465
A presentation of the general linear programming problem to be solved. A review of pertinent matrix theory including convex sets and systems of linear inequalities; the simplex method of solution; artificial bases; duality; parametric programming; and applications. (SMAM-432)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-466 Integer Programming
Registration #1016-466
The optimization of functions of integers; theory and practice of branch and bound; implicit enumeration; cutting plane duality and related solution techniques; heuristics, and applications. (SMAM-465)

Class 4, Credit 4 (offered every year) (S)

SMAM-467 Theory of Graphs and Networks
Registration #1016-467
The basic theory of graphs and networks, including the concepts of circuits, trees, edge and vertex separability, planarity and vertex coloring and partitioning. There is a strong emphasis on applications to physical problems and on graph algorithms such as those for spanning trees, shortest paths, non-separable blocks and network flows.

Class 4, Credit 4 (offered every year) (F, W)

SMAM-469 Mathematical Simulation
Registration #1016-469
An introduction to computer simulation, simulation languages, model building and computer implementation, and mathematical analyses of simulation models and their results using techniques from probability and statistics. (SMAM-353, 361, ICSP-241, 242)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-501, 502 Advanced Differential Equations
Registration #1016-501, -502
A study of first order, linear higher order and systems of differential equations including such topics as existence, uniqueness, properties of solutions, Green's functions, Sturm-Liouville systems and boundary value problems. (SMAM-307)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-511,512 Numerical Analysis
Registration #1016-511, -512
511: Numerical techniques for the solution of non-linear equations, interpolation, differentiation, integration, initial value problems. (SMAM-306, ICSP-220)
512: Continuation of 511 which treats systems of equations, eigenvalue problems, boundary value problems, splines, additional topics at the discretion of the instructor. (SMAM-511)

Class 4, Credit 4 (offered every year) (511-F, W; 512-S, SR)

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-524 An Introduction to Time Series
Registration #1016-524
A study of time series, auto-covariance functions and spectrum, integral representation of time series, linear filtering, estimation of spectrum, and multivariate time series prediction. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-531, -532 Abstract Algebra
Registration #1016-531, -532
531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265, 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-411, -412 or to explore further the topics covered there. (SMAM-265, SMAM-412)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-555,556 Statistics Seminar I, II
Registration #1016-555,556
This course introduces the student to statistical situations not encountered in their previous course of study. Topics include open-ended analysis of data, motivating use of statistical tools beyond the scope of previous courses, introduction to the statistical literature, development of statistical communication skills, and the pros and cons of statistical software packages. (SMAM-353, 354, 355)

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 3, Credit 4 (offered annually) Class 3, Credit 4 (o f f e r e d annual

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. (SMAT-420 or equivalent)

Class 4, Credit 4 (offered every year) (F, W, S, 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, S, 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 recording techniques; graphical analysis; error analysis and report writing. Each student will present a formal written or oral report on some topic of interest at the end of the course.

Class 1, Lab. 2 Credit 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-203 or SMAM-223) (See SPSP-271 for laboratory)

Class 3, Credit 3 (offered every year) (F, W)

SPSP-212 **College Physics II**
Registration #1017-212
Heat and thermodynamics, fluids, wave motion, sound. (SPSP-211) (See SPSP-272 for laboratory)

Class 3, Credit 3 (offered every year) (W, S)

SPSP-213 **College Physics III**
Registration #1017-213
Geometrical and wave optics, electricity and circuits, magnetism, some elements of modern physics. (SPSP-211) (See SPSP-273 for laboratory)

Class 3, Credit 3 (offered every year) (F, S)

SPSP-271 **College Physics Lab I**
Registration #1017-271
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture, (coregistration or credit in SPSP-211)

Lab. 2, Credit 1 (offered every year) (F, W)

SPSP-272 **College Physics Lab II**
Registration #1017-272
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures, (credit or coregistration in SPSP-212)

Lab. 2, Credit 1 (offered every year) (W, S)

SPSP-273 **College Physics Lab III**
Registration #1017-273
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures, (credit or coregistration in SPSP-213)

Lab. 2, Credit 1 (offered every year) (F, S)

SPSP-289** **Contemporary Science—Physics**
Registration #1017-289
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 **University Physics I**
Registration #1017-311
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-312 **University Physics II**
Registration #1017-312
Fluids and elastic properties, heat and thermodynamics, wave motion, sound, geometrical and physical optics. (Coregistration or credit in SMAM-253) (SPSP-311) (See SPSP-372 for three-hour lab, SPSP-376 for two-hour lab)

Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-313 **University Physics III**
Registration #1017-313
Electrostatics, Gauss's law, electric field and potential, dielectrics, dc circuits, magnetic fields, Ampere's law, Faraday's law, inductance and capacitance, magnetism in matter, ac series circuits. (Coregistration or credit in SMAM-253) (SPSP-311) (See SPSP-373 for three-hour lab, SPSP-377 for two-hour lab)

Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-314 **Introduction to Modem Physics**
Registration #1017-314
An introductory survey of modern physics at the sophomore level. Fundamentals of relativity, photons, interaction of radiation with matter, deBroglie waves, Bohr model, introduction to quantum mechanics, nuclear systematics, radioactivity, alpha, beta, and gamma decays, Q-values, nuclear fission, nuclear fusion. (SMAM-305; SPSP-312, 313)

Class 4, Credit 4 (offered every year) (F, W, S)

"Not acceptable for science credit for college of science majors.

SPSP-315 Introduction to Semiconductor Physics
Registration #1017-315
Kinetic theory of gases and transport phenomena; Drude's theory of metals; quantum mechanics of a particle in a box; atomic orbitals; band theory of metals, insulators, and impurity semiconductors; Fermi-Dirac distribution; equilibrium charge-carrier densities in metals, insulators, and semi-conductors; operation principles of diodes, bipolar junction transistors, and MOS-FETs. (SMAM-306, SPSP-314)

Class 4, Credit 4 (offered every year) (W, S)

SPSP-319 Electrical Processes in Solids
Registration #1017-319
Introduction to statistical mechanics; Planck's formula; transport equation; electronic properties of conductors and semiconductors; characteristics of metal-metal, metal-semiconductor, and p-n junctions; operating principles of solid state devices; theory and application. (SPSP-315 and permission of instructor)

Class 4, Credit 4 (offered upon sufficient request) (S)

SPSP-321 Introduction to Laboratory Techniques
Registration #1017-321
An introduction to equipment and procedures common to the physics research laboratory. The oscilloscope and ac circuit analysis, statistics, vacuum systems including vacuum pumps and gauges, the laboratory notebook, and writing for publication. (SPSP-313, SPSP-373)

Class 3, Lab. 3, Credit 4 (offered every year) (W)

SPSP-331 Introduction to Electricity and Electronics
Registration #1017-331
Fundamentals of electricity; construction and measurements of electrical and electronic circuits encountered in a scientific laboratory. (Two quarters of introductory physics).

Class 3, Lab. 3, Credit 4 (offered every year) (F, W, S)

SPSP-341 Foundations of Scientific Thinking
Registration #1017-341
Definition of science; historical perspective; ingredients of the scientific quest; the scientific method; scientific explanation, laws, theories, and hypotheses; the role of mathematics; probability and induction; science and other disciplines. (At least a year of basic sciences at the college level.)

Class 2, Credit 2 (offered upon sufficient request) (F, W)

SPSP-351 Radiation Physics I
Registration #1017-351
Introductory modern physics emphasizing radiation phenomena. Atomic physics, nuclear physics, radioactivity, production of radionuclides, interaction of charged particles and neutrons with matter. (SPSP-213, SMAM-223 required; SMAM-309 recommended)

Class 4, Lab. 3, Credit 5 (offered every year) (F)

SPSP-352 Radiation Physics II
Registration #1017-352
Interaction of x-rays and gamma-rays with matter. Radiation detectors; scintillation detectors, solid state detectors. Radionuclide imaging instrumentation. (SPSP-351)

Class 4, Lab. 3, Credit 5 (offered every year) (W)

SPSP-353 Radiation Physics III
Registration #1017-353
Principles of radiation protection. Radiation protection instrumentation. Internal and external dose calculations. Practical radiation health physics. Introduction to electronics, including laboratory. (SPSP-352)

Class 4, Lab. 3, Credit 5 (offered every year) (S)

SPSP-355 Radiation Protection
Registration #1017-355
Principles and practical aspects of radiation protection; calculation of external and internal radiation dose measurements. (Permission of instructor and one year of college level physics)

Class 3, Credit 3 (offered every year) (S)

SPSP-361 Ultrasonic Physics
Registration #1017-361
A course in the basic physics of ultrasound, covering ultrasonic wave generation and propagation, transducers, Doppler effect, reflection and refraction, biological effects, and applications of ultrasonic physics in medicine. (Permission of instructor and one year of college level physics)

Class 4, Lab. 3, Credit 5 (offered every year) (F)

SPSP-371 University Physics Lab I
Registration #1017-371
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (See SPSP-375 for a 2-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 Modem 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-401,402 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)

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-312, 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 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-312, 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 to physics. (SMAM-307, SPSP-480, plus co-registration or credit in SPSP-401 and SPSP^11)

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 3, Credit 4 (offered annually) Class 3, Credit 4 (offered annually)

SPSP-541, 542, 543 **Physics Research**
Registration #1017-541, -542, -543
Faculty-directed student projects or research usually involving laboratory work or theoretical calculations that could be considered as of an original nature. (Permission of instructor)

Class variable, Credit variable (offered every year)

SPSP-550,551 **Physics Seminar**
Registration #1017-550, -551
Preparation and presentation of papers based on physics literature search. May include reports on student research projects. Special emphasis on the techniques of physics literature search and on the mechanics of preparation, organization, and presentation of technical papers. (Senior physics major or permission of instructor)

Class 1, Credit 1 (offered every year) (F, S)

SPSP-553 **Nuclear Physics**
Registration #1017-553
A study of the structure of the atomic nucleus as determined by experiments and theory. Description and quantum mechanical analysis of nuclear properties, radioactivity, and nuclear reactions. (SPSP-522)

Class 4, Credit 4 (offered on sufficient request) (S)

SPSP-559 **Special Topics—Physics**
Registration #1017-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures. Topics could include: introductory statistical mechanics; plasma physics; general relativity; linear integrated circuits; cryogenics; radio astronomy; history of physics; astrophysics; astronomy.

Class variable, Credit variable (offered upon sufficient request)

SPSP-599 **Independent Study—Physics**
Registration #1017-599
Faculty-directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.

Class variable, Credit variable (offered every year)

Clinical Sciences

SCLG-301 **Medical Terminology**
Registration #1026-301
Emphasizes etymology, definition, pronunciation and correct utilization of medical terms which enables students to develop a vocabulary essential to the understanding of and communication with the various health areas in which allied health professionals will serve. (SBIB-306 or instructor's permission)

Class 3, Credit 3 (offered every year) (F) (S)

SCLG-415 **Pathophysiology**
Registration #1026-415
This course combines knowledge of human physiology with disease processes, the etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, diagnostic and therapeutic procedures of common diseases will be covered. Topics include cellular and tissue response to pathogenic agents, neoplasia, developmental disorders, disorders of body systems, and diseases of major organs. (SBIB-306)

Credit 4 (S)

SCLG-559 **Special Topics—Clinical Sciences**
Registration #1026-559
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)

SCLG-599 Independent Study—Clinical Sciences
Registration #1026-599
Faculty directed study of appropriate topics on a tutorial basis. This course will be used to enable an individual to pursue studies of existing knowledge available in the literature.

Class variable, Credit variable (offered every quarter)

SCLB-201 Introduction to Biomedical Computing
Registration #1027-201
An introduction to the applications of computers in health care. Information concerning career opportunities, and co-operative education will be provided.

Class 1, Credit 1 (offered yearly)

SCLM-210 Medical Technology Seminar
Registration #1024-210
This course is designed to introduce the student to the profession of Medical Technology through a series of lectures which provide an overview of the major departments within the modern clinical laboratory. Historical perspectives, developmental aspects, and regulating standards of the Medical Technology profession will be discussed. Insights into the dynamics of the profession will be facilitated by informal discussions with interning students, practicing Medical Technologists, area sales representatives and members of the clinical sciences department.

Class 1, Credit 1 (F)

SCLM-401 Hematology/Immunohematology
Registration #1024-401
A study of the blood (erythrocytes, leukocytes, platelets, coagulation factors and blood group antigens). Descriptions of the cellular components of the blood in health and in disease. Cellular and immunological functions and their inter-relationships. Hemostasis and coagulation mechanisms. Structures of antigens and antibodies and mechanisms of antigen-antibody reactions. Lab procedures demonstrate cell counting techniques, coagulation studies, antigen-antibody reactions and compatibility testing of various blood groups. (SBIB-306 or instructor's permission)

Class 3, Lab. 3, Credit 4 (S)

SCLM-405 Diagnostic Bacteriology and Mycology
Registration #1024-405
Study of bacteria and fungi that cause human disease. Lecture and laboratory subjects include microorganism growth, isolation, identification, antibiotic sensitivity, and related human immunological and serological responses. (SBIB-404)

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

SCLM-432 Biology Laboratory Techniques I
Registration #1024-432
Principles of clinical laboratory instruments in the analysis of body fluids. This quarter stresses the principles of instrumental methods of analysis including visible and ultraviolet spectrophotometry, nephelometry, fluorometry, flame photometry, atomic absorption spectrophotometry, chromatography, electrophoresis, osmometry, radiation counters, and automated chemical analyzers. (SCHG-217, or equivalent, SBIB-306)

Class 2, Lab. 6, Credit 4 (F, W)

SCLM-433 Biology Laboratory Techniques II
Registration #1024-433
Principles of clinical chemistry in the analysis of the chemical component of body fluids. This quarter stresses the basic chemistries underlying the classical methodologies and relates them to the disease state. Topics include; liver function tests, renal function tests, carbohydrates, electrolytes, acid base balance, enzymes, lipids, endocrine function tests, drug analysis, and statistical quality control. (SCHG-217, or equivalent, SBIB-306)

Class 2, Lab. 6, Credit 4 (S)

SCLN-401 Introduction to Clinical Nuclear Medicine
Registration #1025-401
A combination lecture/laboratory course introducing clinical aspects of Nuclear Medicine. Hospital organization is presented as well as the relationship of nuclear medicine services to other hospital services. Laboratories in affiliated hospitals are correlated with lectures on nuclear medicine technology, patient care and emergency procedures. (Fourth year standing in NMT program)

Credit 4 (F)

SCLN-402 Nuclear Medicine Procedures-
Registration #1025-402 Central Nervous System
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the central nervous system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth year standing in NMT program)

Credit **1** (F)

SCLN-501 Nuclear Medicine Procedures-
Registration #1025-501 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-
Registration #1025-502 Skeletal System
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the skeletal system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth year standing in NMT program)

Credit **1** (F)

SCLN-503 Nuclear Medicine Procedures-
Registration #1025-503 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-
Registration #1025-510 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-
Registration #1025-511 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-
Registration #1025-512 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-
Registration #1025-513 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-
Registration #1025-514 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-
Registration #1025-515 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
Registration #1025-516 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
Registration #1025-517
A combination lecture/lab course covering the production and use of radioisotopes in medicine. Radiopharmaceutical compounding, quality control procedures, dose calibration, and licensing regulations regarding the handling and use of radiopharmaceuticals are covered. (Fourth year standing in NMT program)
Credit 2 (W)

SCLN-518 Radionuclide Therapy and Radiation Biology
Registration #1025-518
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
Registration #1025-519
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
Registration #1025-520
A combination lecture/practicum course in RIA. Topics include theory and basic principles, instrumentation, types of assays performed, and quality control. Commonly encountered pitfalls, current RIA developments and the diagnostic meaning of several tests are covered. (Fourth year standing in NMT program)

Credit 4 (S)

SCLN-521 Review in Nuclear Medicine
Registration #1025-521
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 variable. Class 3, Lab 4, Credit 5 (Spring)

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 used 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. Emphasis is placed on sonographic correlation of anatomical structures. Course is self-paced within each assigned section. Students draw and label cross-sections using the cadaver slices as guides. (Permission of instructor)

Class 3, Rec. 1, Credit 4 (W)

SCLS-413 Ultrasound Instrumentation
Registration #1030-413
Principles and fundamentals of diagnostic ultrasound instrumentation. Application of ultrasonic physics to ultrasound scanning techniques will also be discussed. Laboratory will stress the development of scanning techniques and use of instrument controls.

Class 3, Lab. 1, Credit 4 (S)

SCLS-551 Intro, to Clinical Ultrasound
Registration #1030-551
A combined lecture/laboratory course introducing clinical concepts of diagnostic medical sonography. Topics include both clinical and didactic applications of ultrasound. (Fourth year standing in the ultrasound program)

Credit 5 (F)

SCLS-552 Intro to Obstetrical Ultrasound
Registration #1030-552
This course will equip the student with the practical skills and clinical knowledge necessary to perform basic diagnostic obstetrical ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in basic obstetrical ultrasound. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. (SCLS-551 and fourth year standing in the ultrasound program)

Credit 5 (F, W, S)

SCLS-553 **Introduction to Gynecologic Ultrasound**
Registration #1030-553
This course will equip the student with the practical skills and clinical knowledge necessary to perform basic gynecologic ultrasound scans. Image production, recognition, and acceptability are stressed. Examination protocols will be outlined. This course provides classroom, simulation laboratory, and clinical instruction in techniques for competency in gynecologic ultrasound. Instruction includes review of teaching files. Completion of a clinical practicum is required. (SCLS-551 and fourth year standing in the ultrasound program)

Credit 5 (F, W, S)

SCLS-554 **Advanced Obstetrical Ultrasound**
Registration #1030-554
This course is a continuation of SCLS-552 and will equip the student with the practical skills and clinical knowledge necessary to perform advanced diagnostic obstetrical ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in advanced obstetrical ultrasound. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This isan internship course. Completion of a clinical scanning practicum is required. (SCLS-552 and fourth year standing in the ultrasound program)

Credit 5 (F, W,S)

SCLS-555 **Advanced Gynecologic Ultrasound**
Registration #1030-555
This course is a continuation of SCLS-553 and will equip the student with the practical skills and clinical knowledge necessary to perform advanced gynecological ultrasound scans. Image production, recognition, and acceptability are stressed. Examination protocols will be outlined. This course provides classroom, simulation laboratory, and clinical instruction in advanced gynecologic ultrasound. Instruction includes the review of teaching files. This is an internship course. Completion of a clinical practicum is required. (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 basic abdominal ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in basic abdominal ultrasound procedures. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. (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 basic abdominal ultrasound scans. Image production, recognition, and acceptability are stressed. The course provides classroom, simulation laboratory, and clinical instruction in basic abdominal ultrasound procedures. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. (SCLS-556 and fourth year standing in the ultrasound program)

Credit 7 (F, W, S)

SCLS-558 **Advanced Abdominal Ultrasound**
Registration #1030-558
This course will equip the student with the practical skills and clinical knowledge necessary to perform basic abdominal and small parts ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in basic abdominal ultrasound procedures. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. ^SCLS-557 and fourth year standing in the ultrasound program)

Credit 7 (F, W, S)

SCLS-560 **Seminar in Ultrasound I**
Registration #1030-560
Case study presentations by ultrasound interns. Students prepare and orally present two ten minute case studies. Presentations to include: history, physical findings, laboratory data, clinical impression, ultrasound findings, followup, pathology, and scanning techniques. Students present one case study during each of their two clinical rotations. This is an internship course. (Permission of Instructor)

Class 1, Credit variable (offered W, S)

SCLS-561 **Seminar in Ultrasound II**
Registration #1030-561
Interns must write and present a topic paper on some aspect of diagnostic ultrasound. Paper and presentation should include: history and statistics of disease entity, the role of ultrasound in the diagnosis of the entity, correlative imaging, treatment and prognosis of the entity, drawings, illustrations and appropriate sonograms. Paper is due in March, April or May of the internship year as assigned. Paper should be a minimum of five pages in length not including the bibliography or references. (Permission of Instructor)

Class 2, Credit 2 (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 4 (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 toxicology samples-gas-liquid chromotography, radioimmunoassay, enzyme multiplied immunoassay. (Permission of instructor, class size limited to 12)

Lab. 4, (offered concurrently with SHPC-820)

SCLC-821 **Advanced Clinical Chemistry II**
Registration #1023-821
Proteins, enzymes, hemoglobins, iron, renal functions, lipids, quality control, automation, and method selection. (Permission of instructor)

2 hr. lecture, 2 hr. seminar, Credit 4 (F 1984)

SCLC-811 **Advanced Clinical Chemistry Laboratory II**
Registration #1023-811
Comparison of current methods for separation and determination of isoenzymes. (Permission of instructor, class size limited to 12)

Lab. 4, (concurrent with SHPC-821)

SCLC-822 **Advanced Clinical Chemistry III**
Registration #1023-822
Radioimmunoassay, hormones, fetal-placement unit, integration of laboratory data. (Permission of instructor)

2 hr. lecture, 2 hr. seminar, Credit 4 (F 1985; S 1985)

SCLC-812 **Advanced Clinical Chemistry Laboratory III**
Registration #1023-812
Methods for the development, improvement, and trouble shooting of radioimmunoassay analyses. (Permission of instructor, class size limited to 12)

Lab. 4, (concurrent with SHPC-822)

SCLC-877 **External Clinical Chemistry Research**
Registration #1023-877

Credit variable

SCLC-879 **Clinical Chemistry Research**
Registration #1023-879

Credit 1-16

SCLC-899 **Independent Study**
Registration #1023-899

Credit variable

SCLC-712 **Statistics and Quality Control**
Registration #1023-712
Principles of statistics as they apply to biomedical sciences and to clinical laboratory analyses. Illustrative examples will involve clinical laboratory data. Probability, normal distributions, analysis of variance sampling, normal values, quality control, applications in patient care, hypothesis testing.

Class 3, Credit 3 (S 1984)

SCLC-870 **Clinical Chemistry Seminar**
Registration #1023-870

Credit 1

SCLC-872 **Special Topics In Clinical Science**
Registration #1023-872
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.

Class variable, Credit variable

SCLC-722 **Clinical Laboratory Computer Applications**
Registration #1023-722
Data processing overview and terminology, hospital computer utilizations, evaluation of the need for computers in the laboratory, design of laboratory and hospital systems, evaluation-selection-installation of computer systems, legal aspects of biomedical data processing, instrument interfacing.

Class 3, Credit 3 (W 1985-86)

SCLC-705 **Mechanisms of Disease**
Registration #1023-705
Following a brief review of normal physiology, emphasis will be on aspects of the development and reversal of functional abnormalities in disease states. Cellular damage will be integrated with organ failure and multi-organ systemic disease and healing.

Credit 3 (W 1985-86)

National Technical Institute for the Deaf

Department of Support Service Education

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-210 **Fingerspelling and Number Comprehension**
Registration #0850-210
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-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 modulation 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-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, 262, 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-303 Expressive Interpreting III
Registration #0850-303
This course introduces advanced vocabulary needed for legal, medical, and educational settings. Audiotapes and other materials are made beginning at a speed of 80 wpm and increase to a speed of 120 wpm. The students are critiqued to check progress and help to increase skills. (NITP-202)

Class 3, Credit 3 (offered annually)

NITP-331,332 Expressive Transliteration I & II
Registration #0850-331, 332
These two courses concentrate on expressive transliteration 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 conceptural accuracy, accuracy of fingerspelling, vocabulary development, facial expression and body movement, and self critquing skills. (NITP-0850-202)

Class 2, Lab. 2, Credit 3 (Spring, Fall)

NITP-341 Introduction to Specialized
Registration #0850-341 Interpreting Settings
This course introduces the student to interpreting in various specialized settings. Included are platform, telephone, religious, artistic, and educational. Practice is given to creating translations for artistic samples. (NITP-303)

Class 3, Credit 3 (offered annually)

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-impared students. A minimum of 10 hours per week is committed to taking notes in class and tutoring outide 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: Educational 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)