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Undergraduate Courses 1990–91

Rochester Institute of Technology
Rochester, New York

Rochester Institute of Technology
1990-91 Institute Calendar

• FALL QUARTER

September 2	Move-in Day for New Residents
September 2-5	Orientation for New Students
September 5	Open Registration (New and Returning Students)
September 5-8	All Classes Begin
September 13	End of Drop/Add Period
October 26	Last Day to Withdraw with a Grade of "W"
November 14	Last Day Class
November 17	Last Saturday Class
November 16,17, 19,20	FINAL EXAMS
November 20	Last Evening Class
November 21-29	Fall/Winter Break

• WINTER QUARTER

November 30	Open Registration
December 1	Saturday Classes Begin
December 3	Evening Classes Begin
December 3	Day Classes Begin
December 10	End of Drop/Add Period
December 21	Last Day of Classes Before Break
January 3,1991	Classes Resume
February 1	Last Day to Withdraw with a Grade of"W"
February 20	Last Day Class
February 22,23, 25,26	FINAL EXAMS
February 23	Last Saturday Class
February 27	Last Evening Class
February 28-March 7	Winter/Spring Break

• SPRING QUARTER

March 8	Open Registration
March 11	Evening Classes Begin
March 11	Day Classes Begin
March 9	Saturday Classes Begin
March 18	End of Drop/Add Period
May 3	Last Day to Withdraw with a Grade of "W"
May 17	Last Day Class
May 20-23	FINAL EXAMS
May 24	Last Evening Class
May 18	Last Saturday Class
May 25	COMMENCEMENT
May 26-30	Spring/Summer Break

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

Course Numbering

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

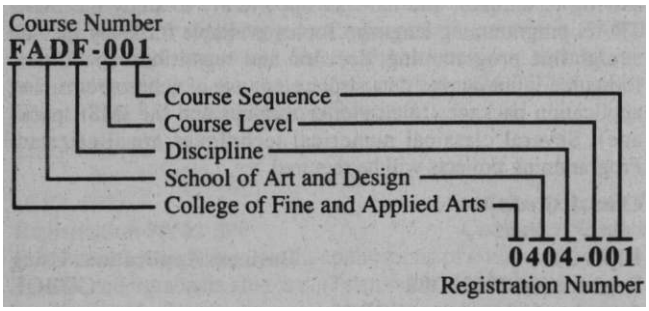
First letter: College offering the course

Second and third letters: School or department of that college

Fourth letter: Discipline

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

Second and third numbers: Course differentiation and sequencing



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

Course prerequisites are shown in parentheses after course descriptions.

Course of Study 1990-1991

Produced by RIT Communications

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

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

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

Or for information about programs offered through NTID, contact:

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

Table of Contents

College of Applied Science and Technology

School of Computer Science and Information Technology

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

Information Technology

Courses are offered by the Department of Information Technology for students who are enrolled in one of the programs within the department and for students who are enrolled in other departments in the Institute.

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

Class 4, Credit 4

ICSA-205 **Computer Techniques**
Registration #0602-205
Students will be introduced to computer systems, learn problem solving techniques, and have an opportunity to study the FORTRAN programming language. Topics available for study include straightline programming, decision and repetition capabilities, formatted input/output, data structuring, and the use of sub-programs. Programming projects will be required.

Class 3, Credit 3-4

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

Class 4, Credit 4

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

Class 4, Credit 4

ICSA-220 **FORTRAN Programming for**
Registration #0602-220 **Engineers**
Students will be introduced to computer systems, learn problem solving techniques, and have an opportunity to study the FORTRAN programming language.Topics available for study include straightline programming, decision and repetition capabilities, formatted input/output, data structuring, use of subprograms, and application packages (e.g., plotter routines and the IMSL package). Several classical numerical techniques are illustrated. Programming projects will be required.

Class 4, Credit 4

ICSA-300 **Business Applications Using**
Registration #0602-300 **COBOL**
A study of elementary COBOL programming, using structured design and programming concepts developed in ICSP-210. The course will emphasize the use of COBOL in solving common business, commercial, and managerial problems. Topics include COBOL program organization, sequential file I/O, COBOL control structures, arithmetic operations and report editing, control break processing, and table handling. Students will write programs that adhere to specific programming and documentation standards. (ICSA-210)

Class 4, Credit 4

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

Class 4, Credit 4

ICSA-410 **Computer Concepts and**
Registration #0602-410 **Software Systems**
An introduction to the overall organization of digital computers and operating systems for non-majors. Topics include basic machine organization, an overview of machine and assembly language, properties of common I/O devices, sychronization and scheduling of processes, physical and virtual memory management techniques, resource allocation and protection, and user interface issues. (ICSA-210)

Class 4, Credit 4

ICSA-411 **Data Communications and**
Registration #0602-411 **Computer Networks**
An introduction to data communications hardware and software, and use of these components in computer networks. Topics include communication system components, communications software, packet switching, network control, common carrier issues, long-haul vs. local area networks, and performance considerations. (ICSA-210)

Class 4, Credit 4

ICSA-483 **Applied Database**
Registration #0602-483 **Management**
An introduction to issues in data management in organizations, and the role of database management systems in addressing these issues. Topics include the uses and needs for data in organizations, review of simple data structures, the influence of computer architecture and I/O devices on the management of data, basic file oganizations supporting data management (sequential, direct access, indexed sequential), logical data models and their physical implementation, database administration, and DBMS selection. (ICS A-300 or permission of instructor)

Class 4, Credit 4

ICSA-590 **Seminar in Applied**
Registration #0602-590 **Computer Studies**
Current topics and advances in applications of computer technology for undergraduate students. (Permission of instructor)
Credit variable 2-4

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

Credit variable 2-4

Computer Science Courses

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

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

Class 0, Credit variable

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

Class 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, and trees. Programming projects are an integral part of the course. (ICSP-241)

Class 4, Credit 4

ICSP-243 **Programming III Design**
Registration #0601-243 **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, modularity measures (cohesion and coupling), common programming paradigms, and advanced file I/O. Programming projects are required; one of these will be a team project. (ICSP-305)

Class 4, Credit 4

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

Class 4, Credit 4

ICSP-306 **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 Programming
Registration #0601-307
An introduction to the concepts and techniques relevant to the business programming environment. Structured COBOL is used to solve common business application problems, including report generation, sorting and table processing and generation, and complex I/O processing. Project management, programming teams, and the module stubs for prototype development are used in the course. Programming projects will be required. (ICSS-325)

Class 4, Credit 4

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

Class 1, Credit 1

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 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. (ICSP-241)

Class 4, Credit 4

ICSS-360 Fundamentals of Computer Science for Transfer Students
Registration #0603-360
This course covers selected topics from ICSP-241, 242 and 243, and introduces students to the Unix operating system, the Modula-2 programming language, and concepts of software engineering. This course is intended for students with previous programming experience and a background in data structures. Open only to transfer students and students who have received advanced placement credit for ICSP-242; not to be taken as a computer science elective. (ICSP-242 or equivalent)

Class 4, Credit 4

ICSS-380 **Introduction to Computer Science Theory**
Registration #0603-380
A survey of important topic areas in theory of computer science. Topics may include regular expressions; deterministic and non-deterministic finite state machines; analysis of time and space complexity of algorithms; algorithm design paradigms, concept of NP-Hard and NP-Complete algorithms; introduction to formal correctness of programs; Turing machines; and the halting problem. (Corequisite SMAM-266 or SMAM-467; SMAM-265)

Class 4, Credit 4

ICSS-400 **Logical Design**
Registration #0603-400
An in-depth study of the logical design of digital circuits. Topics include combinational circuit design with emphasis on use of MSI and LSI circuits and CAD tools, sequential circuit synthesis, both synchronous and asynchronous, and an introduction to interfacing techniques. Additional topics to be covered include testing, CAD tools such as logic simulators and logic reduction programs, integrated circuit technologies, and an introduction to VLSI design. Lab experiments required. (ICSP-315 and SMAM-265 or equivalent)

Class 3, Lab 2, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

ICSS-499 **Cooperative Education**
Registration #0603-499

One quarter of appropriate work experience in industry.

Credit 0

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

ICSS-521 Introduction to
Registration #0603-521 Microprocessor Systems
An examination of microcomputers and microcomputer applications, including the study of microprocessors and their use in the construction of microcomputers. Additional topics covered include microcomputer busses, parallel and serial interfaces, analog interfacing, interrupts, and real time clocks. The use of microprocessors in real world situations is emphasized. Single board microcomputer systems are used in laboratory projects to explore hardware and software design issues, as well as memory design and **I/O** interface techniques. Students who have taken 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)

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 3, Lab 2, Credit 4

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

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

Class 4, Credit 4

ICSS-565 Computer Systems Selection
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 fundamentals, graphics packages, and graphics systems. Students will use and develop a graphics software system based on an accepted graphics standard. Programming projects will be required. (Third-year standing in Computer Science)

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 2-4, Credit 2-4

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

Class 2-4, Credit 2-4

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

Class 4, Credit 4

Packaging Science

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

Class 3, Credit 3

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

Class 1, Lab 3, Credit 3

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

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

Class 1, Lab 4, Credit 3

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

Class 2, Recitation, Lab 2, Credit 4

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

Class 2, Recitation, Lab 2, Credit 4

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

Class 2, Lab 4, Credit 4

IPKG-401 Career Seminar
Registration #0607-401
Career opportunities in Packaging Science; methods and procedures used in obtaining 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. (IPKG-321, 322)

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 shipping containers for product physical protection and methods for testing and predicting package performance will be studied. (IPKG-301, 321, 322)

Class 2, Lab 4, Credit 4

IPKG-433 Packaging for Marketing
Registration #0607-433
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a 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-462 Packaging Regulations
Registration #0607-462
A detailed study of federal, state, and local regulations that affect packaging. History of the development of packaging law; detailed study of recent packaging regulations, including the Fair Packaging and Labeling Act and the Poison Prevention Packaging Act; consideration of Food and Drug Administration regulation of packaging, including requirements for tamper evident packaging; hazardous materials packaging regulations administered by the Department of Transportation; freight classifications, freight claims, the Interstate Commerce Act as it applies to shipment of goods in packages; weights and measures law; consumer product safety law, environmental law, and patent, trademark, and copyright law as they apply to packaging.

Class 3, Credit 3

IPKG-485 Principles of Shock and Vibration
Registration #0607-485
A study of the factors involved in analyzing potential damage to packaged items resulting from impact or vibration forces. Students will be expected to master basic mathematical and physical concepts and to use various pieces of testing equipment. (IPKG-432)

Credit variable 3-4

IPKG-499 Packaging Co-op
Registration #0607-499
One quarter of appropriate work experience in industry. Two quarters of co-op experience are required. (IPKG-321, IPKG-322)

Credit 0

IPKG-510 Introduction to Electrostatics
Registration #0607-510

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

Class 4, Credit 4

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-531 Packaging Process Control
Registration #0607-531
An advanced course designed to give packaging students instruction in design, process, and quality control techniques for packaging applications. Topics include the concepts of zero defects, computer applications for control charts, and acceptance sampling. (IPKG-431, SMAM-309; or equivalent; professional elective)

Class 3, Recitation 1, Credit 4

IPKG-536 Medical Products Packaging
Registration #0607-536
Study of unique requirements for packaging materials and containers for sterilized medical devices. Current sterilization techniques, impacts on materials properties, and distribution requirements are considered for this specialized product group. (IPKG-433; 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-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, Lab 2, Credit 4

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, marketing, retailing and printing.) (Professional elective)

Class 2, Lab 4, Credit 4

IPKG-577 Packaging Internship
Registration #0607-577
This course number is used by students in the Packaging Science program for earning internship credits. The number of credits and the nature of on-location experience is determined by the student's advisor, subject to approval of the department.

Credit variable 1-8

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

Arranged, Credit 4

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

Arranged, Credit variable 1-4

School of Engineering Technology

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

Civil Engineering Technology

ITEC-099 Introduction to Civil
Registration #0608-099 Engineering Technology
Introduces transfer students to the CET program in order to ease the transition from their previous colleges. Information is provided on cooperative education, technical electives, liberal arts core and concentration courses, and preregistration procedures. Discussion of topics including P.E. registration and N.I.C.E.T. certification.

Class 1, Credit 0

ITEC-210 Engineering Graphics
Registration #0608-210
An introduction to engineering graphics. Course is laboratory-oriented and provides training in development of basic graphic communication skills. The course is intended for students with little or no background in engineering drawing.

Class Z, Lab 4, Credit 4

ITEC-220 Civil Engineering Graphics
Registration #0608-220
This course includes the background information and actual work performance related to the preparation of plans and drawings for civil engineering works, as well as a basic exposure to the graphics of interfacing disciplines: architecture, mechanical and electrical engineering, and landscape architecture. The course builds upon the fundamentals of graphics learned by the student in ITEC-210 and focuses on the actual drawings and related documents used in building civil engineering works; for example, site development, structures, water and wastewater transport systems, water and wastewater treatment, highways, and bridges. (ITEC-210 or equivalent)

Class 2, Lab 4, Credit 4

ITEC-230 Computer Applications
Registration #0608-230
Programming in BASIC, using time-sharing terminals and microcomputers. Student is introduced to log-on and log-off procedures and general methods of use of time-shared system. Concepts of BASIC language are presented with student learning application through program writing. Student also uses stand-alone microcomputers and is exposed to commercially available programs. Emphasis is on engineering technology applications.

Class 4, Credit 4

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

Class **3,** Lab 2, Credit 4

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

Class **3,** Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 3, Credit 4

ITEC-380 Elementary Structures
Registration #0608-380
Application of the principles of Statics and Strength of Materials to the design of basic structural elements such as beams, columns, and trusses. The emphasis is on structural steel and reinforced concrete, with some time spent on timber members. There will also be practice in the use of AISC and ACI specifications. (Statics and Strength of Materials)

Class 4, Credit 4

ITEC-404 Applied Mechanics of Materials
Registration #0608-404

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

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, Statics and Strength of Materials, ITEC-421; Hydraulics Lab must be taken concurrently.)

Class 3, Credit 3

ITEC-421 Hydraulics Laboratory
Registration #0608-421
Experimental study of principal physical properties of liquids and major laws of fluid mechanics. Operating various laboratory equipment and devices while concurrently taking ITEC-420, Hydraulics, for principal theoretical studies of physical and mechanical properties of liquids, hydrostatics fluid, kinematics and dynamics, hydraulic machinery and their operation.

Lab 3, Credit 1

ITEC-422 Elements of Building Construction
Registration #0608-422
Elements and details of building construction; study of building codes from a design concept; foundations; wood, steel and concrete construction and wall systems; overview of highway bridges.

Class 4, Credit 4

ITEC-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 presentation, including audiovisual, are stressed. (Basic college writing)

Class 4, Credit 4

ITEC-432 **Water and Wastewater**
Registration #0608-432 **Transport Systems**
Discussion of surface and groundwater sources. The hydraulic design of sanitary and storm sewer systems, and water distribution systems, including pump systems. (ITEC-420,421)

Class 2, Credit 2

ITEC-438 **Principles of the Treatment**
Registration #0608-438 **of Water and Sewage**
An introduction to water and wastewater treatment, interpretation of analyzed physical, chemical, and biological parameters of water quality with regard to the design and operation of treatment processes and to the control of the quality of natural water; fundamental principles and applications of physical, chemical and biological processes employed in water and wastewater treatment; analysis of waste assimilative capacity of streams, with an introduction to microbiology. (SCHG-272,276)

Class 3, Lab 2, Credit 4

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

Class 2, Credit 2

ITEC-460 **Construction Equipment**
Registration #0608-460
Fundamentals of equipment selection; determining equipment requirements based upon the design and capabilities of currently available construction equipment. Emphasis is given to economic aspects of equipment ownership, principles of equipment management, and earthmoving project analysis.

Class 4, Credit 4

ITEC-470 **Timber Design and Construction**
Registration #0608-470
Discussion of the properties of structural lumber including grades, sizes, and design properties. Design of beams, columns, trusses, plywood diaphragms and shear walls. Other topics include glued-laminated timber, nailed and bolted joints. The provisions of various building codes are investigated, and the specification of the National Forest Products Association is followed. (ITEC-404)

Class 4, Credit 4

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

Class 4, Credit 4

ITEC-482 **Hydrology**
Registration #0608-482
Course presents major theoretical and practical considerations of hydrology in application to study groundwater hydraulics, hydraulic structures, water transportation systems, and transportation. (ITEC-420)

Class 4, Credit 4

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

Class 4, Credit 4

ITEC-490 **Structural Analysis**
Registration #0608-490
Introduction to the analysis of statically determinate and indeterminate structures by classical and modem techniques. The types of structures covered include beams, trusses, and frames which are loaded in the plane of the structure. Topics include slope deflection, moment distribution, approximate methods, and an introduction to matrix methods. Some computer work is involved. (ITEC-404)

Class 4, Credit 4

ITEC-495 **Structural Design**
Registration #0608-495
Structural design in reinforced concrete and structural steel. In the reinforced concrete portion of the course, 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 used in designing members and frames that are primarily determinate. In both portions the accent is on building construction. Provisions of the ACI code and AISC specification are followed. (ITEC-490)

Class 4, Credit 4

ITEC-499 **Cooperative Education**
Registration #0608-499
One quarter of appropriate work experience in industry. (ITES-099)

Credit 0

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

Class 2, Credit 2

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

Class 2, Credit 2

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

Class 3, Recitation 2, Credit 2

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

Class 2, Credit 2

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

Class 2, Credit 2

ITEC-514 **Land Planning**
Registration #0608-514
The environmental and social aspects of land planning are covered as well as the engineering and cost considerations. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wetlands, other planning and control tools, solar access planning, and urban revitalization. Students are involved in an independent project consisting of a concept design for a subdivision, or other land use projects. 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**
Registration #0608-516 **Concrete Structures**
The course is organized to continue with the study of reinforced concrete that was begun in ITEC-495. Topics include retaining walls, footings, two-way slabs, rectangular tanks, columns, and an introduction to prestressed concrete. The strength method of the ACI code is used. (ITEC-495)

Class 4, Credit 4

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

Class 2, Credit 2

ITEC-520 **Design of Wastewater**
Registration #0608-520 **Treatment Facilities**
Principles of wastewater treatment plant design, conceptual and hydraulic design of activated sludge and trickling filter plants are studied. Tertiary treatment facilities, such as nitrogren and phosphorous removal will be discussed. Processes, plant design, and construction elements are stressed. (ITEC-438)

Class 3, Lab 2, Credit 4

ITEC-522 **Principles of Treatment**
Registration #0608-522 **of Water and Sewage II**
Principles of microbiology and its application to water and wastewater. Principles and practice of water and wastewater treatment processes with emphasis on setting, chemical precipitation, adsorption, disinfection, granular medium filtration, aerobic suspended and attached growth, and anaerobic suspended growth. (ITEC-438)

Class 3, Lab 3, Credit 4

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

Class 4, Credit 4

ITEC-526 **Industrial Wastewater**
Registration #0608-526
Industrial wastewater characterization and waste flow survey. Case studies of selected industrial wastewater. (ITEC-438)

Class 2, (Lab 6 for students taking 4 cr.) Credit 2 or 4

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

Class 3, Credit 3

ITEC-528 **Soil Mechanics Laboratory**
Registration #0608-528
The Soil Mechanics Laboratory is to be taken concurrently with ITEC-527. Exercises will include tests in internal friction by direct shear, unconfined compression, triaxial compression, consolidation and compaction.

Lab 2, Credit 1

ITEC-530 **Transportation Engineering**
Registration #0608-530
The course exposes the student to the fields of highway, airport, and rail engineering. The areas of administration, planning, design, construction, maintenance, and operation are covered. After the introductory material is presented, stress is put on specific skills needed in these fields, including highway, rail, and airport standards, geometry and alignment, drainage, earthwork, safety standards, and structures. An independent design project is included. Ample field exposure to all elements is part of the formal structured program. (Route surveying)

Class 4, Credit 4

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

Class 3, Lab 2, Credit 4

ITEC-544 Contracts and Specifications
Registration #0608-544
This course includes a fundamental overview of contract law, followed by the application of this material in the contracts for construction. Subsequently, the student is exposed to construction specifications. Substantial use is made of actual documents such as those of the New York State Department of Transportation, the Construction Specification Institute, and trade standards such as ANSI, ASTM, and others. Students are required to develop and assemble a mock-up set of contract documents.

Class 2, Credit 2

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

Class 1, Credit 1

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

Class 4, Credit 4

ITEC-552 Analysis and Design
Registration #0608-552 of Steel Structures
This course is organized to continue with the study of structural steel that was begun in ITEC-495. Topics include continuous beams, plate girders, connections, and composite steel-concrete construction. Discussed will be the working stress method, plastic design, and an introduction to load resistance factor design. (ITEC-495)

Class 4, Credit 4

ITEC-556, 557 Wastewater TVeatment Plants
Registration #0608-556, 557 Operation and Control I & II
A self-paced, audiovisual course. Emphasis is on the functional aspects of wastewater treatment plants' operation. Discussion of the significance of the results of laboratory analysis and interpretation and application to the control of treatment processes. (ITEC-438 and permission of instructor)

Credit variable 1-4

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

Class 3, Lab 2, Credit 4

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

Class 4, Credit 4

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

Class 3, Credit 4

ITEC-599 Independent Study
Registration #0608-599
A supervised investigation within a civil technology area of student interest. (Consent of the sponsor and departmental approval)

Credit variable 1-8

Electrical Engineering Technology

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

Class 3, Lab 2, Credit 4

ITEE-202 AC Circuits
Registration #0609-202
AC circuits and devices with topics of phasor algebra, reactance, impedance, AC power and power factor, resonance, maximum power transfer, frequency, bandwidth, and three-phase circuits. Use of the computer to solve and simulate circuit problems. (ITEE-201; corequisite SMAT-420)

Class 3, Lab 3, Credit 4

ITEE-203 Electronic Devices
Registration #0609-203
An introduction to electronic devices and systems. The operating characteristics and applications of diodes, zeners, and transistors will be investigated. Emphasis will be placed on the biasing of bipolar and FET amplifiers and on the basic characteristics of impedance and gain of simple amplifiers. (ITEE-202; corequisite SMAT-420)

Class 3, Lab 3, Credit 4

ITEE-205 Drafting and Fabrication
Registration #0609-205
An introduction to the engineering technology field with emphasis on the skills that a student will need in a laboratory environment. The skills include fundamentals of drafting and electrical layout, prototyping, wirewrapping, and soldering. The fundamentals of printed circuit board fabrication and assembly will be discussed. (Corequisite ITEE-201)

Class 1, Drafting Lec/Lab 2, Fabrication Lab 2, Credit 4

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

Class 1, Credit 1 '

ITEE-231 Digital Fundamentals
Registration #0609-231
Introduction to digital logic, number systems and codes, TTL gates, simplification of logic expressions, combination logic and sequential logic.

Class 3, Lab 2, Credit 4

ITEE-271 Telecommunication Fundamentals
Registration #0609-271
A survey and an introduction to the structure and regulation of the telecommunications industry is provided. The basics of telephony, switching systems, and networks are introduced. Data communication components, codes, and techniques are identified. Methods for selecting and implementing a telephone system are reviewed, and the principles of traffic engineering are applied to the system.

Class 4, Credit 4

ITEE-314 Basic Electricity
Registration #0609-314
Basic study of important electrical concepts for both AC and DC circuits. Topics covered include AC/DC circuit theory, single- and three-phase power distribution, power factor, line losses, efficiency, AC motors and transformers, energy costs, wiring methods, instrumentation and circuit protection.

Class 3, Lab 2, Credit 4

ITEE-335 Transducers & Instrumentation
Registration #0609-335
An introduction to electrical transducers, their characteristics, applications, and amplification or drive requirements. (ITEE-362, 353)

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 3, Credit 4

ITEE-361 Applied Electronics I
Registration #0609-361
The application of electronic devices in practical circuits. Power supply devices, properties of transistor amplifiers, and power circuits are investigated.

Class 3, Lab 2, Credit 4

ITEE-362 Applied Electronics II
Registration #0609-362
A continuation of Applied Electronics I. The topics will include discrete differential amplifier, the op-amp, and power amplifiers. (ITEE-361)

Class 3, Lab 2, Credit 4

ITEE-363 Applied Electronics
Registration #0609-363 for Communication
This course applies the concepts of circuits and electronics to basic communication circuits for amplitude and frequency modulation. (ITEE-202, 362)

Class 3, Lab 2, Credit 4

ITEE-401 Transformed Circuits 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 permission of the department)

Class 3, Recitation 2, Credit 4

ITEE-402 Transformed Circuits II
Registration #0609-402
Frequency response of network functions as solved by use of pole-zero diagrams and Bode diagrams. Mutual inductance. The Fourier series solution of circuits with non-sinusoidal inputs. Use of the laboratory to demonstrate concepts. (ITEE-401)

Class 3, Lab 2, Credit 4

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. (ITEE-402, SMAT-422)

Class 3, Lab 2, Credit 4

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

Class 1, Credit 1

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

Class 3, Lab 2, Credit 4

ITEE-412 Electrical Principles for Design II
Registration #0609-412
An introductory survey course in the basics of analog and digital electronics; 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-413 Applied Microprocessors
Registration #0609-413
Applications of microprocessors for manufacturing engineering technology students. Application of the INTEL 8085 microprocessor, with emphasis on the interface to SDK-85 microcomputers. Microcomputers as applied to robotics and numerically controlled machinery. (ITEE-412)

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

ITEE-424 Logic and Digital Devices
Registration #0609-424
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-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 are presented. Included are the topics of feedback and frequency response in multistage amplifiers. (Corequisite ITEE-402)

Class 3, Lab 3, Credit 4

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

Class 4, Credit 4

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

Class 4, Lab 2, Credit 5

ITEE-441 Integrated Circuit Amplifiers
Registration #0609-441
A study of discrete differential amplifiers and integrated operational amplifiers, including applications in instrumentation, active filers, waveform generation and shaping, and precision rectifiers. Regulators, including switching regulators, are covered. Computer analysis using SPICE is included.

Class 4, Lab 2, Credit 5

ITEE-472 Telecommunication Concepts
Registration #0609-472
This course introduces the student to transmission modes, multiplexing methods, and signal theory of communications systems. Technical capabilities of voice, digital, and data transmission media are examined using modems in the laboratory. Different types of transmission modes, multiplexing methods, and transmission hierarchies are studied. Voice and digital signals are analyzed in the presence of noise. (ITEE-363, ITEE-271)

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

ITEE-474 Telephone Systems
Registration #0609-474
Provides an understanding of basic telephony concepts and the public telephone systems. Different types of telephone systems and their components are studied and compared. The laboratory teaches the student how to measure specifications of telephone systems in the presence of noise. (ITEE-363, ITEE-472)

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

ITEE-476 Digital Communication Systems
Registration #0609-476
Provides an introduction to digital communication theory with an emphasis on voice application, voice digitalization, digital transmission, and video transmission. Types of modulation techniques studied are frequency and phase shift keying, pulse code modulation, and delta modulation. These techniques are implemented in the laboratory. (ITEE-472, ITEE-231)

Class 3, Lab 2, Credit 4

ITEE-477 Data Communication Technology
Registration #0609-477
This course studies the various hardware and equipment used to implement and maintain data communication systems. Examples of data communication software systems presently in use by manufacturers are utilized to study this hardware. The laboratory utilizes telecommunications test equipment. (ICSA-411)

Class 3, Lab 2, Credit 4

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

Credit 0

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

Class 3, Recitation 2, Credit 4

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

Class 3, Lab 2, Credit 4 (On demand only)

ITEE-530 Operational Amplifiers
Registration #0609-530
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 Analog Communication Systems
Registration #0609-534
Circuit design and systems concepts for AM, DSB, SSB, VSB, and FM of each type of modulation are determined using the Fourier series of periodic waveforms. The noise figure, noise temperature, and signal-to-noise ratio of each system is determined. (ITEE-428)

Class 3, Lab 2, Credit 4

ITEE-535 Telecommunication Systems
Registration #0609-535
Topics include sampling theorem, plus modulation (PAM, PWM, PPM), digital modulation (PCM, DM), time-division multiplexing, quantization noise, baud rate, coding, PCM telephone circuitry, asynchronous and synchronous transmission, protocols, digital radio and space communication techniques, and fiber-optic communication systems. (ITEE-534 or equivalent)

Class 3, Lab 2, Credit 4

ITEE-536 Control Systems II
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; application of control theory to specific electromechanical temperature and light control systems. 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 (On demand only)

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. 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 microprocesssors 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 Peripherals and Interfacing
Registration #0609-543
A study of the most common peripherals used with microprocessors and minicomputers. Peripherals include UARTS, IC timers, TTYs, modems, CRT drivers, disc drives, line printers, and D/A and A/D converters. Methods of interfacing these peripherals to minicomputers and microprocessors are emphasized. Advanced topics in microprocessors will also be considered. (ITEE-539 and ITEE-542 or permission of the instructor)

Class 3, Lab 3, Credit 4

ITEE-547 Digital Processing of Signals
Registration #0609-547
Basic concepts of linear systems are covered, followed by an introduction to digital signal processing 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 4, Credit 4

ITEE-551 Protective Relaying
Registration #0609-551
The physical construction and characteristics of electromechanical relays, short circuit calculation and line, bus, transformer and motor generator protection are studied. Solid state relays, instrument transformers, and telecommunications and supervisory control are included. (ITEE-402, ITEE-550, or permission of department)

Class 4, Credit 4

ITEE-552 **Power Systems II**
Registration #0609-552
The symmetrical component method of three-phase circuit analysis is used for fault analysis. Lightning and surge protection, load flow, economic operation, and system stability are covered. System protection is introduced. (ITEE-550 or permission of instructor)

Class 4, Credit 4

ITEE-554 **Electronic Optic Devices**
Registration #0609-554
An introductory course in the basics of optoelectronics. Basic optics is reviewed. Topics covered include the introduction to optics, lenses and optical systems; light sources and transmitters; modulation; light detectors and receivers; fiber optics, and lasers.

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

Lecture 3, Recitation 2, Credit 4

ITEE-561 **Microelectronics II**
Registration #0609-561
The fabrication techniques of MOS/CMOS devices are presented along with the physical basis of their operation and use in IC devices. VLSI design procedures using MOS/CMOS devices are introduced and developed. (ITEE-560)

Lecture 3, Recitation 2, Credit 4

ITEE-565 **16-Bit Microprocessors**
Registration #0609-565
A study of 16-bit microprocessors, emphasizing the Motorola 68000 and the Intel 8086. The architecture, instruction set, and programming of these microprocessors will be discussed. Input/output, interrupts, and exception processing will also be considered. (ITEE-542 or equivalent)

Class 3, Lab 3, Credit 4

ITEE-571 **Network Engineering**
Registration #0609-571
This course uses local area networks (LAN) to study design issues for communication networks. Design issues studied are topologies, transmission media, interfaces and standards. A LAN is implemented in the laboratory. (ITEE-473, ITEE-474)

Class 3, Lab 2, Credit 4

ITEE-572 **Network Management**
Registration #0609-572
The course studies the issues and regulatory policies confronting a manager of a modern communication network. Issues studied are cost/performance trade-offs, network flow, control, and security. The current state of federal and state regulatory policies is examined. (ITEE-475)

Class 4, Credit 4

ITEE-574 **Network Planning and Design**
Registration #0609-574
Students in this course learn how to design and analyze communication networks for a particular business. Queuing and traffic theories are reviewed. System performance criteria are determined for various types of networks. Policy issues are identified for different networks. (ITEE-571, SMAM-309)

Class 4, 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

Mechanical Engineering Technology

ITEM-211 **Introduction to Materials**
Registration #0610-211 **Technology**
A course dealing with the characteristics of materials and the fabrication of materials into finished products. Topics will include mechanical, electrical, thermal, chemical, magnetic and optical properties of materials, the structure of the materials and the interrelationship of material characteristics and manufacturing processes.

Class 4, Credit 4

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

Class 1, Lab 2, Credit 2

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

Class 3, Recitation 2, Credit 4

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

Class 3, Recitation 2, Credit 4

ITEM-304 Materials Testing
Registration #0610-304
A laboratory course dealing with standard physical tests of various materials, instrumentation used in these tests, and the preparation of laboratory reports. (ITEM-303)

Class 0, Lab 2, Credit 1

ITEM-306 CAD Applications in
Registration #0610-306 Mechanical Design I
This is an applications course in CAD which uses the fundamental concepts and software studied in Introduction to CAD, CAD I and CAD II. Instruction will be provided in geometric dimensioning and tolerancing. Laboratory exercises will emphasize machine component design problems. (ITEF-360)

Class 2, Lab 4, Credit 4

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

Class 2, Lab 4, Credit 4

ITEM-308 Kinematics
Registration #0610-308
A study of basic kinematics, using analytical, graphical, and computer-aided techniques. Kinematics analysis of mechanisms and machine components. The design of cams, gear trains, linkages, flexible machine elements, hydraulic mechanisms. Case studies of mechanisms. (ITEM-303, ITEM-220)

Class 3, Recitation 2, Credit 4

ITEM-404 Applied Mechanics of Materials
Registration #0610-404
The basic concepts of mechanics of materials as applied to mechanical design are covered in depth. The course includes a review of statics, the concepts of stress and strain, the stress-strain relationship and strength of materials. Specific topics include simple normal and shear stresses, torsion of shafts, bending stress and deflection of beams, combined stresses and statically indeterminate problems. (ITEM-408 or equivalent)

Class 3, Recitation 2, Credit 4

ITEM-405 Applied Dynamics
Registration #0610-405
This is a course in the fundamentals of kinematics and kinetics of motion. Kinematics is the study of the geometry of motion. Kinetics relates the forces on objects to their resulting motion. This includes the study of Newton's Laws of Motion and energy methods. (ITEM-404, SMAT-421, or concurrent)

Class 3, Recitation 2, Credit 4

ITEM-406 Dynamics of Machinery
Registration #0610-406
A study of the kinematics of machine elements including gear trains, cams and linkages. Applications in robotics mechanisms are studied. Both graphical and computer methods are used. (ITEM-405 and 432)

Class 3, 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. (Must be taken concurrently with ITEM-414)

Class 1, Lab 2, Credit 2

ITEM-408 Introduction to
Registration #0610-408 Strength of Materials
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
Registration #0610-409 Technology Laboratory II
A course in mechanical laboratory techniques, the analysis of experimental results and the preparation of laboratory reports. Experimental work in mechanics of materials, materials science and plastics technology will be conducted. Instruction will be provided in several forms of technical communication. (ITEM-404, 407, 415 concurrently)

Class 1, Lab 2, Credit 2

ITEM-414 Materials Technology I
Registration #0610-414
A course involving a study of materials, their structure and their characteristics. Topics covered include metallic structures, unit cell, phases and phase diagrams, physical properties, diffusion in metals, recovery, recrystallization and grain growth, ferrous and some non-ferrous metals, heat treatment and age hardening of metals.

Class 3, Credit 3

ITEM-415 Materials Technology II
Registration #0610-415
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

ITEM-432 Computers in Mechanical Technology
Registration #0610-432
The use of computers to solve problems encountered in mechanical engineering technology will be emphasized. This will include an introduction to the RIT academic computing system and introduction to the use of personal computers. Instruction will be provided in word processing, spread sheet programming, plotting and other applications programs. Assignments will be based on problems encountered in mechanics, materials testing, energy analysis, etc. (ITEM-303 or ITEM-408)

Class 2, Lab 2, Credit 3

ITEM-440 Applied Thermodynamics
Registration #0610-440
The first and second laws of thermodynamics and their applications in mechanical engineering technology. Thermodynamic properties of fluids including ideal gasses and pure substances are studied. Thermodynamic processes and applications of thermodynamic principles to steam cycles and refrigeration cycles.

Class 4, Credit 4

ITEM-442 **Heat Transfer**
Registration #0610-442
The first course in heat transfer. The theory and application of the fundamentals of heat conduction, convection, and radiation. The design and applications of heat transfer-apparatus. (ITEM-440)

Class 3, Lab 2, Credit 4

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

Class 4, Credit 4

ITEM-460 **Applied Fluid Mechanics**
Registration #0610-460
A study of the fundamentals of fluid statics and dynamics. Applications of kinematics, momentum, conservation of energy, and laminar and turbulent flow in pipes, dimensional analysis, fluid machinery and meters. (ITEM-440, and either ITEM-405 or ITEM-408)

Class 4, Credit 4

ITEM-465 **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, ITEM-460)

Class 1, Lab 3, Credit 3

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

Credit 0

ITEM-506 **Machine Design I**
Registration #0610-506
The study of the static and fatigue failure of machine components and the design and analysis of fasteners, springs, and gears. Computer programs are used to study the statics theories of failure and for fatigue analysis (ITEM- 405,432)

Class 3, Recitation 2, Credit 4

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

Class 3, Lab 2, Credit 4

ITEM-512 **Computer-Integrated**
Registration #0610-512 **Mechanical Design**
The use of computers involving mechanical design problems will be emphasized. This includes data manipulation, plotting, graphics, applications programming, and an introduction to finite elements. (ITEM-432, 506)

Class 3, Recitation 2, Credit 4

ITEM-522 **HVAC 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 students with an overview of analog feedback control systems. Students are introduced to topics such as block diagrams, classification of control types, mathematical models, measuring means, and LaPlace Transforms. Control systems design will also be discussed. Lab demonstrations will be presented. (ITEM-405,460, and SMAT-422)

Class 4, Credit 4

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

Class 4, Credit 4

ITEM-542 **HVAC System Engineering**
Registration #0610-542
Principles and applications of refrigeration, air conditioning, comfort heating, and ventilating. Thermodynamics of air conditioning, psychrometrics, moisture calculations; also related heat transfer topics.

Class 4, Credit 4

ITEM-543 **Energy Management I**
Registration #0610-543
Technical, management, and cost aspects of energy conservation. Technical aspects of reducing energy consumption in utilities, processes, buildings, heating, air conditioning, and ventilation systems. Special topics such as combustion efficiency, heat recovery, heat pumps, pumping and piping, lighting design, and architectural considerations. (ITEM-542)

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

ITEM-561 Computer-Aided
Registration #0610-561 Energy Analysis
The course examines the application of computer software for both HVAC systems analysis and the sizing of pipes and ducts. Students will use programs that are currently used in design offices to solve design problems. The computer is used to examine alternative designs and to gain insights into the effects of variations in system parameters.

Class 2, Lab 4, Credit 4

ITEM-580 Power Plant Design
Registration #0610-580
Description of power plants and their components; boilers, turbines, pumps, condensers, heat exchangers, nuclear reactors. Relevant analytical tools; cycle calculations, heat balances, gas analysis, fuel analysis. Also, internal combustion power plants and cogeneration plants are covered. (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. (Permission of instructor and departmental approval are required. A program maximum of 12 credits may be earned by independent study.)

Credit variable (1-4)

Manufacturing Engineering Technology

ITEF-220 Manufacturing Processes I
Registration #0617-220
This course will introduce the student to basic metal cutting machine tool operation, proper machining practices and cutting tool selection. Hands-on experience will be emphasized through lathe, milling machine, drill press, band saw, grinder and precision layout work. The course will provide the student with the knowledge and the "how-to-do" skills of manufacturing. (ITEC-210)

Class 3, Lab 3, Credit 4

ITEF-260 Introduction to CAD
Registration #0617-260
This is a first course in CAD. It introduces the basic concepts in automated drafting and design. The course will be taught with the help of a PC-based CAD system. (ITEC-210)

Class 3, Lab 2, Credit 4

ITEF-265 CAD I
Registration #0617-265
This is a second-level course in CAD and will deal with the concepts of mechanical design using a turn-key CAD system. The scope of the course will be limited to the design of parts using 2D geometric models. (ITEF-260)

Class 3, Lab 2, Credit 4

ITEF-300 BASIC Programming
Registration #0617-300
This is a programming course involving microcomputers. The course will first introduce the fundamentals of computer hardware, software, and data processing and then concentrate on developing the skills in programming with BASIC. It will also deal with the use of canned programs for accomplishing many of the tasks in the manufacturing environment. Emphasis will be placed on the application of microcomputers to real-world problems.

Class 3, Lab/Recitation 2, Credit 4

ITEF-360 CAD II
Registration #0617-360
This is the third course in CAD and will deal with the concepts of mechanical design using a tum-key CAD system. In this course, the design of parts will be approached from the point of view of 3D geometric models. (ITEF-265)

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Credit 3

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

Class 4, Credit 4

ITEF-410 Computers in Manufacturing
Registration #0617-410
A course dealing with the use of UNIX operating system in the manufacturing environment and programming with C language. It also deals with the concepts of networking and distributed systems.

Class 2, Lab 2, Credit 3

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

Class 3, Lab 3, Credit 4

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

Class 4, Credit 4

ITEF-425 Statistical Quality Control II
Registration #0617-425
This is an advanced course in quality control. The course will cover in detail the following aspects: Process Control Techniques involving X charts, R charts, P charts, NP charts, and Acceptance Sampling techniques involving MIL-STD 105D, MIL-STD 414, and other MIL-STDs. (SMAM-309)

Class 3, Credit 3

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

Credit 4, Class 4

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

Class 4, Credit 4

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

Class 3, Credit 3

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

ITEF-470 Controls for Manufacturing
Registration #0617-470 Automation
The course deals with the principles and application of programmable logic controllers. Topics include PLC hardware, programming, and application of PLCs in the manufacturing environment.

Class 2, Lab 2, Credit 3

ITEF-471 Computer Numerical Control
Registration #0617-471
An advanced course in the application of numerical control. Emphasis is placed on computer-assisted part programming for contouring in two and three axes. The course-will concentrate on N/C programming with APT.

Class 2, Lab 2, Credit 3

ITEF-472 Tool Engineering
Registration #0617-472
An advanced course dealing with manufacturing tools. Examines concepts in tool design, tool specification and tool selection. Emphasis is on the design of dies.

Class 2, Lab 2, Credit 3

ITEF-475 Computer-Aided
Registration #0617-475 Manufacturing
A course dealing with the process aspects of Computer Integrated Manufacturing systems. Introduces the various elements of CIM and concentrates on the role of CAM in CIM. Deals with the concepts and application of Group Technology, Computer-Aided Process Planning, and Flexible Manufacturing Systems. Includes the relationships between CAD, CNC, Robotics, MRP and CAM. Emphasis is placed on building mini CAM systems in the laboratory. (ITEF-471, ITEF-485, ITEE-413, ITEM-521)

Class 3, Lab 2, Credit 4

ITEF-481 Work Simplification
Registration #0617-481 and Measurement
Principles and application of basic methods for the improvement of operator-assignment time relationship. Methods of measuring and analyzing work, motion studies, and process analysis are covered.

Class 3, Credit 3

ITEF-485 Robots in Manufacturing
Registration #0617-485
A course dealing with the technology and application of robotics. Included are the study of hardware and software of robots and the integration of robots with other elements of Computer Integrated Manufacturing (CIM) systems. The hardware aspects will include the mechanical components, the power systems, the control units, and the sensors. The software aspects will cover the various methods of programming the robots and interfacing them with other components of CIM. The integration aspects include the potential areas of application of robots and their economics. (ITEM-521, ITEE-413)

Class 3, Lab 2, Credit 4

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

Class 4, Credit 4

ITEF-499 Manufacturing Technology Co-op
Registration #0617-499
One quarter of appropriate work experience in industry. (ITES-099)

Credit 0

ITEF-502 Non-Traditional
Registration #0617-502 Manufacturing Processes
A course dealing with precision machining using non-traditional processes. Includes such processes as electric discharge machining, electro-chemical machining, chemical milling, laser beam machining, electron beam machining, ultrasonic machining, water jet cutting, abrasive flow machining and plasma arc machining.

Class 3, Credit 3

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

Class 1, Recitation 4, Credit variable 3-4

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

Class 3, Credit 3

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

Class 3, Credit 3

ITEF-599 Independent Study
Registration #0617-599
A supervised investigation within a manufacturing technology area of student interest. Student must submit written proposal and have it approved prior to registering.

Credit variable 1-4

Computer Engineering Technology

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 3, Credit 4

ITEP-205 Drafting & Fabrication
Registration #0618-205
An introduction to the engineering technology field with emphasis on the skills that a student will need in a laboratory environment. These include fundamentals of drafting and electrical layout, prototyping, wirewrapping, and soldering. The fundamentals of printed circuit board fabrication and assembly will be discussed. (Corequisite ITEP-201)

Class 1, Drafting Lec/Lab 2, Fabrication Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 3, Credit 4

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

Class 3, Lab 3, Credit 4

ITEP-311 **Electronics II**
Registration #0618-311
A continuing course in the analysis and design of electronic circuits. Emphasis will be on the characteristics, operation and biasing of both junction and insulated gate field effect transistors and the use of small signal parameters. Included is an introduction to frequency response of circuits and the depiction of frequency response. (ITEP-310)

Class 3, Lab 3, Credit 4

ITEP-312 **Electronics III**
Registration #0618-312
A continuation course in the analysis and design of simple linear circuits for students who have completed the introductory course sequence in transistor amplifiers. Included is the analysis of multistage transistor amplifiers and the differential amplifier. Emphasis is on the operational amplifier and its applications. Topics include the ideal operational amplifier, non-ideal characteristics, summing amplifiers, and integrators. Also included is an introduction to special purpose electronic devices (SCR, TRIAC, LCD, etc.). (ITEP-311)

Class 3, Lab 3, Credit 4

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

Class 2, Lab 4, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

ITEP-471 **Topics in Computer**
Registration #0618-471 **Engineering Technology**
A course for majors in computer technology, with topics as needed for updating in technology. Anticipated offerings may include topics in new programming languages, advanced microprocessors and microcomputer systems, and computer communications systems and techniques. (Fifth-year status in Computer Engineering Technology)

Class 3, Lab 3, Credit 4

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

Credit 0

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

Class 3, Lab 3, Credit 4

ITEP-539 **Digital Systems Design II**
Registration #0618-539
A study of the design of complete digital systems using combinational and sequential subsystem circuit design and microprocessors. Included is the hardware design used in digital communications systems. Laboratory work is based around the designing, building and modifying of a multifunction microcomputer from individual components. Included are the hardware ramifications of software and operating system design, and small system architecture problems. (ITEP-538,303)

Class 3, Lab 3, Credit 4

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

Class 3, Lab 3, Credit 4

ITEP-580 **Senior Project**
Registration #0618-580
Selected independent study design project by computer technology students with the approval of the department. Approval must be granted first week of the fall or winter quarter for spring quarter registration. (Fifth-year status in Computer Engineering Technology)

Class/Lab as required, Credit 4

School of Food, Hotel and 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.

Class 1, Credit 4, Clinical hours by arrangement

ISMD-525,526 Advanced Nutrition and
Registration #0620-525,526 Diet Therapy I & II
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, gastrointestinal, renal, musculoskeletal, cardiac, endocrine, febrile, and other diseases.

ISMD-525 Class 5, Credit 5
ISMD-526 Class 4, Credit 4

ISMD-550 Community Nutrition
Registration #0620-550
Study of current nutrition problems and delivery of nutrition information and service in the community. Survey of facilities involved in giving nutrition information or nutritional care. Emphasis on acquiring skills necessary for delivering nutrition information and services in traditional and non-traditional markets. An independent study project involving nutrition care in community facilities is required. Assignments are arranged by the instructor.

Class 3, Credit 8, Practicum hours by arrangement

ISMD-551 Food Systems Management II
Registration #0620-551 (Coordinated Dietetics Program)
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.

Class 1, Credit 8, Practicum in hospital by arrangement

ISMD-554 Nutrition in Life Cycle
Registration #0620-554
This is an applied course in nutritional needs throughout the life cycle. Emphasis will be given to nutrition during pregnancy, infancy, early childhood, adolescence, young and middle adulthood, and the elderly. Practicum in facilities delivering nutrition services to these age groups is required.

Class 4, Credit 5, Practicum hours by arrangement

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

ISMD-560 Class 4, Credit 4
ISMD-561 Credit 4, Clinical hours by arrangement

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

ISMD-562 Class 4, Credit 4
ISMD-563 Credit 8, Clinical hours by arrangement

Food and Beverage Management

ISMF-215 Principles of Quality Food Production
Registration #0621-215
Introduction to foods and the basic principles involved in the preparation of high quality food. Topics include composition, varieties, availability and function of foods and ingredients. Organization, management and techniques for efficient food production are stressed. Uniform and professional knife and pastry kits are required.

Class 2, Lab 4, Credit 4

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

Class 2, Credit 2

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

Class 4, Credit 4

ISMF-224 Decision Making in
Registation #0621-224 Food Service Management
Insights into the dynamics of food service management decisions for cost control with consideration given to availability, quality, and cost of raw ingredients, distribution systems, labor required, available equipment, and merchandisability.

Class 4, Credit 4

ISMF-314 Sanitation and Safety
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.

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

ISMF-321 Menu Planning and Merchandising
Registration #0621-321
The menu as the main focus of the food service operation and its relationship to efficient operation, merchandising, theme, and customer satisfaction. "Truth in menu" issues, layout, copywriting, standardized recipes, and pricing techniques will be explored. A wide variety of menus will be critiqued. The student will plan and produce a menu for a theme restaurant and will also create a cycle or other menu for a specific customer and situation.

Class 2, Credit 2

ISMF-330 Quantity Food Production
Registration #0621-330
Principles of quantity food production including equipment operation, holding techniques, use of standard recipes, conversion of small quantity recipes to large quantity, production techniques, forecasting, temperature control, cafeteria/buffet service, purcashing and inventory systems. (ISMF-222)

Class 4, Credit 4

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

Class 3, Lab 10, Credit 6 (ISMF-330)

ISMF-340 Beverage Operations
Registration #0621-340
A study of the principles, methods, and practical applications of beverage management as it applies to the commercial beverage industry. Emphasis is on the administrative objectives, government regulations, operational procedures, and internal control.

Class 2, Credit 2

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

Class 2, Lab 6, Credit 6

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

Class 4, Credit 4

ISMF-430 Restaurant Management
Registration #0621-430
This course is designed to develop entry-level management competence in food service systems through the operation of a restaurant with full beverage service. Students apply knowledge and skills gained from previous course prerequisites as they rotate through managerial positions. Students are exposed to four major areas: planning, organization, leadership, and control. Computer use is an integral part of the course.

Class 2, Lab 10, Credit 6

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.

Class 0

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

Lab **4,** Credit 2

ISMF-507 Garde Manger
Registration #0621-507
Students will explore classical *garde manger* techniques through hands-on practice with arrangements of cold platters, the use of aspic and *chaudfroid,* creation of pates and sculptures, production of carved vegetable arrangements and advanced garnishes. Projects designed and created by students individually and in teams illustrating these techniques will be evaluated in an artistic buffet layout. Ice carvings will be included if time permits.

Lab 8, Credit 4

ISMF-510 Contemporary Cuisine
Registration #0621-510
Nutritional choice is an increasing force in the marketplace. Students will examine the issues shaping this multi-faceted force and develop techniques and expertise in producing attractive, tasty foods that meet this challenge. Specific issues that will be addressed are: choice of ingredients, preparation techniques, portion size, measurement precision, presentation and ethnic possibilities. Students will develop expertise in evaluating the nutritional value of individual dishes. Attention will also be given to menu promotion.

Lab **4,** Credit 2

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

Class 1, Lab 12, Credit **4**

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

Class 2, Credit 2

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

ISMF-522 Contract Environment of the
Registration #0621-522 Food Service Industry
The course will provide students with the theoretical basis for identifying the legal environment of the food service industry. Special emphasis will be placed on identifying the rights and obligations of the food service operator in the contractual environment of food service operations.

Class **2,** Credit **2**

ISMF-525 Specialized Commercial Operations
Registration #0621-525
Application of food service operating principles to specific commercial operations. Operations from single cart to multi-unit dining in various settings (such as sports arenas, convention centers, industry, health care, schools, hotels and resorts) and with various constraints will be explored. Staffing, layout, traffic flow, equipment requirements, decor and control will be covered.

Class 4, Credit 4

ISMF-540 Food and Beverage Marketing
Registration #0621-540
This class will provide students foith an industrial perspective in order to understand the distribution systems and related retail environments of food and beverage products. The class will consider both the macro and micro environments of marketing food and beverage products and services with special emphasis on the alternative marketing and distribution channels.

Class 4, Credit 4

ISMF-541 Beverage Operations Lab
Registration #0621-541
Course consists of hands-on mixology and beverage service as practiced in hotel/food service operations. Students will be assigned activities as practiced in hotel and restaurant operations during the class or for other special events for the school. Minimum age requirement: 19 (state law) (ISMF-340)

Lab 4, Credit 2

Hotel and Resort Management

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

Class 4, Credit 4

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

Class 4, Credit 4

ISMH-310 Resort Development
Registration #0622-310 and Management
This course is designed to give the student an understanding of how resort and hotel properties are developed as tourist and business destinations. Focus will be on the planning, development, operation, design, special needs of recreational surfaces and financing of such properties. Students will, as part of this study, select a specific type of property and analyze the methods used to develop it.

Class 4, Credit 4

ISMH-315 Hotel Engineering
Registration #0622-315 and Maintenance
This course is formatted to expose the student to various problems of maintaining commercial and resort properties. Maintenance of practices, equipment, record keeping, and specific computer energy monitoring systems will be reviewed. A study of the operational set-up of an engineering department will also be undertaken.

Class 4, Credit 4

ISMH-355 Financial Management for
Registration #0622-355 the Hotel Industry
The course covers the elements of managing the financial resources in a hotel setting. Budgeting and point-of-sale flow of income will be examined, and a budgeting project will be included. A study of financial statements for hotels and an exploration of the standard accounting system for hotels will be conducted.

Class 4, Credit 4

ISMH-460 **Seminar in Hotel and**
Registration #0622-460 **Resort Development**
A seminar devoted to examination of the current marketing issues facing hotels and resorts. Current issues will be reviewed, and students will analyze these by defining the problem, the resources that may be used to solve the problem, and possible outcomes of actions taken.

Class **2,** Credit **2**

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

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

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

Class 4, Credit 4

ISMH-500 **Housekeeping, Safety, and Security**
Registration #0622-500 **Management for Hotels**
This course will cover the technical aspects of hotel housekeeping and laundry departments. It also examines hotel responsibilities for the safety and security of both guests and employees.

Class 4, Credit 4

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

Class 4, Credit 4

ISMH-520 **Meeting Management**
Registration #0622-520
A course formulated to introduce the student to the field of meeting management from the perspective of the independent or corporate meeting planner. Included will be identification of the elements of a meeting, including timing, equipment, transportation and site selection. In addition, the areas of budget control and available computer systems will be examined.

Class 4, Credit 4

ISMH-530 **Hotel Law**
Registration #0622-530
Policies, laws and liabilities are examined in this course as they pertain to the innkeeper. Focus will be on current management problems and on the legal responsibilities of management. The rights of innkeepers will also be discussed.

Class 4, Credit 4

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

Class 4, Credit 4

Travel Management

ISMT-205 **Introduction to Tourism**
Registration #0623-205
This course introduces the student to the principles, practices, and philosophy of tourism. Organization, destinations, and cultures of tourism are examined and compared throughout the world. Viewing tourism as a system of interrelated and independent elements is emphasized.

Class 4, Credit 4

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

Class 4, Credit 4

ISMT-210 **Introduction to A. A. SABRE**
Registration #0623-210 **Reservations**
This course emphasizes acquiring operational proficiency with American Airlines' SABRE reservation system. Using SABRE's training mode, the course topics addressed include: creating passenger name records (PNRs), itinerary pricing, fare quotes, queues, and flight information. This course is equally divided betweeen lecture and Travel Lab simulations.

Class 4, Credit 4

ISMT-312 **Travel Reservation Procedures**
Registration #0623-312
Reservation procedures and documentation sourcing for each of the various modes of passenger transportation are examined. Particular attention is given to hotel reservation guide books, cruise ship deck plans and reservation procedures, and interpreting travel brochures. Emphasis is on the various forms used in travel documentation.

Class 2, Credit 2

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

Class **2,** Credit **2**

ISMT-413 Marketing Tourism Destinations
Registration #0623-413
This course focuses on the processes and techniques used to promote tourism attractions and communities. Emphasis will be on the role that destination marketing organizations such as tourist promotion agencies, convention and visitor bureaus, and state divisions of tourism play in marketing and promoting a destination. The development of tourism marketing plans and the management of the inquiry-fulfillment-referral process will also be discussed.

Class 4, Credit 4

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

Class 4, Credit 4

ISMT-438 Tourism Planning and Development
Registration #0623-438
This course is designed to analyze the processes involved in planning and developing a tourist destination and required infrastructures. A major focus will be on the benefits and impacts of tourism development as well as the strategies for maximizing benefits and minimizing adverse effects.

Class 4, Credit 4

ISMT-510 Tourism Product Development
Registration #0623-510
This course examines the research and planning functions conducted by both tourism development organizations and wholesale tour operators in developing tourism products. Particular attention is given to combining travel service offerings in a manner that appeals to various market segments. The development of a travel "package" and its administration through the travel distribution channel are discussed.

Class 4, Credit 4

ISMT-515 Tourism Research and Analysis
Registration #0623-515
This course will focus on research issues, problem solving techniques and analysis skills. Particular emphasis will be placed on the role of information in the decision process and the sources for information that can be useful in management decisions. Computer-assisted data base creation and analysis techniques will be discussed.

Class 4, Credit 4

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

Class 2, Credit 2

ISMT-521 Tour Operations
Registration #0623-521
This course focuses on the planning, development, and marketing of group travel (packaged or group tours) by suppliers and intermediaries. Emphasis also will be on professional organizations that play a major role in the group tour industry and on the reasons for growth of this market.

Class 2, Credit 2

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

Class 2, Credit 2

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

Class 2, Credit 2

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

ISMT-55S **Seminar in Travel/**
Registration #0623-555 **Tourism Management**
This course surveys various issues and events that influence the travel and tourism industry. Emphasis is also on how these factors will affect the careers of future professionals. This course is intended for students who have completed all of their required cooperative education experience.

Class 4, Credit 4

ISMT-575 **Destination Geography**
Registration #0623-575
Leisure and recreation geography stimulate the geographer's curiosity about place, its spatial interactions and expanse, and its man-land interdependence. This course focuses on man's leisure orientation and its spatial manifestations, be they exotic or mundane, esoteric or hedonistic. Select regions of the world are examined in terms of their leisure-recreational potentials.

Class 4, Credit 4

Department of Military and Aerospace Science Reserve Officers Training Corps (ROTC)

ARMY

First Year

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

Class 1, Lab 1, Credit 2

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

Class 1, Lab 1, Credit 2

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

Class 1, Lab 1, Credit 2

Second Year

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

Class 1, Lab 1, Credit 2

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

Class 1, Lab 1, Credit 2

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

Class 1, Lab 1, Credit 2

Third Year

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

Class 2, Lab 1, Credit 3

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

Class 2, Lab 1, Credit 3

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

Class 2, Lab 1, Credit 3

Fourth Year

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

Class 2, Lab 1, Credit 3

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

Class 2, Lab 1, Credit 3

MMSM-503 Military Ethos
Registration #0640-503
This course examines the ideas and issues that define the role of the military in our larger society. Emphasis is placed on the professional and ethical standards required of the military officer. Other topics include: planning and conducting meetings, teaching and counseling, active duty orientation, preparations for commissioning; leadership laboratory; field training exercise.

Class 2, Lab 1, Credit 3

MMSM-510 Senior Seminar and Project
Registration #0640-510
For military science students who have completed their junior year of military study. The seminar is directly related to military science projects that students are working on and consists of written and/or oral presentations given during the quarter. Students may also be required to present this material to other students in a classroom environment.

Class 2, Credit 2

AIR FORCE

IMAF-201,202,203 Leadership Lab I
Registration #0650-201,202,203
Leadership Laboratory I focuses on benefits, opportunities, 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

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

Credit 1

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

Credit 1

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

Credit 1

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

College of Business

Accounting

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, liabilities, 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-319 **Legal Environment of**
Registration #0101-319 **Business**
An introduction to legal principles and their relationships to business organizations. This includes a review of the laws that govern their operations. This course will explore the background and origin of the U.S. legal system, its law enforcement agencies, and the legal procedures used by the government to enforce its laws. Representative topics will include environmental law, bankruptcies, regulatory law. A substantial portion of the course will deal with contract law.

Credit 4

BBUA-320 **Business Law**
Registration #0101-320
This course explores in greater depth the implications of the Uniform Commercial Code to business operations. Representative topics covered include: sales, secured transactions, commercial paper, corporations, and securities regulation. Topical cases and examples are used to help the student grasp the business implications of the law and its nomenclature. (BBUA-319)

Credit 4

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

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, junior status)

Credit 4

BBUA-522 **Tax Accounting I**
Registration #0101-522
A basic course in federal income taxation, emphasizing individuals. Tax aspects of transactions common to all taxpayers are covered, such as concepts of income, deductions, credits, and taxation of property transactions. (BBUA-302, junior status)

Credit 4

BBUA-523 **Tax Accounting II**
Registration #0101-523
A continuation of Tax Accounting I, emphasizing taxation of corporations, partnerships, estates, and trusts. Includes tax aspects of acquisitions and mergers, as well as international taxation. (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 theory, standards, procedures and techniques are studied. The audit process is studied to ascertain how it leads to the development of an audit opinion. (BBUA-409, junior status)

Credit 4

BBUA-540 **Advanced Accounting**
Registration #0101-540
The application of modern accounting theory to problems of advanced complexity. Topical coverage includes consolidated financial statements, partnerships, government and not-for-profit entities and foreign currency implications. (BBUA-409, junior status)

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, senior status)

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.
(BBUA-302, junior status)

Credit 4

Management

BBUB-310,311 **Air Force Management**
Registration #0102-310,311 **and Leadership I, II**
Integrated management and leadership courses emphasize the concepts and skills required of the successful young officer, manager, and leader. The first course includes applied written and oral communication techniques, coordination, history of management theory, analytic methods of decision-making, strategic and tactical planning, various leadership theories, and followership. The second course stresses organizing, staffing, controlling, counseling, human motivation and group dynamics, ethics, managerial power and politics, managing change, career development, and performance appraisal. Actual Air Force case studies are used to enhance the learning process. (ROTC)

Credit 5 each
NOTE: Other Air Force ROTC course listings can be found under the College of Applied Science and Technology.

BBUB-312 Career Seminar
Registration #0102-312
Career planning for the college student. Aptitudes, interests, and course and major selections while in college. Using planning techniques to get the most out of the college experience (i.e., choosing majors, planning for co-op). Importance of career paths to career achievement in organizations. This course must be taken during the freshman year.

Credit 2

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

Credit 4

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

Credit 4

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

Credit 4

BBUB-455 Human Resources
Registration #0102-455 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. Some emphasis is placed on the legal aspects of managing human resources. (BBUB-430, junior status)

Credit 4

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

Credit 4

BBUB-462 Management Development
Registration #0102-462
Training and management development practices in work organizations. Both management and individual approaches to skills development and utilization over the career cycle will be considered. (BBUB-430, junior status)

Credit 4

BBUB-490 Entrepreneurship I
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-491 Entrepreneurship II
Registration #0102-491
The focus of this course is on the creating and building of new ventures. Issues and problems that will be examined include: the forces that drive the new venture process; factors critical to the birth, survival and growth of a new venture; roles played by the founder of the new venture; and the sources of funds available for the creation of a new venture. An integral part of the course will be the development, writing, and presentation of a business plan by each student. Case analysis will be a primary vehicle for the learning of course concepts. Students taking this course will benefit from having taken previous College of Business courses in accounting, finance, and marketing. (BBUB-490, 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-515 Technology Management
Registration #0102-515
The technological innovation process in management will be studied. Also internal and external factors that influence the rate, timing and success of industrial innovations. Technological innovation as a strategic tool to be used in confronting competition and also as a strategic challenge. Designed for advanced standing juniors and for seniors who may manage in a technology-intensive organization. (BBUB-430, BBUF-441, BBUM-463 and senior status. For non-College of Business students, consent of instructor)

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

BBUB-552 Business Policy for Food/Hotel/
Registration #0102-552 Tourism Students
A special action-oriented course for Food, Hotel and Tourism students only. Emphasis is on policy and strategy issues from the perspective of management in planning and reaching organizational goals. Group discussion and case analyses are used extensively in understanding the applications of strategic management principles and techniques to the Food, Hotel and Tourism industries. (Senior status)

Credit 4

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

Credit 4

Economics

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

Credit 4

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

Credit 4

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

Credit 4 (offered upon demand)

BBUE-408 Business Cycles and Forecasting
Registration #0103-408
Analysis of economic conditions affecting the firm. Theory of business fluctuations. Forecasting techniques and services available to the firm. (BBUE-405 or BBUE-406, junior status)

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, 302, junior status)

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. (GSSE-301, 302, BBUA-301, junior status)

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, junior status)

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, infiationtion and public policy. (BBUE-405 or 406, junior status)

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, permission of instructor)

Credit 4

Finance

BBUF-441 **Corporate Finance**
Registration #0104-441
This is the basic course in financial management. It covers the concepts of security markets, risk analysis, time value of money, asset valuation (as it applies to capital budgeting, working capital management, and long-term financing), and cost of capital. Analytic techniques and computer applications are introduced and used. (BBUQ-330, BBUA-302, GSSE-301, junior status)

Credit 4

BBUF-445 **Advanced Corporate Finance**
Registration #0104-445
An extended coverage of business finance with increased emphasis on analytical and computer applications in resource allocation and asset management. Course topics include financial securities, security markets, capital structure, financial statement analysis, cost of capital, leverage, dividend policy, and capital budgeting. (BBUF-441, junior status)

Credit 4

BBUF-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, junior status)

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, junior status)

Credit 4

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

Credit 4

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

Credit 4

BBUF-508 **Portfolio Management**
Registration #0104-508
This course extends Security Analysis to issues concerning portfolio selection. From the perspective of a portfolio manager, the student focuses on modern portfolio theory with respect to the efficient market hypothesis, timing, asset allocation, diversification, and evaluation of security portfolios. (BBUF-507, junior status)

Credit 4

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, junior status)

Credit 4

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

Credit 4

BBUF-530 **Public & Non-Profit**
Registration #0104-530 **Sector 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, junior status)

Credit 4

BBUF-554 **Seminar in Finance**
Registration #0104-554
Course will be designed by individual instructor. (Varies by seminar content)(Permission of instructor, junior status)

Credit 4

Marketing

BBUM-201 **Introduction to Retail Industry**
Registration #0105-201
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

BBUM-301 **Retail Accounting and**
Registration #0105-301 **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. (BBUA-301)

Credit 4

BBUM-401 **Retail Store Operations**
Registration #0105-401 **and Management**
A detailed examination of the operation of a retail enterprise in-cluding xturing, information systems, operating costs, merchandise flows, and security. Particular attention will be paid to the managerial tasks of selecting, training and motivating store personnel. (BBUM-201, junior status)

Credit 4

BBUM-412 Advanced Merchandising
Registration #0105-412
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. (BBUM-301, junior status)

Credit 4 (offered upon demand)

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

Credit 4

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

Credit 4

BBUM-501 Senior Seminar in Retail
Registration #0105-501 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

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, junior status)

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-505, 551, senior status)

Credit 4

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

Credit 4

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

Credit 4

BBUM-554 Seminar in Marketing
Registration #0105-554
The objective of this course is to enable the student to bring together interests, learnings and experiences obtained in previous marketing courses. Specific course content will vary. (BBUM-463, junior status)

Credit 4

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

Credit 4

BBUM-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, junior status)

Credit 4 (offered upon demand)

BBUM-558 Seminar in Retail
Registration #0105-558 Management
Selected topics associated with various aspects of retailing. Course content and structure will differ according to faculty assigned and quarter when offered. (BBUM-201, 301, junior status)

Credit 4

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

Credit 4

BBUM-565 Advanced Marketing
Registration #0105-565 Research
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, junior status)

Credit 4 (offered upon demand)

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

Credit 4

Decision Sciences

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4,4

BBUQ-412 **Inventory Management &**
Registration #0106-412 **Material Control**
Study of inventory management emphasizing the independent demand environment including distribution. Definition and functions of inventory; concepts, principles, techniques and systems necessary to select, order or ship, store, account for, and value inventory; inventory performance measures. (BBUQ-401 or equivalent, junior status)

Credit 4

BBUQ-415 **Purchasing Management**
Registration #0106-415
Study of the activities, responsibilities, relationships and systems involved in the purchase of materials, services and capital equipment. Topics include: identifying requirements; evaluating and selecting "best value" vendors; techniques for planning and executing the purchasing function, including fundamentals of negotiation; ethical and legal aspects of purchasing; interactions with the engineering, quality, manufacturing, materials management, transportation and legal functions and with suppliers; and international aspects of purchasing. Purchasing's responsibility for quality, delivery, inventory, price and contribution to profit are also covered. (Junior status)

Credit 4

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

Credit 4

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

Credit 4

BBUQ-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 simulate a production process. (BBUQ-330, ICSA-210, junior status)

Credit 4

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

Credit 4

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

Credit 4

BBUQ-553 Information Systems Management
Registration #0106-553
Study of the management of information systems. This course will focus on the responsibilities of a manager of information systems, including the selection of hardware, software, and staff; the establishment of IS standards; the development of positive relationships within the organization; and the general application of previously learned management principles to the IS function. Case analysis is utilized. (ICSA-483, BBUQ-464, BBUQ-540, senior status)

Credit 4

BBUQ-554 Seminar in Decision Sciences
Registration #0106-554
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

College of Continuing Education

Business and the Arts

Accounting

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

Credit 4

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

Credit 4

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

Credit 4/Qtr.

Business Law

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

Credit 4

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

Credit 4

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

Credit 4

Data Processing and Systems Analysis

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

Credit 4

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

Credit 4

CBCC-351 **BASIC Programming for**
Registration #0203-351 **Business**
An introduction to computers and computer programming for business students. After a brief survey of computer systems and terminology, this course introduces the student to BASIC programming covering all major functions; problems and examples will be drawn from business applications. Students will learn how to use a time-shared computer system. NOTE: Not for computer science majors.

Credit 2

Finance

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

Credit 4

CBCD-304 **Personal Financial Decision**
Registration #0204-304 **Making**
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 three-quarter course in effective supervision and management for supervisors and potential supervisors. Approximately 50 topics of current importance to supervisors are presented, as well as essential management principles, business communications, and practical supervision techniques. Specific supervisory problems of course participants are discussed in informal sessions and through projects conducted outside the classroom. Instruction is usually guided by a team of management specialists. Lecture-discussion, panel presentations, audiovisual presentation, simulation exercises and case studies. (Course extends over three consecutive quarters and should be taken in sequence.) A management certificate is awarded for successful completion of the course.

Credit 4/Qtr. (12 total)

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

Credit 4

CBCE-305 Customer Relations Systems
Registration #0205-305
This course provides an introduction to basic concepts of how to develop, implement, and measure processes to improve customer satisfaction. Includes innovative techniques to determine how customer care can be integrated as a standard business practice and how concepts of quality can be applied toward achieving customer care.

Credit 4

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

Credit 4

CBCE-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. (CBCH-201, 202, 351,352 and CBCC-321)

Credit 4

CBCE-298,398 Special Topics: Management
Registration #0205-298,398
Special topics are experimental courses offered quarterly. Watch for titles in the course listing each quarter.

Credit Variable

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
Presents various successful planning and marketing approaches (including market determination, distribution and pricing strategies). The regulatory environment facing small business is included along with techniques for planning growth.

Credit 4

Health Care Management

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

Credit 4

CBCF-320 Health Systems Administration
Registration #0206-320
A survey of administration in health care facilities including roles, functions, and responsibilities; organization structures; and health care practices focusing on patient care, education, and research. Supervisory issues such as managerial planning, span of supervision, financing, and coordination of public and private efforts will be discussed.

Credit 4

CBCF-421 Legal Aspects of Health
Registration #0206-421 Care Administration
An overview of legislation as it applies to health facilities. All levels of law—federal, state, and local—will be discussed. Examples of regulatory procedures to be analyzed include Social Security, the National Labor Relations Law, New York State Disability and Workmen's Compensation, minimum wage legislation, and the Code of the New York State Health Department. The role of state and local governments in licensing and accrediting, and the standard of accreditation used by major professional bodies, will be reviewed. (CBCF-310 or CBCF-320 recommended)

Credit 4

CBCF-431 **Health Care Quality Assurance**
Registration #0206-431
An introduction to quality assurance in health care. Course will explore past and current definitions of quality and competing concepts of quality assurance; will review existing quality assurance requirements and accrediting organizations, federal and state agencies, and third party payers; will describe and explain quality assurance methods and tools and their applications in various settings. (CBCF-310 or CBCF-320 recommended)

Credit 4

Marketing

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

Credit 4

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

Credit 4

CBCG-214 **Advertising Evaluation**
Registration #0207-214 **and 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 the marketing concept, developing a product strategy, behavioral aspects of consumer marketing, the marketing mix, segmentation and current marketing issues.

Credit 4

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

Credit 4

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

Credit Variable

Mathematics and Statistics for Business

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

Credit 4/Qtr.

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

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

Credit 4/Qtr.

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-225 **Recruiting, TVaining and Supervising**
Registration #0209-225 **Service Industry Personnel**
This course examines problems and solutions related to establishing realistic and attractive wages and career paths for employees in service sector businesses. In addition, it explores motivation, training and communication techniques that lead to the kind of quality performance required in service industries and organizations to optimize customer satisfaction.

Credit 2

CBCI-229 **Personnel Administration**
Registration #0209-229
An introduction to personnel administration including an overview and discussion of employment, equal employment opportunity, job evaluation, training, performance appraisal, compensation, benefits, personnel planning, labor relations, and other related topics.

Credit 4

Production Management and Industrial Engineering

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 relationships between various aspects of production are presented.

Credit 4

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

Credit 4

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

Credit 4

Logistics and Transportation Management

CBCL-234 **Introduction to Logistics**
Registration #0212-234 **and TVansportation**
Overview of the transportation and logistics industry as a vital part of the nation's social and economic structure. Introduces basic understanding of the functional areas of logistics management and their interrelationships. The purchase and use of transportation services as related to the firm's logistical mission is emphasized.

Credit 4

CBCL-239 **Traffic and Transportation**
Registration #0212-239 **Law, Rates, Accounting and Control**
Introduces the role of government in the transportation industry. The evolution of past and current regulatory and promotional policies is explored. The determination and utilization of freight rates are examined. Various methods to forecast and control transportation costs also are discussed.

Credit 4

CBCL-241 **International Logistics and**
Registration #0212-241 **TVansportation**
Introduces the basic skills required to move materials in support of the logistics function internationally. Includes discussions of duties, customs regulations, and the various instruments used to facilitate international trade.

Credit 4

Real Estate

CBCM-201 **Basic Real Estate Principles**
Registration #0213-201 **Salesperson's Course**
Comprehensive study of real estate principles including: law of agency, human rights and fair housing, real estate instruments, financing, valuation and listing, contracts, license law and ethics, closings, land use regulations, and real estate math. Completion of this course satisfies the NYS educational requirement for a real estate salesperson's license. For licensure, participants must attend all classes and pass the final exam. Individuals interested in licensure only should call 475-5079.

Credit 4

CBCM-202 **Advanced Real Estate Principles**
Registration #0213-202 **Broker's Course**
A study of topics related to real estate including: operation of a broker's office, construction, general business law, subdivision and development, leases, taxes, assessments, investment property, alienation, property management, condominiums and cooperatives, rent regulations, appraisals, and advertising. Completion of this course and Basic Real Estate Principles satisfies the educational requirement for a real estate broker's license. For licensure, participants must attend all classes and pass the final exam. Individuals interested in licensure only should call 475-5079.

Credit 4

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

Credit 4

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

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

Credit 4

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.

Interdisciplinary Studies

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

Credit 2

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 ancj firing finished work. Class projects will emphasize the development of competent skills and good design.

Credit 2

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

Credit 2

CHAC-240 **Ceramic Wheel-Throwing Techniques**
Registration #0222-240
A broad survey of wheel-throwing skills with an emphasis on developing the student's ability to create well-designed, functional wares.

Credit 2

CHAC-243 **Porcelain Techniques**
Registration #0222-243
An intensive introduction to porcelain with an emphasis on Japanese techniques of throwing, finishing and glazing. Basic wheel-throwing skills are required.

Credit 2

CHAC-245 **Earthenware Techniques**
Registration #0222-245
An intensive introduction to earthenware with an emphasis on exploring the characteristics of unglazed, functional and sculptural forms.

Credit 2

CHAC-295 **Independent Study: Ceramics**
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-211,212,213 **Display Design**
Registration #0223-211,212,213
First quarter examines the fundamentals of three-dimensional design. The second and third quarters apply these principles to develop mechanical, graphic and model making manipulative skills and problem solving approaches used by designers in space planning. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience)

Credit 2/Qtr.

CHAD-215,216,217 **Rendering Techniques**
Registration #0223-215,216,217
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. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalent)

Credit 2/Qtr.

CHAD-218 **Introduction to Designing**
Registration #0223-218 **Home Interiors**
Basic principles of interior design. Processes used by both professionals and informed amateurs: gathering information about clients and their needs, activities and preferences; assembling product and color samples and information; measuring spaces and furnishings; arriving at the best interior plans for clients. (Credits may be applied to Interior Design diploma program)

Credit 2

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 experience in the presentation of imagery for reproduction. Presentations will include board techniques, materials, tools, mechanical art procedures, printing and bindery processes, etc. (CHAD-201, 202, 203 or equivalent)

Credit 3

CHAD-224,225 **Interior Design**
Registration #0223-224, 225
Career orientation. Emphasis on practical aspects of the profession. Details of purchasing all furnishings used in a home. Client centered planning and design. (CHAF-201, 202, 203; CHAD-201, 202, 203 or 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
Registration #0223-227 Environmental Design
This course will introduce students to the various occupations available to the environmental and interior designer, and instruct them in the use of their artistic and technical skills to obtain employment and establish themselves in the design community. Dealing with clients, vendors, and contractors will also be covered. Assignments will be structured to meet the personal business needs of each student.

Credit 2

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

Credit 2

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

Credit 2

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

Credit 2/Qtr.

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

Credit 2

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

Credit 2/Qtr.

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

Credit 3

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

Credit 3

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

Credit 4/Qtr.

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

Credit 2/Qtr.

CHAD-315,316,317 Advertising Design
Registration #0223-315,316,317
The functions and skills of the art director touch on all phases of advertising art from concepts and professional studio procedures to practical approaches in design and production. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience. CHAD-261,262, 263 and 311, 312, 313 recommended)

Credit 2/Qtr.

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

Credit 4

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

CHAD-298,398 Special Topics: Design
Registration #0223-298,398
Special Topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.

Credit Variable

Drawing

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

Credit 2/Qtr.

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

Credit 2

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

Credit 2

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

Credit 2

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

Credit 2

Painting

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

Credit 2

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

Credit 2

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

Credit 2

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

Credit 2

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

Credit 2

Sculpture

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

Credit 2

CHAF-3S7 **Sculpture Workshop**
Registration **#0224-357**
An in-depth study of sculptural methods, techniques and materials (clay, wood, plaster, stone and welded metal). Students may concentrate in one material. May be elected more than once for credit. (CHAF-247)

Credit 2

Illustration

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

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

Credit 3

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

CHAF-263 **Calligraphy**
Registration #0224-263
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 variety of styles and letter forms in a concentrated manner. May be elected more than once for credit. (CHAF-263 or equivalent)

Credit 2

Printmaking

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

Credit 2

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

Credit 2

CHAF-295 **Independent Study: Fine Arts**
Registration #0224-295
Independent studies may be developed at the upper level. Projects must be developed with an instructor, subject to 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 more than once for credit.

Credit 2

CHAM-211 **Intermediate Metalcrafts and**
Registration #0225-211 **Jewelry**
Work of a more complex nature will be introduced. Some techniques included will be surface treatment of metal, more sophisticated stone setting, basic hollowware, casting and more. Independent and creative statements will be emphasized in keeping with the student's technical and aesthetic development. May be elected more than once for credit. (6 credits CHAM-201 or presentation of portfolio)

Credit 2

CHAM-301 **Advanced Metalcrafts and**
Registration #0225-301 **Jewelry**
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. (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: Metalcrafts**
Registration #0225-298 **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, four-harness loom techniques, finishing, designing, drafting and color effects. May be elected more than once for credit.

Credit 2

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

Credit 2

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

Credit 2

CHAT-295 **Independent Study:**
Registration #0226-295 Weaving/**Textiles**
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:**
Registration #0226-298 **Weaving/Textiles**
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.

Credit Variable

Woodworking

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

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 toward development of student's own creative ability. Advanced level academic credit is variable in proportion to class and outside assignments scheduled. May be elected more than once for credit. (Presentation of portfolio)

Credit **2**

CHAW-295 **Independent Study:**
Registration #0227-295 **Woodworking**
Independent studies may be developed at the upper division level. Projects must be developed with an instructor, subject to the approval of the program 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 courses announced quarterly. Watch for titles in the course listing each quarter.

Credit Variable

International Studies

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

Deaf Studies

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

Credit 2

CHGD-212 **Sign Language & Manual**
Registration #0234-212 **Communications System II**
A continuation of conversational signing skill development. The course includes 300 additional basic signs, continued practice with the grammatical features of sign language, fingerspelling practice, and further sociolinguistic information regarding the appropriate use of manual communication skills between deaf and hearing persons. (CHGD-211 or equivalent sign skill)

Credit 2

CHGD-213 **Sign Language & Manual**
Registration #0234-213 **Communications System III**
The third in a series of basic conversational sign language courses. Introduces the student to approximately 300 additional signs, continues the practice of the grammatical features of sign language, refines fingerspelling skills, and further develops students' sensitivity to the use of manual communication by deaf and hearing persons. (CHGD-212 or equivalent sign skill)

Credit 2

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

Credit 3

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

Credit 4

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

Credit 2

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

Credit 2

Humanities

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

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

NOTE: 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 Communications
Registration #0236-120

Now offered by Learning Development Center-Technical. See LDC -Technical (Registration #1710-020)

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

Credit 4 .

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

Credit 4

CHGL-206 Vocabulary
Registration #0236-206
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. (Interested persons should contact chairperson, 475-4936)

Credit 1

CHGL-220 Communications
Registration #0236-220
This course consolidates the objectives and content of Dynamic Communications I, CHGL-204, and Dynamic Communications II, CHGL-205. (Requires pre-test)

Credit 4

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

Credit 2

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

Credit 4

CHGL-302 Discussions Skills and
Registration #0236-302 Leadership
Students study the theory of leadership in small groups and the dynamics of group behavior. The major exercises of the course are leading and participating as members in conferences 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 Communicating in Business
Registration #0236-307
This course focuses on the development of those communication skills essential to functioning effectively in the business world. Students learn the process of analyzing communication situations and responding to them appropriately. Topics include reports, memos, letters, oral presentations, and interpersonal skills. (CHGL-204 and 205 or equivalent)

Credit 4

CHGL-308 Technical Report Writing
Registration #0236-308
Students leam to prepare reports of the sort required by practicing engineers and managers in industry and business. Focus is on developing the ability to analyze audiences and purposes, state problems, design reports, and write and edit them. Assigned reports are discussed and critiqued by peers and instructor. (CHGL-204, 205 or equivalent)

Credit 4

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

Credit 4

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

Credit 2

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

Credit 2

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

Credit 2

CHGL-327 Practicum: Designing Manuals
Registration #0236-327
With supervision, students apply general principles of technical communication to the process of planning, researching, writing, editing, formatting, and producing a finished manual. (CHGL-323 and -324)

Credit 2

CHGL-328 Writing in the Sciences
Registration #0236-328
This course reviews current conventions used in presenting the results of scientific investigation in reports and journal articles. The elements of a scientific manuscript embodying technical content, organization, style, validity, and significance are discussed and put into practice. (CHGL-220 or equivalent)

Credit 2

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

Credit 2

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

Credit 4

CHGL-331 **Promotional Writing**
Registration #0236-331
This course focuses on practical guidelines for preparing marketing materials including brochures, data sheets, trade press articles, press kits, and advertising copy.

Credit 2

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

Credit 2

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

Credit 2

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

Credit 4

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

Credit 2

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

Credit 2

CHGL-366 **Writing for the**
Registration #0236-366 **Organization II**
Introduction to writing at the corporate level, including handling crisis communication, covering meetings, adapting interviews for print, and preparing company statements for various media. Techniques are outlined for creating interest, presenting financial information, and quoting. Emphasis is on producing clear, correct copy that is appropriate for purpose and audience. (CHGL-365 or equivalent)

Credit 2

CHGL-367 **Scripting and**
Registration #0236-367 **Speechwriting**
Introduces principles for two specialized forms of writing: speechwriting and scripting. Speechwriting covers techniques for preparing speech in the "voice" of another: adapting message, wording, and tone to speaker. Scripting covers story boarding, using basic script formats, and enhancing the message, where appropriate, with dimensions of characterization, sound, and color. (Comm-220 or equivalent)

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

CHGL-393 Creative Leadership Skills
Registration #0236-393
Focuses on the interpersonal and leadership skills required for administrating communication services within various work environments, such as the small consulting agency, the not-for-profit organization, or the large corporation. Includes strategies and skills for interacting with diverse groups and individuals, such as clients, media, sales and marketing personnel, providers of goods and services; and engineers, editors, writers, and upper management. Provides understanding of cultural, age, and gender issues and techniques for recruiting and retaining good performers. (CHGL-323 or 366, or equivalent)

Credit 4

CHGL-394 Supervising Communication Services
Registration #0236-394
Focuses on the practical skills required for supervising groups that provide communication services and products. Includes defining organizational/group goals, assessing and meeting the needs of clients, establishing standards and systems for quality assurance, performing basic financial functions typical of cost/profit centers, managing permanent and contract employees, and basic techniques for marketing communication services. (CHGL-323 or 366, or equivalent)

Credit 4

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

Credit 2

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

Credit 2

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

Credit Variable

Social Sciences

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

CHGS-223 Principles of Economics III
Registration #0237-223
A further elaboration of the elementary principles of economic analysis introduced in Principles of Economics I (macroeconomics) and II (microeconomics). Particular emphasis will be placed on the application of these principles to the decisionmaking process of business and industry, domestically and internationally. (CHGS-221 and CHGS-222)

Credit 4

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

Credit 2

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 2

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

Credit 4

Photography

NOTE: 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 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 accceptable photographs. Topics include cameras, lenses, films, developing, printing, enlarging, filters, flash photography and print finishing. The emphasis is on successful solution of practical photographic problems.

Credit 0

CHGP-101 Photography Workshop
Registration #0231-101
A flexible course in the application of photography for self-expression. Emphasis is on 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. (CHGP-102 or equivalent)

Credit 2

CHGP-201,202,203 Basic Professional
Registration #0231-201,202,203 Photography
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. (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 principal 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. (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. (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, 322, 323. (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 principal size camera and film used, although, 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:
Registration #0231-351 Instrumentation
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. (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 leam special photographic methods 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. (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 audiovisual 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. (CHGP-201, 202, 203 or equivalent)

Credit 3

CHGP-361,362 Law Enforcement
Registration #0231-361,362 Photography
Advanced photographic applications in various aspects of law enforcement photography. Fingerprints, infrared and ultraviolet photography. Forgery, surveillance and accident photography. (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. (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 of 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 or not it be fashion photography. (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
Registration #0231-411 Natural World
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. (CHGP-201,202,203 or equivalent)

Credit 4

CHGP-431,432,433 Photographic Communication
Registration #0231-431,432,433
Photography for people in action 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
Photographic Vision is a video-based, two-course sequence 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 a 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 and 203.

Credit 1 (-295)

Credit 2 (-298)

Photographic Science

CHGR-207,208,209 Fundamentals of
Registration #0238-207,208,209 Photographic 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. (A background in algebra and trigonometry is suggested)

Credit 4/Qtr.

CHGR-217,218,219 (Lec.) Photographic Chemistry
CHGR-224,225,226 (Lab)
Registration #0238-217,218,
219,224,225,226
This course will provide the student with an understanding of the chemical basis of photography necessary to the continued study of photographic science and with 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 and 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. (CHGR-201, 202, and 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. (CHGR-207, 208, 209 and CTAM-210 or equivalent)

Credit 3/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. (CHGR-207 and CTAM-210 or equivalent)

Credit 3/Qtr.

CHGR-307 Quality Control of
Registration #0238-307 Photographic 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. (CHGR-217,218, 219 or equivalent)

Credit 3

CHGR-407,408,409 Optics
Registration #0238-407,408,409
Introduction to geometrical and physical optics applied to photographic systems and optical instruments. (CTAM-251, 252 or equivalents)

Credit 3/Qtr.

CHGR-414,415,416 Color Sensitometry
Registration #0238-414,415,416
Photographic measurements, color specification, spectrophotometry, visual and printing densities, integral and analytical color densitometry, color reproduction, dye deficiencies and masking. (CHGR-227, 228, 229 and CTAM-251, 252, 253 or equivalents. Computer programming background also required)

Credit 3 (CHGR-414,415), Credit 4 (CHGR-416)

CHGR-417,418,419 Image Evaluation
Registration #0238-417,418,419
The course objective is to develop fundamental and rigorous understanding of the problems of evaluating photo-optical 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; auto-correlation and its applications; modulation transfer function of photo-optical systems (MTF). (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. (CTAM-251, 252,253 or equivalents)

Credit 4

CHGR-520 Xerography and
Registration #0238-520 Electrographics
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-photography, to emphasize 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 reviewed.

Credit 3

CHGR-527 Theory of the Photographic
Registration #0238-527 Process
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 electro-chemistry will be described and employed. (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. (CHGR-217, 218, 219 and 224,225,226 and CHGR-414,415,416 or equivalent)

Credit 4

CHGR-529 Non-Silver Imaging Systems
Registration #0238-529
The purpose of the course is to examine the more promising nonsilver 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 emphasize 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 principal 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. (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. (Permission of chairperson, photography)

Credit 3/Qtr.

Printing

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.

Credit 3

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-221,222, 223 Offset Film Assembly
Registration #0239-221,222,223
A comprehensive course sequence of applied study in offset film assembly to include: imposition planning and layout; black and white, flat color, and process color film assembly techniques; pin register systems; proofing systems; roomlight film contacting procedures. Lab projects are designed to include a wide variety of film assembly techniques and emphasize the development of job analysis, planning and construction skills.

Credit 3/Qtr.

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-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 **Paper and Printing**
Registration #0239-251
A survey of types of paper and papermaking. Emphasis is on paper characteristics and their role in effective printing. Attention is given to paper buying/economics: interrelationship of ink, paper, and press; and identifying, documenting, and resolving paper/press problems.

Credit 3

CHGT-265 **Lithography I**
Registration #0239-265
This course is designed to introduce the student to the principles and theories of offset lithographic printing. Hands-on press work is designed to prepare the student for more advanced concepts presented in the next course.

Credit 3

CHGT-365 **Lithography H**
Registration #0239-365
This course is a continuation of Lithography I, with an emphasis on the production aspect of offset lithographic principles, including more advanced press skills and the efficient production of four-color process work.

Credit 3

CHGT-301,302,303 **Reproduction Camerawork**
Registration #0239-301,302,303
The photographic process as it relates to the printing of black and white and 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 4

CHGT-341 **Printing Processes**
Registration #0239-341 **Introduction 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 materials will be presented in the form of lectures and demonstrations. (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 **Planning 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 book.

Credit 2

Science and Technology

Mathematics

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

CTAM-101,102,103 **Mathematics**
These courses are now offered through the Learning Development Center and can be found under Learning Development Center-Technical. Registration #1710-011, 012, 013

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. (Three years high school math or equivalent)

Credit 4/Qtr.

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. (CTAM-202 or equivalent)

Credit 4

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

Credit 4

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

Credit 4

CTAM-210 **College Algebra**
Registration #0240-210 **and Trigonometry**
A precalculus course covering a study of algebraic and transcendental (trigonometric, logarithmic, and exponential) functions including graphs and equations. (Three years of high school mathematics or equivalent including intermediate algebra)

Credit 4

CTAM-212 **Introduction to Statistical**
Registration #0240-212 **Process Control**
An introduction to the methods of statistical process control. Topics include the normal distribution, estimating population characteristics from sample data, probability, development and interpretation of control charts. (CTAM-201 or equivalent)

Credit 4

CTAM-251 **Calculus**
Registration #0240-251
Topics include limits, derivatives of algebraic and trigonometric functions; continuity; differentials; related rates; curve sketching; maxima and minima problems; indeterminate forms. (CTAM-210 or equivalent)

Credit 4

CTAM-252 **Calculus**
Registration #0240-252
Topics include the indefinite integral; the definite integral; applications; differentiation and integration of transcendental functions. (CTAM-251 or equivalent)

Credit 4

CTAM-253 **Calculus**
Registration #0240-253
Topics include methods of integration; plane analytic geometry; polar coordinates; vector algebra with emphasis on applications; sequences and series. (CTAM-252 or equivalent)

Credit 4

CTAM-265 **Discrete Mathematics I**
Registration #0240-265
An introduction to discrete mathematics with applications in computer science and mathematics, with an emphasis on proof techniques. It covers the basics of combinatorics, sets, functions, the natural numbers, and the integers modulon. (CTAM-201, 202 or equivalent)

Credit 4

CTAM-266 **Discrete Mathematics II**
Registration #0240-266
A continuation of discrete mathematics with applications in computer science and operations research. It covers finite state machines, relations, graphs, trees, optimization and matching. (CTAM-265)

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. (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, LaPlace Transforms. (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, and introduction to partial differential equations; series solutions of differential equations; applications of the material covered. (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. (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. (CTAM-305 or equivalent)

Credit 4/Qtr.

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. (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. (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. (CTAM-305 or equivalent)

Credit 4

Electrical (Applied Science)

CTBE-401 (Lec.) **Circuit Analysis**
CTBE-406 (Lab)
Registration #0241-401,406
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, polyphase circuits, complex frequency, pole-zero diagrams, resonance, magnetically coupled circuits, two- port theory. Fourier series analysis of circuits. LaPlace transform techniques of circuit solution. (CTCP-303 and CTAM-305 or concurrent with CTAM-306)

Credit 4, Lec. 3, Lab 1

CTBE-461,462,463 **Electrical Engineering**
Registration #0241-461,462,463 **Principles**
A course for non-electrical majors. Electric and magnetic circuits, electrical measurements, electronic devices, transformers, power systems, machines, and control circuits. (CTAM-305 and CTCP-303 equivalent)

Credit 4/Qtr.

Mechanical (Applied Science)

CTBM-341,342 **Engineering Mechanics**
Registration #0242-341,342
Vector methods in statics and dynamics, force systems, friction, moments, center 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. (CTCP-302 and CTAM-305)

Credit 4/Qtr.

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. (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.

(CTBM-344 and 354)

Credit 4

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. (CTCP-302 and CTAM-306 or equivalent)

Credit 4

CTBM-402 **Thermodynamics II**
Registration #0242-402
Thermodynamic properties of steam and refrigerants: fluids, heat transfer, mixtures of gases and vapors, internal combustion cycles and vapor power cycles. (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. (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. (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. (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. (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. (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. (CTBM-552)

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. (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. (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. (Concurrent with CTCC-211,212 or equivalent)

Credit 2/Qtr.

CTCC-231 (Lecture) Organic Chemistry
CTCC-236 (Lab)
Registration #0244-231,236
An introductory course in 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. (CTCC-213 or equivalent)

Credit 5, Lec. 3, Lab 2

CTCC-232,233 (Lec.) Organic Chemistry
CTCC-237,238 (Lab)
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. (CTCC-231 or equivalent)

Credit 5/Qtr,, Lec. 3, Lab 2

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

Credit 4/Qtr., Lec. 3, Lab 1

CTCC-312 (Lec.) Analytical
CTCC-317 (Lab) 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. (CTCC-213, CTCC-218 or equivalents, CTCC-231; CTAM-210 or equivalent)

Credit 4, Lec. 3, Lab 1

CTCC-313 (Lec.) Introduction to Physical
Registration #0244-313 Chemistry
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. (CTCC-231, CTCC-233 or equivalents; CTAM-253)

Credit 3

CTCC-561 Surface and Colloid
Registration #0244-561 Chemistry
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. (SCHP-443 or equivalent)

Credit 3

CTCC-562 Photochemistry
Registration #0244-562
Properties of visible and ultraviolet radiation, adsorption of radiation, spectra, mechanisms in gases, liquids, and solids; experimental techniques. (SCHP-443 or equivalent)

Credit 3

CTCC-598 Topics in Chemistry
Registration #0244-598 Spectrometric Identification 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. (CTCC-233 or equivalent)

Credit 3

CTCC-599 Independent Study
Registration #0244-599 Chemistry
Faculty-directed study of chemical topics on a tutorial basis. (Consent of instructor)

Credit 1

Physics

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

Credit 4/Qtr., Lec. 3, Lab 1

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

Credit 5/Qtr,, Lec. 4, Lab 1

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

Credit 4

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

Credit 4

CTCP-459 **Nuclear Physics**
Registration #0245-459
Elementary particles, nuclear structure, nuclear reactions, fission, fusion. Nuclear power, accelerating machines. (CTCP-458 or equivalent)

Credit 4

Contemporary Science

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

Credit 4

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

Credit 4

CTCS-223 **Contemporary**
Registration #0246-223 **Science: Physics**
An introduction to the fundamental principles of physics for nonscience majors, and the application of these concepts to areas of interest and concern in our contemporary technological society. The conceptual basis for the phenomena of heat, light, sound, mechanics, electricity and magnetism is discussed and related to such topics as astronomy, space exploration, lasers and environmental concerns. The course is presented in a lecture-demonstration format. (CTAM-201 or CTAM-205 or CBCH-201 or equivalent)

Credit 4

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

Credit 4

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

Credit 4

Computer Programming

CTDP-201 **Computer Techniques**
Registration #0249-201
Programming in BASIC on RIT's VAX computers. After an introduction to time-sharing and editing procedures the course deals with the computer as a tool for solving applied problems. Not for computer systems majors. (CTAM-202)

Credit 2

CTDP-215 **FORTRAN Programming**
Registration #0249-215
A study of FORTRAN programming techniques and applications. Topics include FORTRAN constants, variables, expressions, functions, logical operations, storage allocations, statements. I/O manipulation and subprograms. Debugging and diagnostic methods. Programming projects will be required. (CTDS-202 or permission of advisor)

Credit 4

CTDP-241 **Programming I**
Registration #0249-241 **Algorithmic Structures**
An introduction to programming emphasizing the development and documentation of modular computer-based algorithms. A structured procedural programming language (e.g., Modula-2) is used to demonstrate modern programming principles. Topics include variables, expressions and assignment, control structures (sequencing, selection and repetition), modularity via procedures and functions, parameter mechanisms, and identifier scope in block structured languages. Programming assignments are an integral part of this course. (CTDS-202)

Credit 4

CTDP-242 **Programming II**
Registration #0249-242 **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 alternate implementations. Topics include arrays, records, pointers, dynamic storage allocation, linked lists, stacks, queues and trees. Programming projects are required. (CTDP-241)

Credit 4

CTDP-243 **Programming III**
Registration #0249-243 **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, modularity measures (cohesion and coupling), common programming paradigms, and advanced file I/O. Programming projects are required. (CTDP-242, CTDP-305)

Credit 4

CTDP-305 **Assembly Language**
Registration #0249-305 **Programming**
A study of assembly language programming methods with topics including computer organization, assembly process, assembly coding, addressing, binary arithmetic, relocatability, 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. Programming projects will be required. (CTDS-202)

Credit 4

CTDP-307 **Business Applications**
Registration #0249-307 **Programming**
The mastery of the techniques and concepts of programming within a business programming environment. Emphasis on algorithmic solutions to business problems, including report generation, sorting and table processing and generation, complex I/O processing. Programming projects are required. (CTDS-325)

Credit 4

CTDP-318 **APL Programming**
Registration #0249-318 **Techniques 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 business systems applications. Programming projects will be required. (A high-level programming language)

Credit 4

CTDP-320 **Computer Programming**
Registration #0249-320 **for Engineers**
Computer programming in FORTRAN. Application emphasis is on numerical methods. Programming projects are required. (CTAM-305)

Credit 4

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

Credit 2

CTDP-488 **Programming Systems**
Registration #0249-488 **Workshop**
A workshop for the mastery of the techniques and concepts of programming systems, design and implementation. Students will work with data modeling, both with and without a data-base management system product. Students will gain experience with system specification and design charting techniques, project scheduling and management and programming team experience. Programming projects will be required. (CTDP-307, CTDS-335, CTDS-485)

Credit 4

Computer Systems

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

Credit 4

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

Credit 4

CTDS-202 **Introduction to**
Registration #0250-202 **Computer Science**
An introduction to the computer: information representation, instruction execution and the software interface to the user. Topics include integer and floating point arithmetic, logical operations, introduction to machine and assembly language, input/output operations, operating systems. (Three years high school mathematics, permission of advisor)

Credit 4

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

Credit 4

CTDS-315 **Digital Computer**
Registration #0250-315 **Organization**
Introduction to computer architecture 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; fetch decode and execution in a simple CPU; input/output subsystems; interrupts. The laboratory experiments introduce elementary integrated circuit building blocks including gates, flip-flops, registers, counters and elementary sequential circuits. (CTAM-265, CTDP-305)

Credit 3

CTDS-32S **Data Organization and**
Registration #0250-325 **Management**
A course dealing with the methodology associated with the external storage of data. Topics include file organization (sequential, indexed and direct access physical organization); space optimization and directory organization; an introduction to external sorting and searching and the basis of data modeling, data base organization and management. Programming projects are required. (CTDP-243)

Credit 4

CTDS-335 **System Specification, Design**
Registration #0250-335 **and Implementation**
Students are introduced to basic concepts of system specification and design, systems 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 HIPO charts, NS charts, etc. and to the structured design methods of Yourdon. (CTDS-325)

Credit 4

CTDS-340 **Finite State Machines**
Registration #0250-340 **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. (CTDS-315)

Credit 4

CTDS-400 **Logical Design**
Registration #0250-400
An introduction to switching theory, sequential circuit analysis and synthesis, error detection, error correction networks, speed-up techniques, serial and parallel approaches, interfacing techniques. (CTDS-315)

Credit 4

CTDS-420 **Data Communication Systems**
Registration #0250-420
Data communication and telecommunication systems. Including communication techniques and interfaces, common carrier implications and tariffs, multiplexors; buffering response time and human factors; network design analysis and cost, software considerations. (CBCH-351, CTDS-315)

Credit 4

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

Credit 4

CTDS-440 **Operating Systems**
Registration #0250-440
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlocks, resource management, memory management, overlays, static and dynamic relocation, virtual memory, file systems, logical and physical I/O, device allocation, process and resource protection. (CTDS-315 and CTDS-325)

Credit 3

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

Credit 4

CTDS-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. (CTDS-325)

Credit 4

CTDS-520 **Computer Architecture**
Registration #0250-520
A study of computer architecture and design. Topics include review of basic theories, hardware technology, parallel and distributive logic, synchronous and asynchronous machines and analysis of commercial machines. Alternatives to classical machine structure. (CTDS-315)

Credit 4

CTDS-525 **Assemblers, Interpreters,**
Registration #0250-525 **and Compilers**
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. (CTDS-325)

Credit 4

CTDS-530 **Discrete Simulation**
Registration #0250-530
Computer simulation techniques. Abstract properties of simulation modeling, analysis of a simulation run and statistics. The simulation language GPSS will be taught. Programming projects are required. (CBCH-351 or equivalent and programming experience)

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 students an overview of recent technological and theoretical advances. Reports on outside readings. (Senior year standing)

Credit 4

CTDS-565 **Computer Systems Selection**
Registration #0250-565
A study of computer systems design, evalution 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. (CTDS-315 and CTDS-325)

Credit 2

Lower Division Electrical Technology

CTEE-321 (Lec.) **Digital Systems**
CTEE-326 (Lab)
Registration #0253-321,326
Introduction to binary and octal number systems, logic components and their functions; truth tables; gates, switches, counters, flip-flops, integrators, differentiators and adders; application to mechanical, relay, fluidic, pneumatic and electronic digital logic systems. (CTIL-203 or equivalent)
Credit 4, Lec. 3, Lab 1

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. (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. (CTIL-203)

Credit 3

CTEE-331 **Programmable Controllers**
Registration #0253-331
Overview of programmable controllers, software and hardware, processor unit and memory, programming tools, input/output systems and languages.

Credit 3

CTEE-361,362,363 (Lec.) **Applied Electronics**
CTEE-366,367,368 (Lab)
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. (CTIL-203)

Credit 4/Qtr., Lec. 3, Lab 1

Lower Division Mechanical Technology

CTEM-301 **Statics**
Registration #0254-301
Basic principles of statics, systems of forces, free-body diagrams, equilibrium conditions, friction, centroids, moments of inertia. (CTCP-201 concurrently)

Credit 4

CTEM-302 **Dynamics**
Registration #0254-302
Principles of dynamics; kinematics and kinetics of rectilinear, rotational and plane motion; velocity, acceleration; inertia; work, energy, power, impact. (CTEM-301 or equivalent)

Credit 4

CTEM-303 **Strength of Materials**
Registration #0254-303
Strength of materials, principle of stress and strain, properties of materials, shear and thermal stresses, stress and deflection of beams, column analysis, connections, combined stress. (CTEM-301 or equivalent)

Credit 4

CTEM-315 **Principles of Mechanical**
Registration #0254-315 **Design I**
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. (CTEM-303)

Credit 3

CTEM-316 **Principles of Mechanical**
Registration #0254-316 **Design II**
Thin-walled tubes, non-circular shafts, springs, screw threads, belts, stress in cylindrical shells. (CTEM-315)

Credit 3

CTEM-317 **Principles of Mechanical**
Registration #0254-317 **Design III**
Ball and roller bearings, gears, stresses in thick-walled cylinders, shrink and press fits, flywheel design, elastic impact, curved beams, cams, loading of at plates. (CTEM-316)

Credit 3

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. (CTIS-203 or equivalent)

Credit 3/Qtr.

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. (CTEM-301, 302 required for CTEF-314; CTEF-314 required for CTEF-315)

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 **Introduction to**
Registration #0255-360 **Numerical Control**
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. (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. (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. (CTEF- 202)

Credit 4

Building Technology (Industrial Technology)

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

Credit 3/Qtr.

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, isometrics, and perspectives. Preparation of drawings required in the design and construction process of different building types. (CTIB-201)

Credit 2

CTIB-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 with concentration on detail and construction drawings. (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, perspective presentation and related design skills. (CTIB-203)

Credit 2/Qtr.

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, perspective presentation and related design skills. (CTIB-206)

Credit 2/Qtr.

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. (High school algebra and trigonometry or equivalent)

Credit 4

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

Credit 3

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, specifications and construction management. (CTIB-241 or equivalent)

Credit 3/Qtr.

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

Credit 3

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. (CTIB-101 or CTIB-203 or equivalent)

Credit 3/Qtr.
t

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 introduction to computer analysis. (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. (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. (CTIB-206 or equivalent)

Credit 2/Qtr.

Engineering Drawing

CTID-200 **Mechanical Blueprint Reading**
Registration #0262-200
This course involves the study of mechanical detail and assembly drawings. Topics include sketching, orthographic projections, and section views. The course will emphasize dimensioning practices, including geometric dimensioning and tolerancing used on detail and assembly drawings.

Credit 2

CTID-204 **Production and Engineering**
Registration #0262-204 **Drawing**
The study of technical graphics will be presented in accordance with the ANSI standards. Emphasis is placed on the preparation of technical assembly drawings using orthographic projection, sectioning and dimensions including G D and T practices.

Credit 4

CTID-205 **Fundamentals of Geometric**
Registration #0262-205 **Dimensioning and Tolerancing**
A study of the use of dimensions and tolerancing practices on production engineering drawings. The course will include symbology, tolerancing methods, and applications for GD&T principles related to manufacturing methods. (CTID-200 or equivalent)

Credit 4

CTID-210 **Computerized Descriptive Geometry**
Registration #0262-210
This course involves solving spacial relationships through graphic representations. The course will present the principles of orthographic projection through views of planes and the true size and shape of a plane. The solution of graphic problems will utilize basic lettering and drafting skills.

Credit 4

CTID-211 **Engineering Graphics**
Registration #0262-211
This is an introductory course in drafting addressed to prospective engineering students. Spatial objects are first drawn freehand before drawing instruments are used. Topics include lettering, orthographic projection, sectioning, basic dimensioning and tolerancing, and auxiliary views.

Credit 2

CTID-215 **Manufacturing Processes**
Registration #0262-215
Manufacturing Processes will acquaint students with methods of fabrication which are commonly used to convert ideas and raw materials into usable products and/or machines.

Credit 4

CTID-216 **Materials Selection**
Registration #0262-216
Investigates the use and conditions of materials in a product life cycle. The atomic, chemical and mechanical composition of materials, including the testing of materials will be studied. (CTID-215 or equivalent)

Credit 2

CTID-217 **Design Considerations**
Registration #0262-217 **and Components**
This course will deal with the fundamental theory of the design and selection of machines and machine parts. Mechanisms and systems requiring levers, horsepower, shaft selection, bearings, gears, fasteners, belts, and pulleys will be calculated and sketched or selected from manufacturers' catalogs. CAD/CAM will be applied. (CTID-216, CTAM-201/202 is recommended)

Credit 4

CTID-220 **Technical Illustration**
Registration #0262-220
Technical illustration studies the methods, tools, and techniques of producing accurate, three-dimensional drawings commonly associated with maintenance manuals, assembly drawings, schematics, conceptual presentation models, and other technical documentation. Topics include orthographic projection; auxilliary views; isometric, perspective, and dimetric drawings; shading; and graphic arts processes. The course includes lecture and lab; however, students are expected to complete the assignments at home. (CTID-204 or equivalent)

Credit 3

CTID-301 **Intro to Computer**
Registration #0262-301 **Integrated Manufacturing**
This course will discuss the multidisciplinary and interrelated nature of Computer Integrated Manufacturing through the use of a common data base, information resource management, and interpersonal communication skills. Topics will include computer hardware and software applications for areas of factory automation, manufacturing processes, and system controls. Case studies and periodicals will be used to illustrate working models.

Credit 3

CTID-345 **Introduction to Computer**
Registration #0262-345 **Aided Drafting (CAD)**
This course includes an overview of the architecture and components of various CAD systems. A CAD system will be used to gain operator skills. (CTID-204 or equivalent)

Credit 2

CTID-347 **Computer Aided Drafting**
Registration #0262-347 **(CAD)**
The purpose of this course is to develop a set of working drawings with advanced system commands. Flowcharting and file management techniques will be required as supporting documentation for each project. This course will also include the digitizing board as an electronic input device for existing drawings and/or sketches. (CTID-345)

Credit 3

CTID-348 **CAM-CNC**
Registration #0262-348
The study of basic concepts for computer numerical control and computer aided machining. NC Programs will be produced manually and with the aid of CAM equipment. Techniques of point to point, continuous path, linear and circular interpolation, loops and macros and special canned cycles will be covered and used. Prototype parts will be produced using numerical control machines. Projects will be drawn in CAD and converted to codes for numerical control equipment. (CTID-345)

Credit 4

CTID-398 **Special Projects**
Registration #0262-398
The purpose of this course is to enable students to select a CAD/CAM topic of special interest and explore it in depth. The project includes meeting with a CAD/CAM advisor and clearly and in writing, describe the area of interest and the methods of exploration and evaluation. The project will require a formal evaluation document such as a complex assembly drawing project, survey findings, case study, laboratory assignments, or other appropriate criterion. Chair approval is necessary.

Credit 2

Electromechanical (Industrial Technology)

CTIL-201 (Lec.)
CTIL-206(Lab) **Elements of Electricity**
Registration #0264-201,206 **and Electronics**
This course and its mandatory associated laboratory provide an introduction to basic electricity and its application to direct current circuitry. Included are principles relating to current, voltage, resistance, Ohm's law, and problems related to various circuit configurations. (Three years high school algebra or equivalent)

Credit 4, Lec. 3, Lab 1

CTIL-202 (Lec.) **Elements of Electricity**
CTIL-207 (Lab) **and Electronics**
Registration #0264-202,207
This course and its mandatory associated laboratory provide an introduction to basic electricity and its application to alternating current circuitry. Included are principles relating to current, voltage, inductance, capacitance, inductive reactance, capacitive reactance, impedance, phase angle, power factor, sinusoids, power, etc. Applicable principles necessary to solye problems related to various circuit configurations are presented. (Three years high school algebra or equivalent)

Credit 4, Lec. 3, Lab 1

CTIL-203 (Lec.)
CTIL-208 (Lab) **Elements of Electricity**
Registration #0264-203,208 **and Electronics**
This course and its mandatory associated laboratory provide an introduction to basic transistor theory. The theory and application of PN junction diodes and PNP and NPN transistors are fully developed. A thorough analysis of the common-base, common-emitter and common-collector configurations is provided. (Three years high school algebra or equivalent)
Credit 4, Lec. 3, Lab 1

CTIL-221,222 **Mechanical Components**
Registration #0264-221,222 **and Mechanisms**
Introduction to mechanical elements of electromechanical systems; study of individual components and mechanisms in terms of function 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. (CTCP-201, 202 and CTID-201,202,203 or equivalents)

Credit 4/Qtr.

CTIL-301,302 (Lec.) **Machines and Power Systems**
CTIL-306,307 (Lab)
Registration #0264-301,302,306,307
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, amplidynes, selsyns, sychro control transformers and their systems applications. Lab sessions develop a qualitative feel for characteristics and applications of power systems, machines and their control. (CTIL-201, 202, 203 and CTAM-201, 202 or equivalents)

Credit 4/Qtr., Lec. 3, Lab 1

CTIL-303 (Lec.)
CTIL-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. (CTCP-201, 202)

Credit 4, Lec. 3, Lab 1

CTIL-351,352 **Electromechanical Devices**
Registration #0264-351,352 **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 transducer. LVDT, proximity sensors, strain gauges, pressure, flow, level transducers, control values, 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. (CTIL-301/306 and 302/307)

Credit 4/Qtr.

CTIL-353 (Lec.)
CTIL-358 (Lab) **Introduction to**
Registration #0264-353,358 **Microprocessors**
This course will provide the student with an understanding of microprocessor fundamentals; binary numbering system and common codes; logical operations and their importance in microprocessor applications; and a brief history of the development of microprocessors up to the present with a comparison of size and speeds. Microprocessor architectures, memory and I/O requirements are discussed as well as various common hardware applications. In addition to hardware, the software environment will be presented. The classroom endeavors are closely related to the associated laboratory efforts. (CTIL-201, 202, 203)
Credit 4, Lec. 3, Lab 1

Machine Shop

NOTE: All courses must be taken in the proper sequence in each program. For additional information call department, 475-4994.

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

Credit 1/Qtr.

CTIS-104 to CTIS-109 **Advanced Machine Shop I, II**
Registration #0266-104,105
106,107,108,109
Advanced work on lathes, milling machines and grinders; explanations and demonstrations of more difficult problems; assemblies and temporary tooling. Some work done entirely in metrics. Must accurately handle tool room layout, machining, and measuring equipment. Special emphasis on skill, neatness and accuracy. (CTIS-203)

Credit 1/Qtr.

CTIS-111 to CTIS-119 **Instrument Making &**
Registration #0266-111,112, **Experimental Work I, II, III**
113,114,115,116,117,118,119
Student must operate all tool room equipment. Skillful manipulation of hand tools; make small temporary tooling required to form or bend the finished parts; blank development and precision layout; make small punches, dies, cutters and assemblies to simulate actual industrial model work. (CTIS-203)

Credit 1/Qtr.

CTIS-121 to CTIS-129 **Tool and Die Making I, II, III**
Registration #0266-121,122
123,124,125,126,127,128,129
Planning and making accurate, complete tool and die assemblies. Emphasis is on accuracy of the individual parts and the fitting of the assembled tool or die. Samples from the forming and blanking dies are inspected for quality. (CTIS-106)

Credit 1/Qtr.

CTIS-151,152,153 **Shop Mathematics**
These courses are now offered through the Learning Development Center and can be found under Learning Development Center-Technical. Registration #1710-051, 052, 053

CTIS-154,155,156 **Shop Trigonometry**
These courses are now offered through the Learning Development Center and can be found under Learning Development Center-Technical. Registration #1710-054, 055, 056

CTIS-157,158 **Shop Mathematics**
These courses are now offered through the Learning Development Center and can be found under Learning Development Center-Technical. Registration #1710-057,058

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 aluminum, brass, bronze, zinc beryllium, copper, silver, monel, stainless and magnetic steel. Several types of heat treating furnaces and atmospheres are available for laboratory exercises and demonstrations of these metals and alloys to prove out the theories of class lectures and discussions.

Credit 2/Qtr.

CTIS-201,202,203 (Lec.) **Machine Shop**
CTIS-206, 207,208 (Lab)
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/Qtr.

CTIS-204 (Lec.)
CTIS-209 (Lab) **Machine Shop**
Registration #0266-204,209
A combination of CTIS-201, 202, 203 and 206,207, 208. Offered summer 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. (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. (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. CAM (computer aided manufacturing) is introduced utilizing the E-Z CAM computer aided system. (CTIS-281 or 282 or programming experience)

Credit 3

Computer Service

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 elctrical wiring diagrams, schematics, logic and block diagrams and others found in service manuals.

Credit 2

CAIC-234 **Digital Circuits**
Registration #0275-234
Student will learn and apply concepts of basic semiconductor devices, diodes, and transistors as building blocks to basic logic gates. How basic logic gates are combined to form MSI, including flip flops, shift registers, counters, and basic memory devices, will be explored. (CTIL-202)

Credit 4

CAIC-237 **Introduction to**
Registration #0275-237 **Computer Operations I**
Introduction to computer software and hardware fundamentals. Students will gain an understanding of hardware components and software types. Lab will provide experience with word processing software, MS/PC DOS, utilities, hard disk management software, and Lotus 1-2-3.

Credit 3

CAIC-238 **Introduction to**
Registration #0275-238 **Computer Operations II**
A continuation of Computer Operations I. The course includes an elaboration of microprocessor circuitry and introduces communication systems. A detailed examination of the interplay of memory and interface devices with the microprocessor will be presented. Topics including advanced DOS, VAX/VMS and UNIX will be explored. (CAIC-237 or equivalent)

Credit 3

CAIC-240 **Microcomputer Organization**
Registration #0275-240
Introduction to microcomputer organization along with in-depth study of computer peripherals. Special test equipment will be used in lab for the control and alignment of disk drives and other computer sub assemblies. (CAIC-234, CAIC-238)

Credit 4

CAIC-250 **Computer Systems Troubleshooting**
Registration #0275-250
Students will troubleshoot, repair, align, and maintain computer equipment to component and board level. Students will be responsible for demonstrating professional technique in both the lab and field environment. (CAIC-240)

Credit 4

CAIC-295 **Independent Research**
Registration #0275-295 **Project**
To allow the student to use the knowledge that he/she has learned in the Computer Service Program. Students will demonstrate this knowledge by doing a research project concerning computers and/or computer maintenance. Emphasis will be placed on not only the accomplishment of the experiment/project, but skills in writing a report documenting progress throughout the experiment/project. The student and faculty member(s) involved will submit, no later than ten class days, a project proposal with goals, tasks, and objectives for review and approval by the department chair and the director. The student will be expected to complete the assignment with minimal faculty supervision. The amount of credit awarded is dependent on the lab time and the amount of outside work required. (Must have department head approval)

Credit 1-4

Learning Development Center-Technical

TLDT-011,012,013 **Mathematics**
Registration #1710-011,012,013
A three-quarter sequence for students whose high school mathematics background is insufficient to allow them to enroll in degree-level mathematics courses. This is an accelerated intermediate high school algebra course with an introduction to trigonometry.

Credit 0

TLDT-020 **Basic Communications**
Registration #1710-020
This course provides an opportunity for students to improve their reading, writing, and listening skills. For college-prep students or adults who want to upgrade their communication skills.

Credit 0

TLDT-051,052,053 **Shop Mathematics**
Registration #1710-051,052,053
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 0

TLDT-054, 055,056 **Shop Trigonometry**
Registration #1710-054, 055,056
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. (TLDT-053 or equivalent)

Credit 0

TLDT-057,058 **Shop Mathematics**
Registration #1710-057,058
Identical to Shop Mathematics, TLDT-051, 052, 053, except for differences in scheduling and credits per quarter. Offered Winter and Spring Quarter evenings.

Credit 0

Emergency Management

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

College of Engineering

Computer Engineering

Required Courses

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

Class 1, Credit 1 (F)

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

Class 1, Credit 1 (F)

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

Class 4, Credit 4 (S)

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

Class 3, Lab 3, Credit 4 (W)

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

Class 4, Credit 4 (S)

EECC-452 **Linear Control Systems**
Registration #0306-452
This course provides a comprehensive introduction to the essential theories and techniques for the analysis and design of both continuous and discrete linear systems. The modeling and control of dynamic systems will be studied using the classical topics of the frequency domain approach which has proven to be so useful in practice. Students will be required to verify their linear control system design projects using computer simulation techniques. (EECC-361)

Class 4, Credit 4 (S, SR)

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

Class 4, Credit 4 (S, SR)

EECC-551 **Computer Architecture**
Registration #0306-551
This course provides 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-553 **Digital Control Systems**
Registration #0306-553 **Design**
This course deals with the design of linear control systems using signals that are sampled in time and quantized in amplitude. The classical transform methods are first described and then applied to illustrative design examples. This course will focus briefly on the topics of the modern state space approach for designing control systems directly in the discrete time domain. Laboratory design projects will be assigned to demonstrate digital control using microprocessors. (EECC-452; EECC-560 concurrently)

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

EECC-560 **Interface and Digital**
Registration #0306-560 **Electronics**
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. Logic families including TTL, ECL, MOS, and their interface^ to each other. (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 covers the specification, analysis, design, and implementation of digital systems. The hierarchical and structured design methodology is introduced. It covers MSI/LSI modules and their use in design. It introduces the structure of a digital hardware problem solution from the architecture view, through data flow concepts and control flow concepts, to implementation. (EECC-341, EECC-560)

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

EECC-630 **Introduction to 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 is 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. (EECC-341 or ICSS-400 or EEEE-240; Basic Electronics; fourth- or fifth-year standing)

Class 4, Credit 4 (F, S, SR)

EECC-655 **Projects in Computer**
Registration #0306-655 **Engineering**
Several detailed projects involving the design of hardware and software will be posed to exercise the students' engineering design creativity and ability to integrate concepts from throughout the curriculum. Some lectures will be presented on real time programming techniques such as interrupt handlers, multitasking concepts, process synchronization, response time considerations, input noise reduction, and debugging techniques. Other topics will also be presented. (Fifth-year standing in Computer Engineering)

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

EECC-672 **Special Topics**
Registration #0306-672 **in Computer Engineering**
Topics and subject areas that are not among the courses listed here are frequently offered under the Special Topics title. Under the same title also may be found experimental courses that may be offered for the first time. Such courses are offered in a normal format; that is, regularly scheduled class sessions with an instructor. The level of complexity is commensurate with a senior level undergraduate/first year graduate technical course.

Class 2, Lab 3, Credit 3

EECC-694 **Data and Computer**
Registration #0306-694 **Communications**
This course provides a unified view of the broad field of data and computer communications. Emphasis will be on the basic principles underlying the technology of data and computer communications. These critical design issues in data communication networks as well as the current and evolving standards in computer communication architecture will be discussed. Alternative approaches to meeting user requirements will be explored. (Fifth-year standing in Computer Engineering or with permission of instructor)

Class 4, Credit 4 (S)

Technical Electives

EECC-605 **Introduction to the**
Registration #0306-605 **Theory of Computation**
This course deals with the basic mathematical, logical and linguistic concepts that underlie the formal aspects of computation. It provides a first acquaintance with the theoretical framework that is essential to the later, more detailed study of advanced topics in computer science and computer engineering. (SMAM-265)

Class 4, Credit 4 (S)

EECC-620 **Design Automation of Digital**
Registration #0306-620 **Systems**
Design automation deals with the use of computers as a tool or aid in the design and manufacturing of digital systems. Topics covered will include methods for digital design, hardware description languages, simulation techniques at system level, register-transfer level, and logic element level, partitioning of digital systems, placement, routing, and fault test generation. (EECC-550 or ICSS-520, or 720)

Class 4, Credit 4 (F, W)

EECC-631 **Advanced VLSI Design**
Registration #0306-631
A second course in the design and implementation of Very Large Scale (VLSI) systems. CMOS devices will be studied. System architecture and the use of Computer Aided Design (CAD) tools will be stressed. Extensive laboratory projects will be required, including the testing of chips fabricated in the first course. (EECC-630)

Class 4, Credit 4 (W)

EECC-683 **A Survey of Electronic Document/**
Registration #0306-683 **Digital Image Processing**
This course serves as an introduction to the several topics involved in electronic document processing—input scanning, output printing, digital image processing, and computer communications. It provides a framework for showing the relationships among these various topics in electronic document processing. The course includes image scaling, halftoning, compression, and feature extraction. (Fifth-year standing in computer engineering)

Class 4, Credit 4 (S)

EECC-699 **Independent Study**
Registration #0306-699
The purpose of this course is to allow senior-level undergraduate and first-year graduate students an opportunity to independently investigate, under faculty supervision, aspects of the field of computer engineering that are not sufficiently covered in existing courses. Proposals for independent study activities must be approved by both the faculty member supervising the independent study and by the department head. (Permission of the supervising faculty member and the department head required.)

Credit variable: 1 to 4 quarter credits

EEEE-240 Introduction to Digital Systems
Registration #0301-240
This course introduces students to the basic components used in digital systems. It is also usually the student's first exposure to engineering design. Mixed logic is taught as a design tool for combinational logic. The flip-flop, and its combination into registers and counters, is introduced. Programmable devices are surveyed. A traditional approach to the design of state machines is taken with an end object of hardware implementation on a programmable device. The laboratory component consists of small design projects that must be constructed and validated by the student. The projects run from traditional combinational logic using SSI chips to small subsystem implementation of EPLDs and EPROMs.

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

EEEE-310 Numerical Methods
Registration #0301-310
This course is designed to introduce students to the potential of the digital computer for solving engineering problems. Topics include: solving linear, nonlinear, and transcendental equations; solving systems of linear equations; interpolation and numerical differentiation; numerical integration; curve fitting and data smoothing using method of least squares; and systems of ordinary differential equations.

Class 2, Lab 0, Credit 2 (W, SR, Ext. day S)

EEEE-351 Circuit Analysis I
Registration #0301-351
Covers the fundamentals of DC circuit analysis and of magnetics, starting with the definition of voltage, current, resistance, power, and energy. Linearity and superposition, together with Kirchoffs Laws, are applied to the analysis of circuits havings series, parallel, and other combinations of elements. These concepts are generalized into branch, loop, mesh, and nodal analysis. Thevenin, Norton, and maximum power transfer theorems are proved and applied. Inductance and capacitance are introduced, and the response of RL and RC circuits to step inputs is established. Characteristics of common magnetic materials are reviewed prior to the study of magnetic circuit fundamentals.

Class 4, Recitation 1, Lab 2, Credit 4 (F, S, SR, Ext. day S)

EEEE-352 Circuit Analysis II
Registration #0301-352
Covers the fundamentals of AC circuit anlysis, starting with the study of sinusoidal steady-state solutions for circuits in the time domain. The complex plane is introduced along with the concepts of complex exponential functions, phasors, impedances, and admittances. Nodal, loop, and mesh methods of analysis, as well as Thevenin and related theorems, are applied to the complex plane. The concept of complex power is developed, and three-phase systems are analyzed. Two-port network theory is developed and applied to circuits and interconnections. The anlysis of mutual induction as applied to coupled coils, linear and ideal transformers, in conjunction with RLC circuits, is pursued. Simple filters are studied via transfer functions, plotting amplitude, and phase diagrams and are extended to cover the phenomenon of resonance.

Class 4, Recitation 1, Lab 2, Credit 4 (F, W, Ext. day F)

EEEE-364 Digital Circuits and Microprocessors
Registration #0301-364
This course is intended for non-EE majors who wish to develop an understanding of digital circuits, digital systems and the basics of microprocessors. Topics include fundamentals of digital logic circuits and their use in logic design, commercially available logic packages, computer architecture, memory, central processing unit, computer arithmetic and assembly language programming. Laboratory exercises will introduce the students to the building of basic logic circuits and programming of microprocessors. (This course cannot be used as a substitute for EEEE-365 by EE majors.)

Class 4, Lab 2, Credit 4 (W)

EEEE-365 Introduction to Microcomputers
Registration #0301-365
This course is designed to give the student insight into both hardware and software aspects of microcomputer systems. It begins with a study of number systems and codes and leads to the programmer's model of microprocessors. Computer programming is then introduced at the machine and assembly language levels with emphasis on computer instruction sets and addressing modes. Computer architecture, including detailed discussions of the memory unit, the central processing unit, and input/output, is reviewed. This includes a discussion of programmable peripheral devices. The course requires extensive hands-on exercises, ranging from simple computational programs to complex control functions. (EEEE-240)

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

EEEE-441 Electronics I
Registration #0301-441
Introduction to electronics and the basic principles of small signal analysis of circuits with non-linear components. The course covers ideal operational amplifiers (including their use in non-linear applications such as comparators and circuits with hysteresis, diode applications, including rectification and power supply filtering), basic operation and biasing of bipolar and junction field effect transistors. Analytical techniques include the development of linear equivalent circuits, load line construction, small signal analysis of single and cascaded amplifier stages, and wave form prediction. Emphasis is on developing skills required for circuit design. (EEEE-351)

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

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

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

EEEE-4S3 Linear Systems I
Registration #0301-453 (Continuous)
This course provides the foundations of signal and system analysis, including signal and system description and modeling. Topics covered include: input-output relationship of a linear system, convolution, Fourier series, evaluation of Fourier coefficients, circuit analysis with periodic inputs, exponential and trigonometric forms of Fourier series and their properties, relationships, and applications. Fourier transforms including energy spectrum and energy spectral density (along with applications) are covered. A comprehensive treatment of the Laplace transform and its inverse, concepts of transfer function, poles, and zeros, frequency response of systems and Bode diagrams, application of Laplace transforms to system modeling, solution of differential equations, and circuit anlysis are also taught. (EEEE-352, SMAM-306, SMAM-420)

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

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

Class 4, Credit 4 (S, SR)

EEEE-471 Electromagnetic Fields I
Registration #0301-471
The primary objective is the study of electrostatic and magneostatic fields and the physical laws that govern their behavior. Analytical techniques are developed that provide the foundation for solving electromagnetic problems. The following topics are discussed: review of vector algebra and calculus, electrostatic fields, Coulomb's Law, Gauss's Law, the electric potential, conductors, and dielectrics in static electric fields, polarization, electric flux density and dielectric constant, boundary conditions, capacitance, electrostatic energy and forces, solution of electrostatic problems, Poisson's and LaPlace's equations, method of images, steady electric currents, conduction current density and resistance, static magnetic fields, Ampere's Law, the vector magnetic potential, Biot-Savart's Law, the magnetic dipole, magnetization, magnetic field intensity, permeability, boundary conditions, self- and mutual-inductance, magnetic energy and forces. (SMAM-328, SPSP-313)

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

EEEE-472 Electromagnetic Fields II
Registration #0301-472
The primary objective is to study the propagation, reflection, and transmission of electromagnetic waves in unbounded regions and in guiding structures such as two conductor transmission lines and rectangular waveguides. The following topics are included: Faraday's Law of electromagnetic induction, time varying fields and Maxwell's equations, uniform plane waves in free space and in conductive regions, polarization, the Poynting theorem and electromagnetic power, wave reflection, and transmission, the complex reflection coefficient and wave impedance, TE and TM waves in rectangular waveguides, propagation and dispersion characteristics, attenuation losses, lower transmission. The laboratory portion of the course discusses the theory of transmission lines, pulse and step excitations, reflection diagrams, sinusoidal steady state solutions, standing waves, the Smith Chart, and impedance matching techniques. Experiments are conducted to illustrate fundamental wave propagation and reflection concepts. (EEEE-471)

Class 3, Lab 3, Credit 4 (F,W, Ext. Day F)

EEEE-513 Introduction to Automatic
Registration #0301-513 Control
This is a first course in the study of linear control systems and their physical behavior including stability and transient response. This is approached through the classical methods of the Laplace domain; Routh's Criterion, Nyquist, Bode and Nichols charts and root-locus. Lead and lag compensators are introduced using these tools. (EEEE-453)

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

EEEE-531 Electromechanical Energy
Registration #0301-531 Conversion
This course provides an introduction to transformer systems and AC and DC machines. Basic relationships for power and energy in rotating systems, magnetic fields, and electrical circuits are developed into an understanding of the operational characteristics of electrical machines. (EEEE-352)

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

EEEE-534 Introduction to
Registration #0301-534 Communication Systems
An introduction to the means for forming, transmitting, receiving, and detecting signals for communication. Spectral density and correlation descriptions are developed for deterministic and stationary random signals. Amplitude and angle modulation methods (e.g., AM and FM) are described for continuous signals. Frequency-shift and phase-shift techniques for discrete signals are then developed. In addition, the basic topics of matched filters, maximum likelihood recreption, and signal space and signal vectors are introduced. (SMAM-351, EEEE-453)

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

EEEE-544 Physics of Electronic Devices
Registration #0301-544
The objective of this course is to teach students the physical mechanisms that govern the operation of the most widely used semiconductor devices. Topics include semiconductor fundamentals, pn junction diodes, bi-polar and field-effect transistors, and metal-oxide semiconductor capacitors. The course emphasizes the relationships between the physical and structural parameters of these devices and their electrical performance. (EEEE-442, SPSP-315)

Class 4, Lab 0, Credit 4 (F, W, Ext. day F)

EEEE-545 Digital Electronics
Registration #0301-545
The objective of this course is to study the principles of digital electronic circuits with emphasis on MOS (CMOS in particular) and their use in logic circuits. It is expected to serve as a prerequisite for digital systems design and VLSI design. Topics include: review of basic logic principles, study of MOS devices, circuit characterization and performance estimation, design structures of logic systems, memory, registers and system timing, practical realities and ground rules, and bipolar digital circuits. The laboratory portion of the course will introduce the student to fabrication of integrated circuits, simulation of digital circuits, and design of basic logic circuits using workstations and software packages. (EEEE-240,442)

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

EEEE-554 Linear Systems II
Registration #0301-554 (Discrete)
Topics covered include continuation of the linear systems coneepts from EEEE-453 except that in this course they are applied to discrete signals and systems. The origins of discrete sequences and systems and an introduction to sampling of continuous signals and the sampling theorem, a description of discrete systems via difference equations and convolution, the z transform and inverse z transform, system transfer function, system frequency response function and interpretation of frequency response, an introduction to the design of digital filters, filter block diagrams for FIR and IIR filters, the discrete Fourier transform, its properties and its application to the solution of signal processing problems, and a brief introduction to fast algorithms for computation of the discrete Fourier transform are discussed. (EEEE-453)

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

EEEE-599 Independent Study
Registration #0301-599
A supervised investigation within an electrical engineering area of student interest. (Permission of instructor)

Class variable, Credit variable

EEEE-605 Robotic Vision
Registration #0301-605
An introductory course on computer vision with special emphasis on its use in a manufacturing environment. The course will develop an understanding of how information obtained from images can be used for industrial automation. Topics include: image formation and sensing, effects of lighting, image recognition, binary images, geometrical properties, image segmentation, gray scale image processing, enhancement, edge detection, 3-D structure, motion analysis, industrial applications. Students are required to write image processing programs. Robotic Vision laboratory will be available for projects and for testing image processing programs. (EEEE-554)

Class 3, Lab 3, Credit 4 (S, SR, assuming sufficient demand)

EEEE-614 Design of Control Systems
Registration #0301-614
This course adds to the analytical skills developed in EEEE-513 to sampled data systems and digital control systems. The stress in this course is on classical design techniques based on the Z-Transform. Root locus, Bode, Bode diagrams, and the direct method of design are discussed and examples are presented. The student is expected to utilize available computer-aided design packages (ACSL, CNTROL-C, etc.) in both class assignments and in laboratory projects. Each student is required to participate in the design of a digital control system or detailed design of a system component as the laboratory portion of the course. (EEEE-513, 554)

Class 3, Lab 3, Credit 4 (F, W, assuming sufficient demand)

EEEE-621 Microwave Engineering
Registration #0301-621
The primary objective is to study the theory and design of microwave components and circuits. The course begins with a review of basic EM theory, TEM waves in transmission lines, and TE and TM waves in rectangular waveguides. The following topics are discussed: microstriplines and striplines, TE and TM waves in cylindrical waveguides, the scattering matrix description of multiport microwave circuits, waveguide tees, directional couplers and phase shifters, microwave integrated circuit components, rectangular, cylindrical and coaxial cavity resonators, waveguide and coaxial line filters, and waveguide frequency meters, microwave integrated circuit high pass and band pass filters, ferrite components. The laboratory portion of the course illustrates various microwave component design and measurement techniques using state-of-the-art equipment. Also required is a project on the design of a microwave component.

Class 3, Lab 3, Credit 4

EEEE-622 Antenna Design
Registration #0301-622
This is a design course in microwave antennas. The primary objective is to study the fundamental principles of antenna theory and apply them to analysis and design of antennas. Emphasis will be on the design procedures for practical and popular antenna configurations; e.g., the dipole, thin linear antennas, linear arrays, microstrip antennas, and other antenna arrays. The student will also be exposed to the measurement techniques of antenna characteristics, such as radiation pattern, gain and input impedance using state-of-the-art equipment. The primary part of the course is a project involving the design, construction, and testing of an antenna. The project will require a report and a presentation with a demonstration.

Class 3, Lab 3, Credit 4

EEEE-64S Special Semiconductor
Registration #0301-645 Devices
This course covers devices and applications used in high power applications that are not normally encountered in the required electronic sequence. Four-layer devices such as the SCR, the PUT, the Triac, and the GTO Thyristor are discussed in detail along with applications in power control. The switching behavior of bipolar power transistors and power MOSFETS is investigated, and the devices are applied to switching mode power supplies and switching regulators. All of the devices are compared with respect to performance in typical applications. The laboratory portion of the course consists of experiments that delineate the device properties. The latter part of the laboratory consists of the design, construction, and test of a student project in an area of power control. (EEEE-442)

Class 3, Lab 3, Credit 4 (offered on sufficient demand)

EEEE-650 Design of Digital Systems
Registration #0301-650
This course deals with the design of both synchronous and asynchronous digital systems. The accent is on design methodologies for final implementation on programmable logic devices. Design techniques are based on top-down design using ASM charts and "bubble diagrams" along with microprogramming applications. Design strategies for testability are discussed along with their impact on performance. The practical aspects of component interconnection (crosstalk, noise, transmission line effects) with effects on performance are also surveyed. The laboratory portion of the course consists of two distinct projects that are proposed, designed, implemented, and tested by the student.

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

EEEE-66S **Microcomputer-Based**
Registration #0301-665 **Systems Design**
This course is designed to give the student detailed knowledge of the hardware and software organization of 8-bit microprocessor systems with an emphasis on design. Memory system design, including dynamic RAMs and DMA control will be studied. Peripheral interfacing, both serial and parallel I/O, including interrupts, will be considered. Special attention will be given to interfacing microcomputers with the analog world, including the use of A/D and D/A converters. Software organization as well as design tools will be discussed. Design case studies of typical microcomputer-based systems will be examined. (EEEE-365)

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

EEEE-666 **16-Bit Microcomputer Systems**
Registration #0301-666
This course will cover both the hardware and software aspects of 16-bit microcomputer systems. The architecture, timing, and enhanced instruction sets will be discussed. Memory, serial and parallel I/O interfacing techniques, including standard interface chips, will be examined. Introduction to operating systems, modular programming, and multiprogramming concepts are explored. Multiprocessor concepts, including I/O and floating point co-processors, are introduced. (EEEE-365)

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

EEEE-670 **Introduction to Microelectronics**
Registration #0301-670
An introduction to the processing techniques and systems used in the fabrication of integrated circuits (primarily silicon). Topics include crystal growth and wafer preparation, crystalline defects, solid state diffusion, thermal oxidation, ion implantation, epitaxy, metallization, plasma fundamentals, sputter deposition and etching, ion milling, plasma etching, reative ion etching, overall process design and integration (bipolar, NMOS, CMOS). The students use CAD tools such as ICE (computer aided integrated circuit layout), SUPREM (process modeling), and SPICE (device and circuit modeling). This course is a prerequisite for EEEE-676, IC Processing Laboratory, in which students actually process wafers in the clean room and fabricate and test integrated circuits. (EEEE-544)

Class 4, Credit 4 (SR, F)

EEEE-672 **Optical Devices and Systems**
Registration #0301-672
An introductory applied optics course with an emphasis on lasers and laser applications in electrical engineering. The course covers the following topics: laser fundamentals, including propagation of laser (Gaussian) beams, optical resonators, laser oscillation and amplification, the electrooptic and acoustooptic effects with applications to modulation of optical beams, beam steering, and optical signal processing, optical detectors, and detector noise. The laboratory complements the lecture topics and includes experiments on laser beams and resonator modes, semiconductor lasers, electrooptic modulation, acoustooptic deflection and modulation, photodetectors, and holography. (EEEE- 472, concurrently)

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

EEEE-674 **Fiber Optics:**
Registration #0301-674 **Theory and Application**
An introductory course in fiber optics with an emphasis on fiber optic communications. The course covers the following topics: light propagation in optical waveguides, pulse broadening; fiber optic coupling, fiber fabrication, distribution systems, source and detector characteristics and selection. The laboratory complements the lecture topics and includes experiments on coupling light into optical fiber, connector and splice loss, fiber numerical aperture, attenuation, directional couplers, laser diodes, and photodetectors. (EEEE-472)

Class 3, Lab 3, Credit 4 (S)

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

Class 4, Credit 4 (F, W)

EEEE-679 **Analog Filter Design**
Registration #0301-679
The objective of this course is to study various techniques for the design of filters to meet given specifications. Approximations to the ideal filter characteristic through Butterworth, Chebyshev and other polynomials are discussed in detail. The emphasis is on active network realizations using op amp stages. Topics include: review of analysis of op amp circuits and transfer functions of networks, magnitude and frequency scaling, ideal filter characteristics, Butterworth, Chebyshev and Bessel-Thompson approximations to the ideal filters, determination of transfer functions to meet given specifications, high pass to low pass and band pass to low pass transformations, standard op amp circuits for filter realizations, negative impedance converters, generalized impedance converters, and switched capacitor filters. (EEEE-453)

Class 4, Credit 4 (W)

EEEE-693 **Digital Data Communications**
Registration #0301-693
A course on the principles and practices of modern data communication systems. Topics include: a review of pulse code transmission and error probabilities, M-ary signaling and performance, RF communications link budget analysis, an introduction to channel coding, a discussion of modulation/coding tradeoffs, and a discussion of digital telephony.

Class 4, Credit 4 (W, S)

EEEE-694 **Information Theory and Coding**
Registration #0301-694
The course introduces the student to the notions of source entropy, information, equivocation, and mutual information leading to the topics of efficient source encoding, and communication channel capacity. The effects of random channel disturbances are described leading to the requirements for error-detection and error-protection coding. Linear block coding concepts are introduced followed by a description of cyclic codes and their underlying algebraic structure. (EEEE-453, 534; SMAM-351)

Class 3, Credit 4 (offered annually) Class 3, Credit 4 (offered on sufficient demand)

EEEE-695 Introduction to Audio
Registration #0301-695
A course based on topics from dynamics, acoustics and audio systems. Topics include: electro-mechanical equivalents, plant 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, 442,472)

Class 4, Credit 4 (S)

EEEE-699 Senior Design Project
Registration #0301-699
A design project is undertaken by the student either individually or as a member of a design team. Well-written documentation in the form of a project report is required. Projects that are interdisciplinary in nature are especially encouraged and in such cases dual advisors are provided. Permission of the faculty advisor is necessary for registration. (5th year standing)

Class 4, Credit 4 (F, W, S)

Industrial and Manufacturing Engineering

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

Class 1, Credit 1 (F)

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

EIEI-201 Introduction to Industrial
Registration #0303-201 Engineering
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.

Class 3, Lab 1, Credit 4(F)

EIEI-202 Computing for Industrial
Registration #0303-202 Engineering
A first course in computer programming for engineers and in particular industrial engineers. The course involves extensive development of programming skills required in the engineering disciplines.

Class 4, Credit 4 (W)

EIEI-301 Computer Tools for Increased
Registration #0303-301 Productivity
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)

Class 2, Credit 2 (W)

EIEI-401 Introduction to Operations
Registration #0303-401 Research I
An introduction to the methodology of mathematical problem formulation. Investigation of mathematical programming techniques including linear programming and special types of linear programming problems such as the transportation and assignment algorithms. (SMAM-328 or permission of instructor)

Class 4, Credit 4 (F)

EIEI-402 Introduction to Operations
Registration #0303-402 Research II
A survey of elementary mathematical models within the field of systems and industrial engineering. Areas of study include queuing theory, network analysis, and inventory theory. (SMAM-351, SMAM-306 or permission of instructor)

Class 4, Credit 4 (W)

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 permission of instructor)

Class 3, Lab 2, Credit 4 (W-516, F-415)

EIEI-420 Work Measurement and
Registration #0303-420 Analysis I
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. (Permission of instructor)

Class 3, Lab 2, Credit 4 (F)

EIEI-422 Systems & Facilities Planning
Registration #0303-422
A basic course in plant layout. Topics 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 permission of instructor)

Class 3, Lab 2, Credit 4 (S)

EIEI-481 Management Theory and
Registration #0303-481 Practice
Development of the fundamental principles of the industrial enterprise. Internal organization as well as general economic conditions are considered. Emphasis is placed on the role of behavior science. (Permission of instructor)

Class 4, Credit 4 (S)

EIEI-503 Simulation
Registration #0303-503
A first course in simulation emphasizing the role of the computer in developing simulation models. The SLAM simulation language is emphasized. (EIEI-202, SMAM-351 or equivalent)

Class 4, Credit 4 (W)

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

Class 4, Credit 4 (W-510, SR-511)

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

Class 4, Credit 4 (F)

EIEI-530 Engineering Design
Registration #0303-530
A case study approach of ten real world experiences in engineering design. (Permission of instructor)

Class 4, Credit 4 (W)

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

Class 4, Credit 4 (S)

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
Registration #0303-450 Design of Experiments
An applied approach to the problem of how one goes about running a study or experiment in human factors. (EIEI-511 or permission of instructor)

Class 4, Credit 4

EIEI-482 Production Control I
Registration #0303-482
A basic course in production control emphasizing the systems approach. Topics covered include forecasting, mathematic inventory models, material requirements planning and scheduling including PERT. (EIEI-511 and EIEI-503, or permission of instructor)

Class 4, Credit 4

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

Class 4, Credit 4

EIEI-504 Introduction to Operations
Registration #0303-504 Research III
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 permission of instructor)

Class 4, Credit 4

EIEI-505 Simulation Modelling Techniques
Registration #0303-505
This course is intended to increase simulation modelling skills primarily in the areas of network and discrete event simulations. Emphasis will be placed on methods of model construction, design of simulation experiments, model validation and output data analysis. Student will utilize these technique to analyze the performance of productions systems. (EIEI-503, SMAM-352 or permission of instructor)

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

EIEI-550 Safety Engineering
Registration #0303-550
To acquaint student with practical aspects of safety engineering. Students will acquire a working knowledge of legal and technical aspects of safety. Recent developments in this area will be stressed, such as OSHA, Consumer Product Safety Commission, and the 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. (Permission of instructor)

Class variable, Credit variable

EIEI-625 **Computer-Aided**
Registration #0303-625 **Manufacturing I**
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. (Permission of instructor)

Class 4, Credit 4

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

Class 3, Lab 3, Credit 4

EIEI-690 **Seminar in Computer**
Registration #0303-690 **Integrated Manufacturing**
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 applications.

Class 3, Credit 3

Mechanical Engineering

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

Class 1, Credit 1 (F)

The prerequisites are listed after each course description. A course which does not list a prerequisite may be taken by any student matriculated in the BSME program. When senior- or upper-level standing is specified as prerequisite, it means such standing in the BSME program.

EMEM-211 **Introduction to Graphics**
Registration #0304-211
The freshman course is designed to introduce the student to engineering in general and also to develop fundamental skills in engineering graphics communications. The course is intended for students with little or no engineering drawing. Students with experience in high school or the equivalent may take a qualifying examination for an exemption from this course. The course work conforms to ANSI, standards.

Class 2, Lab 2, Credit 3 (F, W)

EMEM-311 **Computer Aided Design**
Registration #0304-311
This one-quarter course teaches design drafting that concentrates on: computer graphic drawing techniques; geometric dimensioning and tolerancing; and production piece part and assembly drawing requirements. The last portion of the course is devoted to a project. The student learns to convert functional requirements to production drawing callouts. The course includes instruction in isometric sketching of part applications. (EMEM-211)

Class 2, Lab 2, Credit 3 (W, S)

EMEM-331 **Mechanics I**
Registration #0304-331
This course is intended for students majoring in electrical and industrial engineering. Statics: equilibrium, the principle of transmissibility of forces, couples, centroids, trusses, frames, machines and friction. Introduction to strength of materials: axial stresses and strains, statically indeterminate problems, thin-walled pressure vessels, direct shear, torsion, and bending. (Prerequisite: SPSP-311; corequisite: SMAM-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 (S)

EMEM-335 **Elements of Statics**
Registration #0304-335
This two-credit-hour course is intended as an introduction to the principles of statics for non-mechanical engineering students with a view to providing adequate background for a subsequent course in dynamics. This basic course treats the equilibrium of particles and rigid bodies under the action of forces. Topics include forces, couples, equilibrium, centroids, and friction. (Prerequisite: 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 equilibrium. Topics covered include concepts of force and moment, trusses, frames, machines, shear force and bending moment diagrams and equations, friction, fluid statics, centroids and moments of inertia. (Prerequisite: SPSP-311 and SMAM-252; corequisite: SMAM-253 and SMAM-305)

Class 4, Credit 4 (F)

EMEM-342 **Introduction to FORTRAN**
Registration #0304-342 **Programming**
This course introduces the students to the fundamentals of programming through the learning of the FORTRAN language. Topics covered include structured programming techniques using sequential IF-THEN-ELSE and DO WHILE structures. Various forms of the input/output are learned including formatted I/O and END-OF-FILE detection. Writing programs using Function and Subroutine subprograms is stressed. Proper documentation techniques along with efficient usage of the computer systems and a brief introduction to word processing are also covered.

Class 3, Credit 3 (W, S)

EMEM-343 Materials Processing
Registration #0304-343
This course involves a study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Topics covered include cutting processes, casting, forming, powder metallurgy, welding, and processing of plastics. Students make a project in the lab portion of the course.

Class 3, Lab 2, Credit 4 (F, W)

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

Class 3, Lab 2, Credit 4 (W, S)

EMEM-347 Engineering Mechanics
Registration #0304-347
This is a basic course in the fundamental principles of the mechanics of deformable media including stress, strain, deflections, and the relationships between them. The basic loadings of tension, compression, shear, torsion, and bending are also included. Engineering Mechanics Lab (EMEM-348) is to be taken concurrently with this course. (EMEM-336)

Class 4, Credit 4 (W)

EMEM-348 Engineering Mechanics
Registration #0304-348 Laboratory
A basic laboratory course to be taken concurrently with Engineering Mechanics, EMEM-347. This course illustrates the mechanical behavior of common engineering materials. Students investigate a material's response to axial loads and perform experiments in simple torsion and beam bending. Students are also introduced to basic experimental techniques and effective report writing. (Prerequisite: EMEM-336; corequisite: EMEM-347)

Lab 2, Credit 1 (W)

EMEM-349 Elements of Dynamics
Registration #0304-349
This is a basic course for non-mechanical engineering students 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 or EMEM-335)

Class 3, Credit 3 (W, S)

EMEM-410 Three-Dimensional
Registration #0304-410 Computer-Aided Design
This is an elective course which introduces students to three-dimensional computer-aided design using the Intergraph CAD system. Topics include design file creation and manipulation, element construction and manipulation, levels, text placement, cells, graphic groups and working sets, and dimensioning. A student completing this course becomes an experienced system user and qualified for related co-op work and/or further study of the interactive analysis software packages. (EMEM-311)

Class 1, Lab 2, Credit 2 (F, W)

EMEM-413 Thermodynamics
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-415 Fluid Mechanics
Registration #0304-415
This course includes the physical characteristics of a fluid: density, stress, pressure, viscosity, temperature, vapor pressure, compressibility; descriptions of flows: Lagrangian and Eulerian; stream lines, path lines, streak lines; classification of flows. Fluid statics: hydrostatic pressure at a point, pressure field in a static fluid, manometry, forces on submerged surfaces, buoyancy, standard and adiabatic atmospheres; flow fields and fundamental laws: 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; incompressible flow in pipes; laminar and turbulent flows, separation phenomenon; dimensional analysis: Buckingham's pi-theorem, similitude, model studies. (EMEM-413) (Corequisite EMEM-416)

Class 4, Credit 4 (S, SR)

EMEM-416 Thermal Fluid Science
Registration #0304-416 and Energy Lab I
This course is to be taken concurrently with Fluid Mechanics (EMEM-415). This laboratory course contains four laboratory experiments and one project. The experiments cover the following areas: the steam power plant, vapor compression refrigeration, Reynolds pipe flow apparatus and centrifugal pumps (Corequisite EMEM-415; prerequisite EMEM-413)

Lab 3, Credit 1 (S, SR)

EMEM-431 Thermodynamics
Registration #0304-431
A basic course in thermodynamics and heat transfer for Electrical Engineering students. The course contains applications of the first and second law to closed and open systems and elementary heat transfer considerations for electrical engineers. (SPSP-312)

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

EMEM-437 Introduction to Machine
Registration #0304-437 Design
In this course particular emphasis is placed on the design and analysis of machine elements and a discussion of engineering professionalism and ethics. (EMEM-347, EMEM-348)

Class 4, Credit 4 (F, W)

EMEM-439 Dynamics
Registration #0304-439
This is a basic course in the plane kinematics and kinetics of particles, and plane kinematics of rigid bodies. Newton's Laws, the energy method, and the method of impulse-momentum are applied to a variety of particle problems. Systems of particles are used to introduce the student to rigid bodies. Absolute and relative motion are used to investigate the kinetics and kinematics of systems of rigid bodies. Newton's Laws, the work energy principle and the method of impulse-momentum are also applied to a variety of rigid body problems. (EMEM-336, SMAM-306)

Class 4, Credit 4 (S, SR)

EMEM-440 Numerical Methods
Registration #0304-440
This course involves a study of the numerical methods for modelling and solving engineering problems using computers and interpreting and analyzing the numerical results obtained. Topics include roots of algebraic and transcendental equations, solutions of homogeneous and non-homogeneous systes of linear algebraic equations, numerical integration and differentiation, and ordinary differential equations. Problems will be taken from the student's background in statics, strength of materials, dynamics, mathematics and thermodynamics. Students are expected to write a number of programs. (EMEM-342 or equivalent computer experience, SMAM-306, and third-year standing)

Class 4, Credit 4 (F, W)

EMEM-464 Design for Manufacture
Registration #0304-464
This course will teach the student how to quantify design efficiency and how to redesign a product to optimize cost. It will use both manual techniques and computer software.

Class 4, Credit 4 (S, SR)

EMEM-514 Heat Transfer I
Registration #0304-514
This is a basic course in the fundamentals of heat transfer by conduction, convection, and radiation, together with applications to typical engineering systems. Topics covered include one-dimensional steady state and transient heat conduction, radiation between black bodies and gray bodies, correlations for the Nusselt number in forced and natural convection, and an introduction to heat exchanger design by LMTD and NTU methods (EMEM-413, EMEM-415)

Class 4, Credit 4 (F, W)

EMEM-518 Advanced Computational
Registration #0304-518 Techniques
The theoretical base obtained in Numerical Methods, EMEM-440, is extended to discrete analysis. The course covers finite element and finite difference techniques and their applications in mechanical engineering (structural analysis, heat transfer, fluid mechanics). (EMEM-440)

Class 3, Lab 2, Credit 4 (S, SR)

EMEM-543 Response of Dynamic Systems
Registration #0304-543
This course deals with the modeling of lumped parameter systems, and the response of these systems to step or harmoric excitation. The dynamics of mechanical, electrical, thermal, and fluid lumped parameter systems are investigated. Mathematical models are developed and used to study their system response. Alternate system designs are also investigated via modeling techniques. Projects associated with this course introduce students to the use of the ACSL systems simulation software. Students are required to generate ACSL models and execute them to investigate the influence of various system parameters. A computer laboratory course, EMEM-545, must be taken concurrently with this course. (EMEM-439; corequisite: EMEM-545)

Class 4, Credit 4 (F, W)

EMEM-545 Dynamics Laboratory
Registration #0304-545
Companion laboratory for EMEM-543. The lab will contain experiments concerning mechanical, electro-mechanical, and thermo-fluid systems parameter characterizations and system response phenomena. Digital computer simulation of system response, and advanced data acquisition techniques are extensively covered. (Corequisite: EMEM-543)

Lab 2, Credit 1 (F, W)

EMEM-550 Transport Phenomenon
Registration #0304-550
This is a fundamental course in transport phenomenon leading to advanced topics in heat transfer and fluid flow theory. The students are introduced to the boundary layer theory in external and internal flows. Thermal Fluid Science and Energy Lab II (EMEM-551) is to be taken concurrently with this course. (EMEM-514)

Class 4, Credit 4 (S, SR)

EMEM-551 Thermal Fluid Science
Registration #0304-551 and Energy Lab II
This is a companion laboratory course for Transport Phenomenon (EMEM-550), and it consists of four laboratory experiments and one project. The experiments cover the following areas: subsonic wind tunnel, laser Doppler anemometer, flow meters and thermistor and thermocouple response. (Corequisite EMEM-550)

Lab 2, Credit 1 (S, SR)

EMEM-599 Independent Study
Registration #0304-599
This is a student project course encompassing both analytical and experimental work. (Fourth- or fifth-year standing)

Class variable, Credit variable (F, W, S, SR)

EMEM-600 Design Project
Registration #0304-600
In this course the student defines a design project to integrate course work and co-op work experience.

Class variable, Credit variable (F,W,S, SR)

EMEM-630 Senior Design Project I
Registration #0304-630
This course has a 100 percent engineering design content. The course will cover several topics crucial to the basic design process, including the creative process, VAVE, design for manufacture, project analysis, statistics, and communication skills. Students will be given a term project consisting of a feasibility study/design specification to reinforce the concepts presented. (Fifth-year standing)

Class 4, Credit 4 (F, W)

EMEM-631 Senior Design Project II
Registration #0304-631
This course has a 100 percent engineering design content. Students apply the principles of design to a specific system while working in a small group. The projects will be open-ended, requiring the evaluation of alternative solutions. Final oral presentations and reports are required. (EMEM-630)

Class 4, Credit 4 (S)

Technical Electives

(All technical elective courses have a minimum of 25 percent engineering design content. These are offered at least every other year.)

EMEM-605 **Applications in Fluid Mechanics**
Registration #0304-605
This course deals with specific design-oriented applications of fluid mechanics. The course will cover one of the following topics: (a) hydrodynamics, (b) dispersion and diffusion in the environment, (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-440, EMEM-550)

Class 4, Credit 4 (F.W)

EMEM-615 **Robotics**
Registration #0304-615
This is an applied course in the fundamentals and applications of industrial robots. Topics include microprocessors, computer vision, drive systems, sensors, gripper design, safety, economics, design for assembly, flexible manufacturing systems, and case studies. Major emphasis is placed on a term project involving an actual industrial problem. (EMEM-437, EMEM-439)

Class 4, Credit 4 (F, W)

EMEM-618 **Computer-Aided Engineering and Design**
Registration #0304-618
This course introduces the mechanical engineering student to the procedures and techniques used to integrate the computer into the engineering and design cycle. The student is exposed to the computer hardware and software used in mechanical design; that is, mechanical drawing, solids modeling, finite elements, etc. The student will use software on the academic computing system, the Intergraph CAD laboratory, and personal computers. Concepts associated with the design of interactive graphics display programs for design applications will be presented. A design project is selected from one or more of the topics covered. (EMEM-437,440, 543)

Class 3, Lab 2, Credit 4 (S)

EMEM-620 **Introduction to Optimal Design**
Registration #0304-620
This course is an introduction to some basic optimization techniques for engineering design synthesis. Topics covered include: basic concepts, the general problem statement, necessary conditions of optimization, numerical techniques for unconstrained optimization, constrained optimization through unconstrained optimization, and direct methods. Numerical solutions are obtained by interfacing with available software. A design project is required. (EMEM-440, EMEM-543, EMEM-437)

Class 4, Credit 4 (F,W)

EMEM-635 **Heat Transfer H**
Registration #0304-635
The course considers numerical solution of heat transfer problems requiring the use of digital computer programming. It also investigates forced and natural convention heat transfer to single phase fluids and fluids with phase change. It includes a major design project. (EMEM-440 and EMEM-514)

Class 4, Credit 4 (S, SR)

EMEM-652 **Fluid Mechanics of Turbomachinery**
Registration #0304-652
This course examines the basic principles applicable to all turbomachinery as well as the consideration of the operating and design characteristics of several basic classes of turbomachinery. It includes a major design project. (EMEM-415)

Class 4, Credit 4 (S, SR)

EMEM-658 **Engineering Vibrations**
Registration #0304-658
This is a design-oriented course in mechanical vibrations and noise control with emphasis on design applications and instrumentation. Free and force vibrations of one degree of freedom systems are covered including machinery unbalance and isolation, Fourier analysis, numerical and experimental analysis and design methods. Modal analysis of multi-degree of freedom systems is introduced. Industrial acoustics and noise control techniques are also introduced. In addition to laboratory exercises in each area of vibration, a design project is assigned. (EMEM-543)

Class 3, Lab **2,** Credit 4 (F, W)

EMEM-660 **Refrigeration and Air Conditioning**
Registration #0304-660
This is a basic course in the principles and applications of refrigeration and air conditioning involving mechanical vapor compression and absorption refrigeration cycles, associated hardware, psychrometrics, heat transmission in buildings, and thermodynamic design of air conditioning systems. Students are expected to do a design project. (EMEM-413, EMEM-514)

Class 4, Credit 4 (S)

EMEM-672 **Dynamics of Machinery**
Registration #0304-672
This course treats the fundamentals of dynamic design of machinery. Topics include 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. Major emphasis is placed on a term project. (EMEM-543)

Class 4, Credit 4 (S, SR)

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 and EMEM-440)

Class 4, Credit 4 (S, SR)

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-730 VLSI Design
Registration #0306-730
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 is 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. Extensive laboratory projects will be required.

Class 4, Credit 4 (F, S, SR)

EECC-731 VLSI Design Projects
Registration #0306-731
A second course in the design and implementation of Very Large Scale (VLSI) systems. CMOS devices will be studied. System architecture and the use of Computer Aided Design (CAD) tools will be stressed. A major laboratory design project will be required. In addition the students will test chips fabricated in the first course. (EECC-730 or EECC-630)

Class 4, Credit 4 (W)

EECC-740 Analytical Topics for Computer Engineers
Registration #0306-740
This course begins by reviewing signal and system analysis techniques for analyzing linear systems. It includes Fourier techniques and moves on to present fundamental computational techniques appropriate for a number of applications areas of computer engineering. A section on numerical linear algebra will include techniques for analyzing discrete time signals and systems. Other major course areas are symbolic logic and discrete optimization techniques, including computer representations of networks, shortest-path problems and minimum spanning tree problems.

Class 4, Credit 4 (F)

EECC-7S6 Multiple Processor Systems
Registration #0306-756
This course will cover the general guidelines, methodology, and approaches for the design, development, and use of single and multi, micro or minicomputer systems. The 16-bit and 32-bit microprocessors have vast address spaces and virtual memory capability, incorporate complex I/O facilities, and permit rapid execution of cost-saving, high-level languages. The hardware and software support available for these microprocessors also makes them a cost-effective alternative to minicomputers. Distributed systems based on microcomputer technology will be investigated with emphasis on interconnect structures, intercommunications, software and hardware. The course will include a laboratory workshop in which each student will be required to design, implement, and test one or more parts of a practical system. Emphasis will be placed on engineering ability and management skill to meet proposed technical goals on time and within budget. (Graduate standing in Computer Engineering with at least three core courses completed or permission of instructor)

Class 4, Credit 4 (S)

EECC-758 Fault-Tolerant Digital Systems
Registration #0306-758
Formal models and concepts in fault diagnosis. Test generation. Design for testability techniques. Design techniques to achieve fault tolerance. System evaluation techniques. The design of practical fault-tolerant systems. Fault-tolerant design of VLSI circuits and systems. (ICSS-400 or EEEE-650 or EEEE-750, EECC-550 or ICSS-720)

Class 4, Credit 4 (S)

EECC-759 Principles of Digital Interfacing
Registration #0306-759
Standard bus interfaces—parallel and serial. Shielding, grounding, and transmission line techniques. LSI interface devices and controllers. Interface design—peripherals and memory. Data acquisition—A/D & D/A converters, multiplexing. Remote control. Error detection and correction. (EECC-560 or permission of instructor)

Class 3, Lab 3, Credit 4 (F)

EECC-772 Special Topics in Computer Engineering
Registration #0306-772
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 variable (no regular course schedule)

EECC-784 Digital Image Processing Algorithms
Registration #0306-784
This is a graduate-level course which emphasizes the computational and algorithmic techniques required for processing digitized pictorial images. The acquisition and quantization of digital images is described, followed by analysis and filtering techniques. Segmentation, projection, and reconstruction techniques are discussed. Finally, bi-level image processing is discussed, including contour filling and thinning techniques. Programming projects will be required. (Competence in calculus, engineering math, and structured programming are required.)

Class 4, Credit 4 (SR)

EECC-890 Thesis
Registration #0306-890
An independent engineering project or research problem to demonstrate professional maturity. A formal written thesis and an oral defense are required. The student must obtain the approval of an appropriate faculty member to guide the thesis before registering. A thesis may be used to earn a minimum of 5 and a maximum of 9 credits.

Credit variable

Electrical Engineering

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

Class 1, Credit 1 (F)

Free Elective Courses

Typically at least three electives from the list are offered every year.

EMEM-637 Laser Engineering
Registration #0304-637
Laser Engineering studies the applications of lasers as engineering tools. Background physics relevant to the operation of a laser and the interaction of light with matter are given. Safety regulations are discussed and specific applications in industry are covered. (SPSP-314)

Class 4, Credit 4 (TBA)

EMEM-643 Control Systems
Registration #0304-643
This course uses the background developed in Response of Dynamic Systems to study the control of various systems. Topics include transfer functions, LaPlace Transforms, feedback control, and control system design and modeling using Root Locus and Bode techniques. A laboratory associated with the course reinforces the basic control principles presented in the classroom. (EMEM-543)

Class 3, Lab/Rec. 2, Credit 4 (TBA)

EMEM-650 Gas Dynamics
Registration #0304-650
An intermediate 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. (Senior standing)

Class 4, Credit 4 (TBA)

EMEM-651 Viscous Flows
Registration #0304-651
A course in fluid mechanics covering incompressible laminar and turbulent boundary layers. General properties of Navier-Stokes equations, some exact solutions. Boundary layer equations, some exact and approximate solutions for two-dimensional steady flows. Boundary layer controls. Three-dimensional boundary layers. Transition of boundary layers. Theories of turbulence. (EMEM-516)

Class 4, Credit 4 (TBA)

EMEM-680 Advanced Thermodynamics
Registration #0304-680
This course involves an in-depth 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 (TBA)

EMEM-685 Advanced Strength of
Registration #0304-685 Materials
Student study statically indeterminate problems for beams; frames; continuous beams; beams of variable cross section, reinforced concrete beams; beams on elastic foundations and torsion; limit analysis; energy methods with applications to beams, curbed bars, and frames; rotating disks; introduction to composite materials (EMEM-437 and EMEM-440)

Class 4, Credit 4 (TBA)

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 (TBA)

EMEM-690 Environment and the
Registration #0304-690 Engineer
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. (Senior standing in engineering)

Class 4, Credit 4 (TBA)

EMEM-692 Analysis for Engineers
Registration #0304-692
Particle differentiation, chain rule, total differential and optimization problems; multiple integration and manipulation of multiple integrals; linear constant coefficient ordinary differential equations; matrix algebra; and vector calculus or complex variables. (SMAM-306 or equivalent)

Credit 4 (TBA)

EMEM-698 Independent Study Design
Registration #0304-698 Project
This is a design-oriented independent study requiring a major design project. (Senior standing)

Credit 4

Microelectronic Engineering

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

Class 1, Credit 1 (F)

EMCR-201 Introduction to
Registration #0305-201 Microelectronics
This course will provide the student with introductory and career information about the profession of microelectronic engineering. Students study how integrated circuits are made and design and fabricate a custom integrated circuit as part of the laboratory. Students use the Integrated Circuit Facility for the laboratory portion of this course.

Class 3, Lab 3, Credit 4 (F)

EMCR-215 Introduction to Microelectronics—Transfer
Registration #0305-215
This course contains approximately 75 percent of the material covered in EMCR-201 and EMCR-350. For transfer students.

Class 3, Lab 3, Credit 4 (F)

EMCR-221 Introduction to Microlithography
Registration #0305-221
This course provides an introduction to the fundamentals of imaging and photographic science. Topics include: radiometry and photometry, exposure, silver halide materials, photoresists, speed and spectral sensitivity, sensitometry, optics, resolving power, limits of optical microlithography, measurement and control of line width, special exposure effects, and contact and printing systems.

Credit 4 (F, S)

EMCR-350 Integrated Circuit Technology
Registration #0305-350
An introduction to integrated circuit technology and the physics, chemistry and metallurgy of manufacturing with an emphasis on photolithography. The laboratory includes safety, laboratory techniques, processing and testing. Students design and build an integrated circuit. (EMCR-201)

Class 3, Lab 3, Credit 4 (S)

EMCR-520 VLSI Design
Registration #0305-520
A study of transistors in saturation, active and cutoff regions including normal and inverse operation. T2L, I2L, ECL, PMOS, NMOS, and CMOS logic. VLSI design methodologies are discussed and simple design projects are completed. (EMCR-560, EEEE-442)

Class 4, Credit 4 (S, SR)

EMCR-530 Electromagnetic Fields I
Registration #0305-530
A study of electrostatics and magnetostatics important to the understanding of the physics of semiconductor devices and microelectronic processing. (SMAM-328, SPSP-313)

Class 4, Credit 4 (F,W)

EMCR-540 Electromagnetic Fields II
Registration #0305-540
A study of time varying electromagnetic fields important to optical and electrical systems. Topics include Maxwell's equations, wave equations, electromagnetic propagation in free space and guided structures, concepts of reflection, transmission and matching. (EMCR-530)

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

EMCR-560 Device Physics
Registration #0305-560
A basic course dealing with the physics of semiconductor devices. Topics include physics of semiconductor materials, metal-semiconductor contacts, PN junctions, bipolar transistors, MOS structures and field effect transistors. (EEEE-441, SPSP-315)

Class 4, Credit 4 (F, W)

EMCR-573 Microlithography I Laboratory
Registration #0305-573
Laboratory course to be taken concurrently with PIMG-563. Topics emphasize photolithographic process characterization techniques. (PIMG-221, EMCR-350)

Lab 3, Credit 1 (S, SR)

EMCR-575 Microlithography II Laboratory
Registration #0305-575
Laboratory course to be taken concurrently with PIMG-565. Topics emphasize advanced lithographic processes. (PIMG-563, EMCR-573)

Lab 3, Credit 1 (F, W)

EMCR-599 Independent Study
Registration #0305-599
A supervised investigation within a microelectronic area of student interest. (Permission of instructor)

Class variable, Credit variable

EMCR-630 Advanced Microelectronic Chemistry
Registration #0305-630
A selection of topics from physical and plasma chemistry important to the understanding of integrated circuit processing, including plasma etching, chemical vapor deposition, and related technologies. (PIMG-563, EMCR-573, EMCR-350)

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

EMCR-640 Microelectronics
Registration #0305-640
An intermediate course in the study of integrated circuit processing. Topics include diffusion, ion implantation, bipolar and MOS processes. Extensive use of CAE tools such as SUPREM and SPICE. (EMCR-350, 560, 573; EEEE-442, PIMG-563)

Class 4, Credit 4 (S, SR)

EMCR-650 Integrated Circuit Processing Lab
Registration #0305-650
A laboratory course in which the student designs and builds an integrated circuit. Required lab work includes MOS C-V, PMOS I.C. fabrication and safety. (EMCR-640)

Class 2, Lab 6, Credit 4 (F, W)

EMCR-660 Seminar/Research
Registration #0305-660
An investigation of a problem in microelectronic processing. Seminars by experts from the various phases of the microelectronics industry. (EMCR-650)

Class 2, Lab 6, Credit 4 (S)

EMCR-670 Advanced Microlithography
Registration #0305-670
A study of the characteristics of image-forming and image-recording elements and their matching for optimum performance. Spread and transfer functions, partial coherence in image systems, limitations imposed by the wave and particle nature of radiation. Interferometric evaluation techniques. Techniques and instruments for the exposing and evaluation of images. (EMCR-540, 575; EEEE-455, PIMG-543,565)

Class 3, Lab 3, Credit 4 (S)

College of Fine and Applied Arts

School of Art and Design

FADC-301,302,303 Introduction to Graphic Design
Registration #0402-301,302,303
An introduction to the field of graphic design through explorations of formal and perceptual understanding and control; deals with point, line, shape, color, pattern, organizational systems, Gestalt principles, dimension interaction and communications. The relationship of typography and photography to graphic design is included. Recommended course work also includes concentrated work in typography, photography, and art for reproduction methods. (Foundation program or equivalent required) Prerequisite for major in Graphic Design.

Lab 9, Credit 4 (offered each year)

FADC-401,402,403 Graphic Design (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, typography, or computer graphics)

Lab 6, Credit 3 (offered each year), Elective

FADC-501,502,503 Graphic Design (Senior Major)
Registration #0402-501,502,503
Advanced creative problem solving experiences relating to visual communication imagery based on a strong emphasis of formal design values and their utilization for the communication of ideas and information. Assignments oriented to include thematic graphic design applications such as visual identity, signage, audio-visual, packaging, photography, marketing, 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 topics of design study.

Lab 6, Credit 3 (offered on sufficient demand), Elective

FADD-311,312,313 Industrial, Interior and Packaging Design
Registration #0403-311,312,313
An elective offering basic instruction and involvement in industrial, interior and packaging design projects. Each quarter concentrates on a specific topic of design study.
311—Furniture/Space
312—Packaging
313—Industrial Design

Lab 6, Credit 3 (offered each year), Elective

FADD-320 Graphic Visualization
Registration #0403-320
Graphic visualization techniques for the development and presentation of concepts for three-dimensional designs. Familiarization with various media in developing and improving graphic communication skills of value to the designer.

Lab 6, Credit 3 (offered on sufficient demand)

FADD-411,412,413 Design Applications
Registration #0403-411,412,413
An elective that provides basic instruction in three dimensional computer graphics applications for designers.

Lab 6, Credit 3, Elective

FADU-301,302,303 Industrial and Package Design
Registration #0442-301,302,303 (Sophomore Core)
An introduction to the fields of industrial and package design. Emphasis is on basic skills and processes for 3-dimensional design conceptualization and development.
301—Graphic Visualization of Objects
302—O-Datum, decimal, and Engineering Drafting
303—Forms and Functional Studies

Lab 9, Credit 4 (offered each year)

FADU-401,402, 403 Industrial Design II
Registration #0442-401,402,403 (Junior Major)
The acquisition of a technical and theoretical base in industrial design. Application of communicative and problem-solving skills to comprehensive design projects involving form.
401—The integrated development of human factors and consumer product design, emphasizing understanding, style, function, and safety
402—Design development of small equipment through sketches and quick study mock-ups, together with the introduction to materials and processes
403—The application of style, fashion and graphics as they apply to product form

Lab 12, Credit 6 (offered each year)

FADU-501,502,503 Industrial Design III
Registration #0442-501,502,503 (Senior Major)
The application of design methods and skills to professional level projects in industrial design.
501—Advanced product development based on a corporate design program providing technical information, marketing concerns and outside review of work
502—History of 20th century furniture design is reviewed as a context for designing furniture for a defined market. Professional practice including writing contracts or letters of agreement, business and contractual agreements
503—A special student-interest project in industrial design including resume and portfolio design. Design issues and ethics are explored through examination of biographical material.

Lab 18, Credit 9 (offered each year)

FADI-301,302,303 Interior Design
Registration #0444-301,302,303 (Sophomore Core)
An introduction to interior design. Emphasis is on the basic skills and processes for spatial relationships, design conceptualization, and development.
301—Architectural Visualization
302—Architectural Drafting
303—Spatial Studies and Relationships

Lab 9, Credit 4 (offered each year)

FADI-401,402,403 Interior Design II
Registration #0444-401,402,403 (Junior Major)
The acquisition of a technical and theoretical base in interior design. Application of communicative and problem-solving skills to comprehensive design projects involving space and including environmental control, decorative arts and materials.

Lab 12, Credit 6 (offered each year)

FADI-501,502,503 Interior Design III
Registration #0444-501,502, 503 (Senior Major)
The application of design methods and skills to professional level projects in interior design with an emphasis on space planning, construction documents, furniture, professional practices and career development.

Lab 18, Credit 9 (offered each year)

FADK-401,402,403 Packaging Design II
Registration #0440-401,402,403 (Junior Major)
The course progresses through a series of interrelated experiments, covering analysis and visual translation of package form and function, package structure, production processes, package trends, materials, and package graphics.

Lab 9, Credit 4 (offered each year)

FADK-501,502,503 Packaging Design III
Registration #0440-501,502,503 (Senior Major)
The course will further investigate analysis and visual translation of package form and function, package structure, production processes, package trends, construction, materials and package graphics. A strong emphasis will be placed on preparation of a portfolio.

Lab 9, Credit 4 (offered each year)

FADF-205,206,207 Creative Sources
Registration #0404-205,206,207
This course is designed to make students aware of themselves, their experiences, and their environment as tools for creative problem solving. This will be accomplished through lectures, individual and group assignments, demonstrations, and guest speakers.

Class 1, Lab 1, Credit 2 (offered each year)

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

Lab 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
A structured introduction to the fundamentals of design and color with media exploration in two dimensions, concentrating on concept development, visual recognition and organization, and skill development through creative problem solving.

Lab 6, Credit 3 (offered each year)

FADF-241,242,243 3-D Design
Registration #0404-241,242,243
The elements of design and their structural relationship as applied to problems in three dimensions. A variety of media are used.

Lab 6, Credit 3 (offered each year)

FADF-261,262,263 Drawing (Crafts Majors)
Registration #0404-261,262,263
Drawing in variety of media. Introduction to line, form, and color as elements of pictorial and object description and presentation. Drawing systems utilizing perspective, visualization, and spatial illusion.

Lab 6, Credit 3 (offered each year)

FADF-321,322,323 Design for Photo II
Registration #0404-321,322,323
Emphasis upon problems which are related to visual phenomena, fundamentals, and communications. Expression through image making viewing and discussion.

Class 1, Lab 2, Credit 2 (offered each year)

FADP-301,302,303 Introduction to Fine Arts
Registration #0405-301,302,303 (Sophomore Core)
Fine arts core for painting, painting-illustration, printmaking and printmaking-illustration. Emphasis is placed on 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 for further study in painting, printmaking and illustration. (Foundation program or equivalent required)

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 9, Credit 4 (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 (Junior Major)
Registration #0405-401,402,403
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
Registration #0405-404,405,406 (Junior Major)
One day of painting and one day of illustration per week. Emphasis is on development of media and concept through creative problem solving relating to painting, illustration and drawing.

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), Elective

FADP-421,422,423 Medical Illustration
Registration #0405-421,422,423 Applications (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 12, Credit 8 (F, W) 421,422 (offered each year)
Lab 6, Credit 5 (S) 423 (offered each year)

FADP-430 Medical Illustration
Registration #0405-430 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, and photography 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 (Senior Major)
Registration #0405-501,502,503
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 on sufficient demand), Elective

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 by RIT and the University of Rochester.

Lab 12, Credit 6 (offered each year)

FADR-401,402,403 Printmaking (Junior Major)
Registration #0406-401,402,403
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 ehcouraged. A limited edition portfolio project is developed with the participation of all students.

Lab 12, Credit 6 (offered each year)

FADR-404,405,406 Printmaking-Illustration
Registration #0406-404,405,406 (Junior Major)
One day of printmaking and one day of illustration per week. Emphasis is on development of media and concept through creative problem solving relating to printmaking, illustration and drawing.

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), Elective

FADR-501,502,503 Printmaking (Senior Major)
Registration #0406-501,502,503
Continuation of third-year printmaking. Expanding the technical involvement in paper making, photo etching and photo litho. Opportunity is presented for involvement in developing a more concentrated and personal art form through any singular technique or combination. A limited edition portfolio project is developed with the participation of all students. Encouragement is offered for students to exhibit professionally in regional and national exhibitions. Emphasis is placed on preparing a strong professional body of prints.

Lab 18, Credit 9 (offered each year)

FADR-504,505,506 Printmaking/Illustration
Registration #0406-504,505,506 Option (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 on sufficient demand)

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.

Lab 6, Credit 3 (offered each year)

School for American Craftsmen

FSCC-200 Ceramics Materials and
Registration #0409-200 Processes (Freshman Major)
Sequential course for three quarters stressing the design and wheel thrown fabrication of the basic pottery forms. Includes firing kilns, clay preparation and use, along with the history 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
Registration #0409-300 Processes (Sophomore Major)
Sequential course for three quarters that stresses problem solving with the use of ceramic processes. The emphasis will be on developing conceptual attitudes and a wide scope of creativity. The curriculum also includes clay 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 on sufficient demand)

FSCC-400 Ceramics Materials and
Registration #0409-400 Processes (Junior Major)
A sequential course for three quarters designed to incorporate the technical skills acquired in the freshman year along with the conceptual perspectives gained in the sophomore year. The purpose of this course is to develop a personal interpretation of the issues in functional pottery. The third quarter will be devoted to the planning, design, and execution of the Journeyman's piece.

Lab 15, Credit 5 (offered each year)

FSCC-500 Ceramics Techniques and Thesis
Registration #0409-500 (Senior Major)
Sequential course for three quarters focusing on thesis development of a body of work that reflects self expression, and a personal direction in clay. This research and thesis project will stress a high level of aesthetic content and skilled execution.

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 the nature of sign and symbol as visual metaphor paralleling legend, myth, folklore, and fairy tale as verbal metaphor; analysis of Freudian and Jungian theories about symbolic/metaphoric communication; and application of the theories to contemporary examples. The course is designed to help the artist, designer, and craftsperson produce more effective visual communication.

Class 3, Credit 3 (offered each year)

FSCF-350 Asian Art
Registration #0410-350
A study of the art of India, China, and Japan in the area of painting, printmaking, sculpture, architecture and the crafts with emphasis on their implications for contemporary artists, designers and craftsmen.

Class 3, Credit 3 (offered each year)

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

Class 3, Credit 3 (offered each year)

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

Class 3, Credit 3 (offered each year)

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

Class 3, Credit 3 (offered each year)

FSCF-566 Special Topics
Registration #0410-566
Consideration of special art historical themes, areas, and topics not covered in regular courses.

Class 3, Credit 3 (offered each year)

FSCG-200 Glass Materials and
Registration #0411-200 Processes (Freshman Major)
A basic survey course of the properties, techniques and technology of glass, plus an overview of glass history. Individuals are encouraged to participate in a variety of hot and cold glass techniques: blowing basic shapes, stemware, color applications, stained/leaded glass, lamination, polishing, sand casting, and slumping/fusing. Basic knowledge of technique lays the foundation for concept development.

Lab 15, Credit 5 (offered each year)

FSCG-251,252, 253 Glass Elective I
Registration #0411-251, 252,253
A survey course emphasizing furnace glassblowing and stained glass as a means of personal expression and appreciation. A portion of the course is a basic investigation of the history, chemistry, techniques and technical aspects of glass.

Lab 6, Credit 3 (offered each year)

FSCG-300 Glass Materials and
Registration #0411-300 Processes (Sophomore Major)
Techniques of stationary/multi-sectional mold blowing, color overlay, graphal, and latticino are examples of continued emphasis on blown glass. Neon bending, sealing and bombarding; gravity casting, pate-de-verre, engraving, fabrication and architectural stained glass are offered. In-depth history of glass and the decorative arts, plus practical chemistry of glass, batching and LEC will be learned.

Lab 15, Credit 5 (offered each year)

FSCG-351,352,353 Glass Elective II
Registration #0411-351,352,353
Prerequisite: Glass Elective 251, 252, or 253. This course provides an opportunity for more advanced work in both hot and cold glass. Emphasis is placed upon individual expression with glass and may involve slumping, casting, blowing, cutting, polishing or sculptural construction.

Lab 6, Credit 3 (offered on sufficient demand)

FSCG-400 Glass Materials and
Registration #0411-400 Processes (Junior Major)
Design projects from decorative arts companies are undertaken. Knowledge of glass studio design/construction, equipment and business practices is acquired. The journeyman's series piece is planned, designed and executed. Techniques of enameling, electroforming and advanced casting processes are investigated. The conceptualization process is further developed through spatial/environmental projects.

Lab 15, Credit 5 (offered each year)

FSCG-500 Glass Techniques and Thesis
Registration #0411-500 (Senior Major)
Based upon the three previous years of investigation, the senior-level glass student will present a proposal which will be offered as evidence of qualification for the baccalaureate degree. The senior will present a resume, portfolio and a research paper related to his/her exhibition at the end of the academic year.

Lab 24, Credit 8 (offered each year)

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 on sufficient demand)

FSCM-200 Metalcrafts Materials and
Registration #0412-200 Processes (Freshman Major)
Sequential course for three quarters, introducing basic exercises in the use of equipment and metalcrafts techniques through hollowware and jewelry design in various metals. Included will be the discussion of metal design utilizing the techniques of fabrication, forging, raising and basic gem setting.

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 in the area of either hollowware or jewelry.

Lab 6, Credit 3 (offered each year)

FSCM-300 Metalcrafts Materials and
Registration #0412-300 Processes (Sophomore Major)
Sequential course for three quarters, introducing gold work, repousse and chasing and moldmaking. Analysis of design and production problems relating to hollowware 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 hollowware or jewelry.

Lab **6,** Credit **3** (offered on sufficient demand)

FSCM-400 Metalcrafts Materials and
Registration #0412-400 Processes (Junior Major)
Sequential course for three quarters, introducing flatware, spinning and machine tool processes. Introduction to industrial manufacture and lapidary work.

Lab 15, Credit 5 (offered each year)

FSCM-500 Metalcrafts Techniques and
Registration #0412-500 Thesis (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
Registration #0413-200 Processes (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. Experiments 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
Registration #0413-300 Processes (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, 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 on sufficient demand)

FSCT-400 Textile Materials and
Registration #0413-400 Processes (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, papers, reports.

Lab 15, Credit 5 (offered each year)

FSCT-500 Textile Techniques and
Registration #0413-500 Thesis (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
Registration #0413-520 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)

FSCW-200 Woodworking Materials and
Registration #0414-200 Processes (Freshman Major)
Sequential course for three quarters, covering function and care of hand and machine woodworking tools. Wood as a material: history, kinds, qualities, sources. Fundamental techniques of wood fabrication, including basic joinery, turning, and finishing.

Lab 15, Credit 5 (offered each year)

FSCW-220 Woodworking Materials and
Registration #0414-220 Processes (Freshman AOS Major)
A sequential course for three quarters covering the fundamental techniques and aesthetics of woodworking. Topics covered include the care and use of hand and machine tools, wood as a material, its basic properties, basic joinery and fundamental techniques of wood fabrication, and finishing. The course includes a machine maintenance program.

Lab 18, Credit 5 (offered each year)

FSCW-231,232,233 Technical Drawing
Registration #0414-231,232,233 (AOS Major)
A sequential course for three quarters covering basic drafting technique as it is used for purposes of both design and presentation. Topics covered include lettering, use of instruments, dimensioning, basic layout techniques and formats, orthographic projection, sectioning, auxiliary views, axonometric drawing, perspective sketching and visualization, measured perspective and presentation techniques.

Lab 3, Credit 2 (offered each year)

FSCW-251,252,253 Wood Elective I
Registration #0414-251,252,253
An elementary course in design and techniques in woodworking. Hand and power tools will assist in the making of small scale wood objects.

Lab 6, Credit **3** (offered each year)

FSCW-300 Woodworking Materials and
Registration #0414-300 Processes (Sophomore Major)
Sequential course for three quarters, covering advanced design, layout and construction. Plywood construction, chairmaking and chest of drawers technique. Historical development of furniture; papers and reports.

Lab 15, Credit 5 (offered each year)

FSCW-320 Woodworking Materials and
Registration #0414-320 Processes (Sophomore AOS Major)
A sequential course for three quarters covering advanced topics of woodworking. This is an intensive studio course focusing on both aesthetic and technical problems. Topics include the use of man-made materials, drawer and solid wood carcase construction, issues related to production work and student initiation of specific interest projects. The course includes a machine maintenance program.

Lab 24, Credit 7 (offered each year)

FSCW-331,332,333 Furniture History
Registration #0414-331,332,333 (AOS Major)
A sequential course for three quarters covering a survey of the history of furniture from Egyptian times to the present. There is particular attention given to the social, functional, technological, and cultural background of furniture use and production. The lives, works and influence of known furniture designers and craftsmen will be emphasized. The course will include lectures, independent study, reports, and designing furniture based on historical models.

Lab 3, Credit 2 (offered each year)

FSCW-341,342,343 Wood Professional Practices
Registration #0414-341,342,343 (AOS Major)
A sequential course for three quarters covering topics associated with the profession of woodworking. These include employment options, portfolio, resume writing, business cards and stationery, marketing, customer relations, contracts and other legal issues, record keeping, banking, insurance, taxes, location and layout of a shop and electrical and machinery considerations. The course will include lectures, independent study, assigned studio visits, papers, reports, and guest speakers.

Lab 3, Credit 2 (offered each year)

FSCW-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 on sufficient demand)

FSCW-400 Woodworking Materials and
Registration #0414-400 Processes (Junior Major)
Sequential course for three quarters covering advanced concepts in furniture and woodworking, wood sculpture, and veneering. Emphasis will be placed on enlarging student's vocabulary of form.

Lab 15, Credit 5 (offered each year)

FSCW-500 Woodworking Techniques
Registration #0414-500 and Thesis (Senior Major)
Sequential course for three quarters, allowing each student, with approval of the instructors, to specialize in that branch of woodworking/furniture design that he/she intends to pursue following graduation. The thesis, culminating in the final quarter, consists of a body of work including at least one commissioned piece, and a complete business promotion package including a portfolio, resume and stationery.

Lab 24, Credit 8 (offered each year)

FSC(C, G, M, T, or W)-478 Professional Studio
Registration #0409,11,12,13,14-478 Internship
This internship is designed to give qualified students and professionals the opportunity to spend one or two quarters in the personal studio of a faculty member from the School for American Craftsmen in order to gain practical experience in the day-to day operation of a professional studio. Selection of applicants will be based on background, portfolios, and interviews.

40 hour week, Credit 8 (offered by special approvals)

College of Graphic Arts and Photography

School of Photographic Arts and Sciences

All courses in the School of Photographic Arts and Sciences are offered at least once annually, except as noted.

Fine Art Photography

PPHA-207 **Still Photography**
Registration #0921-207
In the first quarter students become familiar with the 35mm camera, processing and printing. The work is restricted to black-and-white photography. The aesthetics and basic understanding of photographic practice are covered. The second and third quarters deal with more advanced techniques and principles of photography. This series of courses is available for students who are not majoring in photography.

Class 1, Lab 6, Credit 3

PPHA-208 **Still Photography II**
Registration #0921-208
A basic studio course for the hobbyist or someone who occasionally uses photography in his or her work. Covers how to light and photograph 2-D work (copy) such as drawings, paintings, or old photographs; and how to light and photograph 3-D objects (inanimate) and people. Ideas of portraiture are discussed and explored in a natural (rather than commercial) manner, both of one person and then of two people. The idea of self-portrait also is discussed and explored. (PPHA-207 or a working knowledge of developing film and making enlargements)

Class 1, Lab 4, Studio 2, Credit 3

PPHA-209 **Still Photography III**
Registration #0921-209
A one-quarter course in which students determine their own theme, develop and shape it into picture book form with the use of some words. (PPHA-207 or a working knowledge of developing film and making enlargements; permission of instructor)

Class 1, Lab 6, Credit 3

PPHA-301,302,303 **History of Aesthetics of**
Registration #0921-301,302,303 **Photography**
Covering the history and aesthetics of photography from 1839 to the present, with special emphasis on the development of photographic seeing, and its related effect on other media. A survey of the numerous processes and how their development affected the image making of their particular period, i.e., daguerreotypes, collotypes, ambrotypes, etc. Student projects are designed to illuminate phases of photographic history best understood by personal visual exploration.

Class 3, Credit 3

PPHA-313 **Introduction to Fine Art**
Registration #0921-313 **Photography**
The meaning of fine art photography will be discussed and then explored by doing various fine art assignments which will lead the student to discover personal solutions to personal concerns. The faculty will provide surveys of fine art photographers, their work and the non-silver processes sometimes used. The class will be supplemented with field trips to museums, galleries, and artists' studios.

Class 2, Lab 8, Credit 4

PPHA-323 **Photo Media Survey**
Registration #0921-323
Students will experiment with image combinations and alterations such as collage, montage, hand coloring, xerox, hand-coated emulsions, etc. Lectures will introduce historical perspective on artists using these techniques and also will feature demonstrations of various imaging systems and their integration.

Class 1, Lab 4, Credit 3

PPHA-401,402,403 **Photography as a Fine Art I**
Registration #0921-401,402,403
The major emphasis is placed on the individual's learning to identify and articulate a personal response to his or her environment through the medium of photography. Students design their own projects and work under the guidance of the professor. Traditional silver, as well as non-silver, photography techniques may be utilized. (PPHA-313)

Class 3, Field trip 2

PPHA-411,412,413 **Contemporary Issues**
Registration #0921-411,412,413
An examination of many thought-provoking and/or controversial issues in photography from 1950 to the present through a series of lectures, readings and discussions. Topics to be covered include post-modernism, genderism, pornography, censorship, altered images, connoisseurship, and others. The course format allows review and exploration of such themes as the landscape, the nude, portraiture, conceptual art, trompel'oeil and so on. Students will prepare an oral debate or a written term paper.

Class 2, Credit 2

PPHA-460 **Photography for Printers**
Registration #0921-460
A workshop in black-and-white and color photography for non-photography majors. Technical and aesthetic information will be given to enhance non-vocational photographers' use of their equipment. Darkroom work will be limited to the black-and-white negative and print. Color work will emphasize improvement of camera techniques.

Class 2, Lab 4, Credit 4

PPHA-501,502,503 **Photography as a Fine Art II**
Registration #0921-501,502,503
Emphasis is placed on the student's setting of goals, selection of assignments and projects, and expansion of work on his or her own terms. Lectures and experiences are oriented to encourage awareness of shared concepts in the other arts, goals set by working artists, and the relevance of the history of the visual arts to the student's work. (PPHA-403)

Class 2, Lab 8, Credit 4

PPHA-506,507,508 Photo Media Workshop
Registration #0921-506,507,508
Photo Media Workshop emphasizes visual problem solving utilizing alternative photographic processes. The first quarter features work with emulsions on various surfaces; the second deals with visual books; and the third quarter covers generative systems including electrostatic, offset printing and other methods of altering images. The course is best when taken in order, but students may join in at any quarter.

Class 2, Lab 4, Credit 4

PPHA-521,522,523 Color Photography Workshop
Registration #0921-521,522,523
Emphasis is on the creative and aesthetic aspects of color photography and other color imaging systems. Students are provided with an opportunity to explore the variety of ways in which color photographs can be produced, reproduced, sequenced, displayed and preserved. A personal portfolio of work presented as color prints, color transparencies, a slide presentation, an exhibition or as an art book is required for each quarter. (Basic color course)

Class 2, Lab 4, Credit 4 (not offered every year)

PPHA-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 pictures are used in communications, establish what pictures are needed for specific projects, discover how they may be found (or produced), and make arrangements to obtain reproduction rights. A case history in picture researching and a personal picture researching project will be produced by each student. (Basic course in History of Photography or equivalent)

Class 2, Critique 2, Field Research 4, Credit 4

PPHA-535 Gallery Management
Registration #0921-535 Display
A basic, hands-on course in gallery operation to include gallery management and aesthetics. Course work is done with actual shows in the RIT photo gallery and other galleries where appropriate.

Class 2, Credit 1 (not offered every year)

PPHA-538 Photographic Careers
Registration #0921-538 Seminar
This seminar examines career options available to photography graduates. Students develop skills in resume preparation, interview practices and techniques, and personal goal setting. Students attend three special sessions offered by the Center for Cooperative Education and Career Services. (Third- and fourth-year with visual studies background)

Class **3,** Credit **3**

PPHA-551,552,553 Special Topics Workshop
Registration #0921-551,552,553
Topics of current or special interest designed to broaden and intensify the students' ability to use photography as a means of communication and expression.

Class 1-2, Lab 4-15, Credit 3-9

PPHA-560 Semiotics and Advertising
Registration #0921-560 Photography
An introductory course which emphasizes the application of selected semiotic principles to the practice of photography. Semiotics is the study of signs and symbols and what they signify.

Class 2, Lab **4,** Credit **4**

PPHA-599 Independent Study
Registration #0921-599
Learning experiences not provided by formal course structure may be obtained through use of an independent study contract.

Credit 1-9

Biomedical Photography

PPHB-201,202,203 Biomedical Photography I
Registration #0901-201,202,203
Basic photography course for biomedical photographers with emphasis on theory, craftsmanship and visual communication. Patient photography, close-up and other photography as a foundation for future biomedical photography.

Class **4,** Lab **4,** Studio **4,** Credit **6**

PPHB-211 Survey of Biomedical
Registration #0901-211 Photography
Career opportunities, typical biomedical photography settings, types of photography performed. Ethical, professional, and personal relationships with patients, physicians, research and staff personnel.

Class 1, Credit 1 (S only)

PPHB-301,302,303 Biomedical Photography II
Registration #0901-301,302,303
Further study and practice of theory and principles used in biomedical photography, including photomacrography, photomicrography, hospital photography techniques, infrared and ultraviolet radiation, biological field studies. (PPHB-203)

Class 2, Lab 10, Credit 5

PPHB-331,332,333 Preparation of Biomedical
Registration #0901-331,332,333 Visuals
Study of basic principles of effective visual communication and design. Student will produce slide presentations and exhibition displays as well as anatomical demonstrations using cell animation techniques. (PPHB-203)

Lecture 2, Lab 2, Credit 3

PPHB-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; basic color course)

Class 2, Lab 6, Credit 4

PPHB-404 **Microcomputer Applications**
Registration #0901-404 **in Biocommunications**
This course is designed to introduce the student to numerous current microcomputer applications in biocommunications including elementary programming, computer graphics, spread sheet formats, word processing, inventory control, hardcopy methods, and modem systems. The course introduces these applications by using a wide variety of microcomputer exercises. The course is taught each Fall, Winter, and Spring quarter, enabling every Biomed Photographic Communications student to enroll.

Class 4, Credit 4

PPHB-415 **AV Production for Biomedical**
Registration #0901-415 **Communications**
Design, creation, and presentation of 35mm slide and 35mm slide plus 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)

Credit 4

PPHB-421 **Scanning Photomacrography**
Registration #0901-421
Scanning photomacrography is a technique that provides a universal depth of field in photomacrograph while producing an isometric projection at the same time. A thin sheet of light is projected onto a three-dimensional subject at a right angle to the optical axis of the camera lens within the depth of field to be photographed. The subject is then precisely moved along this optical axis while the camera shutter is open. Out-of-focus areas remain in darkness and are not recorded during the time the illuminated strip is exposed. Students will learn the principles and applications of this technique, producing images of exceptional clarity in black and white as well as color. The precise and often unique disciplines required to make these images prepare the students for other scientific photographic tasks as well as fulfill an existing need for scanning photomacrographs in the biological sciences, (PPHB-301, 302; PPHB-331, 332; PPHB-401)

Class 1, Credit 4

PPHB-425 **Producing Audiovisual**
Registration #0901-425 **Presentations I**
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; syncronization and presentation preparation. Project required. (Photography skills required; for nonmajors)

Credit 4

PPHB-501,502,503 **Photo Concentration**
Registration #0901-501,502,503
Investigating, planning, organizing and producing an audiovisual presentation, a learning package or an informational program for a biomedical communications client. (Completion of biomedical photographic communications A AS degree requirements; at least one upper-division photo elective in media; permission of the instructor)

Class 3, Lab 3, Credit 4 (W)

PPHB-551,552,553 **Special Topics in**
Registration #0901-551,552,553 **Photography**
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper-level students.

Credit variable

PPHB-599 **Independent Study**
Registration #0901-599
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.

Credit variable

Film/Video

PPHF-201 **Film Production I**
Registration #0902-201
A fundamental course in film production. Filmmaking as a means of interpretation and expression. A combined theoretical/practical approach to media continuity. Production will be in Super 8 (non-sync) format. Students furnish film, tape and processing. Equipment is furnished by the department.

Class 3, Lab 4, Credit 5

PPHF-202 **Film Production II**
Registration #0902-202
A fundamental course in narrative film production. Filmmaking as a means of interpretation and expression with emphasis on the narrative. A combined theoretical/practical approach to the film medium. Production will be in super 8 (non-sync) format. Students furnish film, tape and processing. Equipment is furnished by the department.

Class 3, Lab 4, Credit 5

PPHF-204,205,206 **History and Aesthetics of the**
Registration #0902-204,205,206 **Moving Image**
A non-scholarly exploration of the history and aesthetics of film. Emphasis is on determining the unique characteristics of the medium, how those characteristics are used as a means of interpretation and expression, and their relevance to other kinds of non-verbal image making. (Must be at least a second-year student)

Class 3, Credit 3

PPHF-207 **Introduction to Portable**
Registration #0902-207 **Video I**
A basic course for novices. Emphasis is on videotaping and the use of the medium as an interpretive and expressive medium. A combined theoretical/practical approach to the dynamics of the medium.

Two short video projects are required. 1/2" beta equipment, including editing facilities, is provided by RIT. Students must purchase a minimum of two 60-minute, 1/2" video cassettes.

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

PPHF-208 **Introduction to Portable**
Registration #0902-208 **Video II**
In this course the student applies the basic video skills acquired in PPHF-207 to the design and realization of mature narrative imagery. Progress is supervised by the instructor through regular screenings and conferences with the student. (PPHF-207)

Class 3, Lab 3, Credit 4 (W)

PPHF-210 **Materials and Processes of**
Registration #0902-210 **the Moving Image I**
This course is primarily designed to familiarize students with the basic technical concepts of filmmaking. By taking this course, students should gain an understanding of the technical procedures required to commit an image to the medium of film in a professional manner.

Lec. 1, Demo. 2, Credit 2 (F)

PPHF-220 **Creative Processes I**
Registration #0902-220
An examination of the various creative approaches necessary to bring an initial idea to the screen. There is an emphasis on appreciating the differences of individual creativity. The course exposes the student to various methods of organizing and articulating approaches to the creative problems of film making.

Class 2, Credit 2

PPHF-221 **Creative Processes II**
Registration #0902-221
A discipline specific follow-up to the more general theories of PPHF-220. The course varies in its approach from year to year, i.e., one year it may take the whole quarter to study one film. (PPHF-220)

Class 2, Credit 2

PPHF-250 **Introduction to Film**
Registration #0902-250 **(for non-majors)**
A fundamental course in film production for non-film majors. Filmmaking as a means of interpretation and expression. A combined theoretical/practical approach to media continuity. Production will be in Super 8 (non-sync) format. Students furnish film, tape, and processing. Equipment is furnished by the department.

Class 2, Lab 4, Credit 4

PPHF-298 **Motion Picture Workshop I**
Registration #0902-298
Moving image production as a means of interpretation and expression. A combined theoretical/practical approach to the dynamics of the moving image medium. The student is expected to demonstrate technical and theoretical knowledge of the structuring of the moving image through a series of film assignments. Production will be in super 8 (non-sync) format. Students furnish film and processing; equipment is furnished by the department. (Basic photography course or equivalent experience)

Class 9-4 p.m., Credit 9 (SR)

PPHF-299 **Motion Picture Workshop II**
Registration #0902-299
Filmmaking as a means of expression, clarification and intensification, with emphasis on the non-fictional narrative and dramatic fiction film (not excluding the conceptual film form). Application of structural and organizational factors involving purpose, content, style, elements, principles, techniques and technology 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 filmmaking process through a series of film assignments and examinations. Production will be in super 8 (non-sync) format. Students furnish film and processing; equipment is furnished by the department. (PPHF-411 or equivalent)

Class 9-4 p.m., Credit 9

PPHF-310 **Materials and Processes of**
Registration #0902-310 **the Moving Image II**
A technical survey of the tools and materials used in video production. (PPHF-210, PPHF-202)

Lec. 2, Credit 2 (F)

PPHF-311 **Portable Video Production**
Registration #0902-311
An examination of the practical, technical and aesthetic considerations of portable video production. Work involves single system 3/4" shooting and editing. Skills are developed in visual continuity, storyboarding, graphics, camera work, lighting, sound and off-line insert editing. Viewings and discussion of student work, application workshops, outside readings and viewings supplement lecture presentation and production work. (PPHF-**202, 208)**

Class 2, Lab 4, Credit 4 (F)

PPHF-312 **Documentary and**
Registration #0902-312 **Multi-Camera Video**
In addition to continuing the documentary work of the first quarter, lab meetings will introduce and develop real-time television skills. This includes the scripting, staging and directing of a multi-camera unedited production. Lectures include broadcast history, ratings, cable and satellite television along with additional viewings and discussions of documentary work. Each student will produce a studio interview show as well as a "mini-documentary." (PPHF-311)

Class 2, Lab 4, Credit 4 (W)

PPHF-321 **Writing for Film**
Registration #0902-321 **and Video I**
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 (W)

PPHF-322 **Writing for Film**
Registration #0902-322 **and Video II**
Continuation of PPHF-321. (PPHF-321 or consent of instructor)

Class 2, Lab 3, Credit 3 (S)

PPHF-324 **Introduction to Animation and**
Registration #0902-324 **Graphic Film Production I**
An introduction to the techniques and practices of graphic and animated film production. This course provides training and practical experience in a wide variety of approaches to single frame motion picture production. Students produce a number of short film exercises utilizing both existing and original artwork. Some techniques covered in the course are: direct modification of the film surface, cell, ink, and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is required. No prerequisites.

Class 3, Lab 2, Credit 4 (F)

PPHF-325 Introduction to Animation and
Registration #0902-325 Graphic Film Production II
A continued introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a number of approaches to single frame filmmaking in addition to those covered in PPHF-324.-Some techniques covered in the course are: three-dimensional animation; optical printing; computer animation; and hand-drawn sound. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is **not** required. (PPHF-324)

Class 3, Lab 2, Credit 4 (W)

PPHF-326 Animation and Graphic Film
Registration #0902-326 Production
This course provides practice in all phases of single frame film production. Students produce a 16mm 60-second film with sound utilizing one or more techniques learned in the preceding two quarters. (PPHF-325)

Class 3, Lab 2, Credit 4 (S)

PPHF-350 Directing the Actor
Registration #0902-350 for Film and Video
A course in basic directorial techniques with emphasis on the special problems peculiar to film and video production. Class meetings are organized around the presentation of scenes prepared by student directors.

Studio 4, Class 1, Credit 3

PPHF-404 Senior Project Seminar
Registration #0902-404
A required course for third-year film/video majors and the prerequisite for PPHF-541, Senior Project. Students will discuss and generate a written plan for their senior film and/or video projects and will select an advisor from among the film/video faculty. (PPHF-412)

Class 1, Credit 1 (S)

PPHF-405 Advanced Video
Registration #0902-405
A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing and store, computer imaging and animation are some of the topics covered. (PPHF-313, PPHF-310)

Class 3, Credit 3

PPHF-410 Materials and Processes of
Registration #0902-410 the Moving Image III
The course introduces the student to 16mm film technology and production systems that apply to other media production as well. (PPHF-202, 310)

Class 1, Lab 2, Credit 2(F)

PPHF-411 Introduction to 16mm
Registration #0902-411 Film Production
An introduction to all aspects of professional film production. Students produce short projects while learning basic shooting and editorial procedures and equipment handling and maintenance.

Class 3, Lab 4, Credit 5

PPHF-412 16mm Film Production I
Registration #0902-412
An advanced class in filmmaking. Students plan and shoot a 16mm film project to be edited and completed during the spring quarter, PPHF-413. (PPHF-411)

Class 3, Lab 4, Credit 5

PPHF-413 16mm Film Production II
Registration #0902-413
Students edit, mix sound and complete the 16mm project begun in PPHF-412. (PPHF-412)

Class 3, Lab 4, Credit 5

PPHF-420 Sound Recording
Registration #0902-420
Specialized information and work in sound to give information and lab work beyond the regular course and to encourage the beginning of vocational level work in sound. Each student prepares a mixed sound track to professional quality standards.

Lec. 1, Lab 2, Credit 3 (F)

PPHF-427 Microcomputer Animation I
Registration #0902-427
This course provides an introduction to animation created through the use of a digital computer, rather than with traditional motion picture techniques. A survey of various computer animation hardware/software combinations precedes actual production of animated sequences, both with and without sound, which are then recorded on computer disk, motion picture film, or video. (PPHF-324)

Class 2, Lab 4, Credit 4 (W)

PPHF-428 Microcomputer Animation II
Registration #0902-428
This course provides practice in microcomputer animation. Students produce a finished animated project on film or videotape with sound. Emphasis is placed upon various post-production strategies which involve such techniques as combining computer animation with live action, the addition of film and video special effects, and combining computer animation with existing film or video imagery. (PPHF-427)

Class 2, Lab 4, Credit 4 (S)

PPHF-430 Advanced Sound Recording
Registration #0902-430
Continuing the work in PPHF-420 to include the decision level in the employment of various sound equipment and including more complex work in multi-track recording and mixing. (PPHF-420 or permission of instructor)

Class 2, Lab 2, Credit 3

PPHF-434 Advanced Video
Registration #0902-434

A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing and store, computer imaging and animation are some of the topics covered. (PPHF-202, 310)

Class 3, Credit 3

PPHF-442 Film/Video Internship
Registration #0902-442
This course is designed to provide the students with on-the-job experience in the field of film/video. The student will seek and acquire a school-approved internship position in a business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the internship coordinator will assist the student in evaluating the experience. The coordinator should be the faculty member most familiar with the student's internship field. (Permission of internship coordinator)

Credits 1-6/Qtr. (F, W, S)

PPHF-S41 Senior Production I
Registration #0902-541 (Film/Video)
Continuation of the introduction to business and legal factors begun in the basic film and video production activities. The course assists the student in detailed budgeting and shooting, script preparation and breakdown. Final project shooting begins this quarter. (PPHF-413)

Class 1, Lab 6, Credit 6(F)

PPHF-542 Senior Production II
Registration #0902-542 (Film/Video)
Continuing the senior project shooting phase to completion. Production teams meet as sections with faculty whose experience matches the kind of production involved. (PPHF-541)

Class 1, Lab 6, Credit 6 (W)

PPHF-543 Post Production
Registration #0902-543 (Film/Video)
Completion of senior projects. Includes a review of post-production techniques. (PPHF-542)

Class 1, Lab 6, Credit 4 (S)

PPHF-551,552,553 Special Topics in
Registration #0902-551,552,553 Film/Video
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper-level students.

Credit variable

PPHF-599 ' Independent Study
Registration #0902-599
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA or 3.0 or greater.

Credit variable (F, W, S)

General Photography

PPHG-200 Photography I
Registration #0903-200 (Summer transfer)
An intensive 10-week summer course for students entering the transfer programs in Professional Photographic Illustration and Imaging and Photographic Technology. This is the minimum photographic education needed to gain entry to second-year standing and replaces PPHL- and PPHT-201, 202, 203. Since this course is such an intensive offering, some previous photographic experience is highly advisable.

Class 10, Lab 20, Credit 12

PPHG-290 Introductory Photographic
Registration #0903-290 Workshop
A basic credit course in photographic techniques designed for the college student. The course will be directed to meet the needs of a variety of students: the industrial or business student desiring accurate visual records, the art and design student, as well as the hobbyist. Units of work to be covered include basic camera handling; 35mm and roll film processing; projection printing and controls; contact proofs; photographic lighting elements and techniques of successful photographs; and best methods of using black-and-white and color films. Field trips for developing outdoor techniques will be offered. Students will be expected to furnish their own supplies and cameras.

Credit 6

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

PPHL-205,206 Creative Problems
Registration #0904-205,206
This course is designed to make students aware of their own creative problem solving potential. Emphasis is placed on students' personal environments, enthusiasms and experiences. Attention is given to individual thinking and seeing. This will be accomplished through lectures and individual group assignments.

Class 3, Credit 3

PPHL-207 Introduction to Color
Registration #0904-207
A one-quarter course introducing color as a new element in making photographs. The course will offer a theoretical, technical and aesthetic foundation in color photography. The student will gain familiarity with the materials through shooting assignments. Emphasis will be placed on developing printing skills.

Class 2, Lab 4, Credit 3

PPHL-300 Photography II, BFA Transfer
Registration #0904-300
A concentrated 10-week summer course for students entering the transfer program in photographic illustration. Students must have had previous photography, design and an AAS degree (or its equivalent) from another institution. All selections will be verified by portfolio. This course is designed for exclusive admission to the complete third/fourth-year BFA program.

Credit 15 (SR)

PPHL-311,312,313 Applied Photography II
Registration #0904-311,312,313
Advanced applied photography in black-and-white and color with emphasis on craftsmanship, problem solving, and visual communications. Major technical emphasis and introduction to studio electronic flash and large format photography. Further emphasis is placed on the development of the student's ability to apply creative thinking and contemporary techniques in executing meaningful and effective photographs. (PPHL-203)

Class 4, Studio 5, Credit 5

PPHL-31S **Colloquia**
Registration #0904-315
A lecture/presentation offering the specific interests and passions of the faculty. The range is academically wide and varied. (Second-year status)

Class 1, Credit 1 (W)

PPHL-340 **Narrative/Documentary**
Registration #0904-340 **Editorial Workshop**
A major course in photojournalism and editorial photography. Emphasis will be placed on the development of intuitive photographic responses.

The objective of this five-week workshop will be to orient as well as challenge the students to photographically explore the nature of their subject matter and to visually communicate in a contemporary editorial spirit those responses and feelings to daily and weekly assigned projects that will be made in color slides and black-and-white prints.

A majority of these projects will be photographed on location throughout western New York and perhaps other not so distant environments including NYC. The educational direction of the workshop will be to visually explore photographic attitudes in approaching and solving photographic/photojournalism problems. The historic and aesthetic nature of photojournalism through documentation, recording, and personal responses will be applied as well as discussions through slide presentation and lecture on the nature of editorial magazines in the United States, Europe, and South America.

Critiques will be held after each project is edited and presented, enabling the student to obtain direct feedback from his peers and the instructor. The eagerness to learn, work hard, explore, and care is very important.

Students will be expected to furnish their own 35mm cameras and supplies. Several publications may be used.

This course may be used by BFA photo students for major credit. Limit 12 students.

Credit 8 (SR)

PPHL-416,417,418 **Photojournalism I**
Registration #0904-416,417,418
This course will explore the use of the photographic image in narrative, documentary and editorial form. The emphasis of the course will allow the students a variety of experiences. There will be emphasis on publication and public need. (PPHL-313)

Class 4, Field 5, Credit 5

PPHL-434 **Advertising Illustration**
Registration #0904-434
A course built strictly to the standards of professional photography. Only those students who seriously aspire to be professional craftspeople should enroll. The assignments are specific and vary from strictly commercial to advertising illustration. In addition, the student is encouraged to specialize in the direction of his or her own natural ability and interests. Approximately 2/3 of the photography will be in color. (PPHL-443)

Lec. 1, Critique 2, Studio 6, Credit 4 (F)

PPHL-437,438,439 **Visual Communications**
Registration #0904-437,438,439 **Workshop**
Primarily a photographic course; however, emphasis is placed on experimental approaches to communications. Visual and psychological purposes of media will be explored. This course presupposes a basic background in design, as well as in photography.

Class 2, Lab 8,* Credit 4

*Lab hours may not be scheduled and are to be completed in available time.

PPHL-441,442,443 **Advertising Photography I**
Registration #0904-441,442,443
A course in visual problem solving with photography. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. (PPHL-313)

Class 4, Studio 5, Credit 5

PPHL-451,452 **Portrait Photography I & II**
Registration #0904-451,452
The lecture period is devoted to discussion of the current portrait project and its problems, to lighting demonstrations, posing and draping models, composition and make-up. Basic, advanced, contemporary lighting is stressed, with a special emphasis on more advanced repeatable lighting techniques. Professional quality portraits are analyzed for lighting and finishing, as well as composition. Students are encouraged to orally analyze their own work and their shortcomings.

The studio period allows students the opportunity to work on projects under the supervision of the instructor. Students also are encouraged to create something beyond the basic project and to choose the proper models for the project. Students are taught to "see the lightings," and are permitted to use either mazda or speed lighting. These "lightings" are very adaptable to commercial, illustration, and fashion photography. Professional quality is required throughout the course. Work of inferior quality will not be accepted. (PPHL-313 or equivalent)

Class 3, Studio 2, Credit 4 (F, W)

PPHL-453 **Advanced Portrait**
Registration #0904-453 **Photography**
This course brings together the skills of the first two terms and encourages the student to develop a personal approach to portrait photography through a term-long, self-directed project. (PPHL-452 or equivalent)

Lec. 2, Studio 4, Credit 4 (S only)

PPHL-455 **Studio Photo/Still Life**
Registration #0904-455
A summer session course in visual problem solving with photography, emphasizing still-life techniques. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. Students may enroll in this course and PPHL-456 together, as an alternative for PPHL-441, 442, 443 (with department chairperson's approval; note that this is two credits less than PPHL-441, 442, 443) or take one or both sessions as photo electives. (PPHL-313 or equivalent)

Credit 7 (SR)

PPHL-456 **Studio Photo/People**
Registration #0904-456
A summer session course in visual problem solving with photography, emphasizing people in the studio. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. Students may enroll in this course and PPHL-455 together, as an alternative to PPHL-441, 442, 443 (with department chairperson's approval; note that this is two credits less than PPHL-441, 442, 443) or take one or both sessions as photo electives. (PPHL-313 or equivalent)

Credit 7 (SR)

PPHL-461 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.

Class 2, Lab 2, Credit 4

PPHL-462 The Personal Document
Registration #0904-462
A combination studio and location class that introduces the student to the concepts of using personal experience and lifestyle as information and inspiration towards image making and taking. A variety of issues will be dealt with such as public and personal events, cultural, social, personal and intercultural symbols. The course will cover the written word and its effect and influence on the photograph, and advanced black-and-white printing. Layout and presentation, and their effect on the audience the work is designed to serve will be included. (PPHL-313, or permission of instructor)

Credit 7 (SR)

PPHL-465 On Location Photo
Registration #0904-465
This course will cover the techniques and equipment necessary to complete an "on location" assignment for a corporate report, brochure, or audiovisual presentation. Students will be encouraged to meet professional standards while developing a strong personal point of view. (PPHL-313 or equivalent)

Credit 6 (SR)

PPHL-470 Environmental Portraiture
Registration #0904-470
A course involving the selection of various persons as subjects and learning of their skills and specialties. The student will interview subjects, define what they do and where they do it, and design a photograph that shows the viewer the subject's job or avocation and the environment in which the subject operates.

Class 1, Critique 2, Studio/Location 4

PPHL-516,517,518 Photojournalism II
Registration #0904-516,517,518
This course will explore and expand the use of the photographic image in the narrative/documentary and editorial point of view. Emphasis will be upon publication and professional use of the image. (PPHL-418)

Class 4, Field 5, Credit 5

PPHL-535,536 Advanced Color Seminar
Registration #0904-535,536
This is a portfolio preparation course. It concentrates on the shooting, structure, and presentation of a body of work. Completion of a four-part thematic assignment and three individual photographic assignments are required. All assignments are non-specific in nature, allowing the student the freedom of his or her own direction. As part of the course requirements, each student will choose an appropriate portfolio format and will begin to show a portfolio. (Fourth-year standing or instructor's permission; PPHL-443,418 or instructor's permission)

Class 3, Studio 4, Credit 4 (W, S)

PPHL-541,542,543 Advertising Photography II
Registration #0904-541,542,543
A course that brings together the artistic and technical input of the first three years of the program and directs the student towards the application of the acquired skills through a series of professionally oriented assignments. (PPHL-443 or equivalent)

Class 4, Studio 5, Credit 5

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 Illustration 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 GPA of 3.0 or greater.

Class, Credit variable

Photographic Processing and Finishing Management

PPHM-204 Orientation to Production
Registration #0905-204 Photographic Finishing Management
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. (Freshman standing in the Photographic Processing and Finishing Management Program)

Class 1, Lab 3, Credit 1 (F only)

PPHM-300 Production Processing and
Registration #0905-300 Finishing
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 (SR)

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. (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. (PPHT-213)

Class 2, Lab 8, Credit 4

PPHM-303 **Custom and Professional**
Registration #0905-303 **Finishing**
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. (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.

Class 2, Lab 2, Credit 2 (S)

PPHM-315 **Electricity and Electronics I**
Registration #0905-315
Circuits using d.c. sources are analyzed. Components stressed are the inductor, capacitor, diode, transistor, relays, and solenoids.

Class 3, Lab 3, Credit 4

PPHM-316 **Electricity and Electronics II**
Registration #0905-316
Circuits using a.c. sources and used in printers are analyzed. Components stressed are the transformer, SCR and motors. (PPHM-315)

Class 3, Lab 3, Credit 4

PPHM-317 **Electricity and Electronics III**
Registration #0905-317
Continuation of PPHM-316. Circuits of other photofinishing equipment are analyzed. Additional topics include operational amplifiers, logic circuits and an introduction to computers. (PPHM-316)

Class 3, Lab 3, Credit 4

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.

Class 4, Credit 4 (W, S)

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

PPHM-410,411,412 **Training and Supervision of**
Registration #0905-410, **Photographic Processing and**
411,412 **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 and permission of instructor)

Class 2, Lab 8, Credit **4**

PPHM-418 **Color TVansparency Processing**
Registration #0905-418 **Techniques**
The fundamentals of slide duping, internegatives from slides and reversal processing for small laboratories are addressed in this course. The emphasis is on establishing a quality control system including densitometry, chem mix, control charts, chemical control, use of quality control computers and the operation of several types of processing equipment.

Credit 4

PPHM-420 **Applied Statistical Quality**
Registration #0905-420 **Control**
The basic concepts of quality control and the role of applied statistics are addressed using examples from the photographic and graphic arts industries. Examples will include the use of such statistical tools as process capability studies, conformance to specification analysis, control charts, attitude and acceptance sampling plans as well as the use of nonparametric techniques for the subjective evaluation of image quality. Although many of the topics covered are statistically based, attention is given to the ingredients necessary for a successful company-wide quality control program.

Class 2, Lab 2, Credit 3

PPHM-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 text editing and processing.

Class 2, Lab 2, Credit 3

PPHM-501,502,503 **Senior Seminar in Production**
Registration #0905-501,502,503 **Processing 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) Students will register each quarter, but credit will be assigned only in spring quarter.

Class three times a quarter for three quarters, Credit 1

PPHM-506 **Theory of Corrective**
Registration #0905-506 **Color Printing**
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 equipment. (PPHM-303)

Class 2, Credit 2 (S)

PPHM-510 **Finishing Lab Operations**
Registration #0905-510 **Management**
This course is designed to provide Photographic Processing and Finishing Management students with the background knowledge that 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 that lead to efficient operation. Cost analysis of a laboratory operation will be presented, and optimization techniques for cost reduction and scheduling will be discussed. (PPHM-303)

Class 4, Credit 4

PPHM-511,512,513 **Advanced Production**
Registration #0905-511, 512,513 **Processing and Finishing**
This course, taken during the last year of study, provides 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

PPHM-520 **Operation, Care and Maintenance**
Registration #0905-520 **of Photofinishing Equipment**
This course will provide students with an opportunity to gain a thorough understanding of the mechanical, optical, and electrical aspects of major pieces of photofinishing equipment. The course will employ the latest techniques in programmed learning, demonstrations, "hands-on" experience and lectures so that students will be able to operate and perform basic care and maintenance on major pieces of processing and finishing equipment. Broad principles learned here will be applicable over a wide range of equipment. (PPHM-412)

5 full days at Kodak Marketing Education Center, Credit 1

PPHM-551, 552,553 **Special Topics in**
Registration #0905-551, **Photographic Processing and**
552,553 **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. 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 GPA of 3.0 or greater.

Credit variable

Imaging and Photographic Technology

PPHT-201,202,203 **Photography I**
Registration #0920-201,202,203
A study of the fundamentals of photography with emphasis on the development of the needed creativity, craftsmanship, theory and visual communications to undertake advanced study in the medium. The theory and technical aspects are taught as they relate to solving photographic problems.

Class 4, Studio 4, Lab 4, Credit 7

PPHT-210 **Materials and Processes**
Registration #0920-210 **of Photography**
An intensive 10-week summer course for students entering a transfer program in Biomedical Photographic Communications or Imaging and Photographic Technology. This course replaces PPHT-211, 212, 213. (Either this course or the PPHT-211, 212, 213 sequence is also a requirement in the Professional Photographic Illustration Program.)

Class 9, Credit 6 (SR)

PPHT-211,212, 213 **Materials and Processes**
Registration #0920-211,212,213 **of Photography**
Basic study of the technology of photography, with the emphasis on applications to real photographic problems. Among the topics studied are image formation and evaluation, photosensitive materials, exposure, processing, tone reproduction, visual perception, color theory, variability, quality control, and photographic effects. An independent study project is required.

Class 3, Credit 3

PPHT-220,221 **Survey of Imaging and**
Registration #0920-220,221 **Photographic Technology**
This course is designed to provide students with information concerning career opportunities within the field of imaging and photographic technology and subdivisions of specialization, and includes presentations by experienced professionals representing a variety of positions.

Class 1, Credit 1

PPHT-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 and oral reports. (PPHT-213)

Class 2, Lab 3, Credit 3

PPHT-302 **Technical Photographic**
Registration #0920-302 **Chemistry**
The basic chemistry of black-and-white and selected color processes is presented. Developer, short stop, fixation, bleaching and reversal are investigated. Student-designed investigations are carried out. Technical notebook and report preparation are required.

Class 2, Lab 3, Credit 3

PPHT-303 Photographic Optics
Registration #0920-303
The principles of geometrical optics as applied to image formation, lens types, lens aberrations, lens testing, and optical instruments, including the human eye, and radiometric applications to optical systems. (SMAM-204, SPSP-211, 212, 271,272)

Class 2, Lab 3, Credit 3

PPHT-305 Portrait Retouching
Registration #0920-305
The study and application of different techniques, materials and processes used in portrait retouching of negatives and prints. Projects making use of these techniques, materials and processes will be required.

Class 2, Lab 4, Credit 3

PPHT-306 Commercial Retouching
Registration #0920-306
The study and application of the techniques, materials and processes used in commercial retouching. Projects making use of these techniques, materials and processes will be required.

Class 1, Lab 4, Credit 3

PPHT-307 Basic Airbrushing
Registration #0920-307
Study of the different types of airbrushes and their uses. A series of lessons will develop skill in the handling of the airbrush and an understanding of when and how the airbrush is used to retouch photographs.

Class 1, Lab 4, Credit 3

PPHT-311 Color Photography/Photographic 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
This course provides an introduction to color theory and the exploration of color processes utilizing practical laboratory procedures and photographic color reproduction processes. This will support lectures and readings on applied color theory relating to both color photography and its applications. Important topics, in addition to color materials and processes, include color vision, psychological aspects of color, color terminology, and color measurement and specification.

Class 2, Lab 4, Credit 4

PPHT-313 Color Measurement
Registration #0920-313
Equipment and methods used for the measurement of color will be discussed and demonstrated in the laboratory. Topics covered include light sources, radiometry, spectrophotometry, color order systems, and reproduction of color. Pascal programming will be presented and programming assignments will be required. (PPHT-321 or equivalent)

Class 2, Lab 4, Credit 4

PPHT-321 Applied Computing for
Registration #0920-321 Technical Photography
Current time-sharing 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. (Limited to Imaging and Photographic Technology students or by the permission of the instructor)

Class 2, Credit 3

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 on the student's development of innovative solutions to a set of photographic problems. Topics to include such subjects as high speed photography, strip photography, velocity and time measurement cameras, polarization, time lapse, astrophotography and others. First hand experience is encouraged by participation in simulated and simplified approaches to more complex specialties.

Class 2, Credit 4

PPHT-341 Introduction to Photography
Registration #0920-341 for Publications
An introduction to the use of photography in specialized publications in science, industry, business and education. Skill-building assignments to improve competence and an introduction to the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHL-313, PPHT-312 or the permission of the instructor)

Class 2, Lab 4, Credit 4

PPHT-401,402,403 Photoinstrumentation
Registration #0920-401,402,403 Applications Seminar
The student will be exposed to a variety of technical, industrial and/or applied photographic experiences in order to gain a fuller understanding of the scope of photography and its applications. Simplified approaches to photographic instrumentation applications are emphasized. Photographic topics are discussed that emphasize scientific and technical applications where photography functions as a tool of measurement and visualization of events that are beyond the range of normal photographic equipment.

Class 1 1/2, Lab 4, Credit 4

PPHT-404,405,406 Seminar in Photography for
Registration #0920-404,405,406 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 to the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHL-313, PPHT-312 or permission of the instructor)

Class 2, Lab 4, Credit 4

PPHT-410 Architectural Photography
Registration #0920-410
An image-making course for advanced students with a specific interest in interior and exterior architectural photography. Assignments are designed to emphasize the development and exploration of professional attitudes and techniques while providing a comprehensive study of the subject. All required work will be on color transparency materials. (PPHL-313, PPHT-312 or permission of the instructor)

Class 3, Credit 9 (SR only)

PPHT-411 **Preparation of Visuals**
Registration #0920-411
Study of the basic 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. (PPHT-203 or equivalent)

Class 2, Lab 2, Credit 3

PPHT-412 **Photomacrography/**
Registration #0920-412 **Photomicrography**
Basic principles of photomacrography and photomicrography with major emphasis on illumination techniques and image formation, with lectures, demonstrations, and projects. (PPHT-303)

Class 2, Lab 4, Credit 3

PPHT-421 **Holography I**
Registration #0920-421
This course is intended to be an introduction to holography theory and techniques. Lectures and demonstrations will cover the materials, processes, and applications of the fundamental types of holograms. Labs will give hands-on experience with the construction and playback of transmission, reflection, and focused image hologram types. (Algebra and physics)

Class 2, Lab 4, Credit 4

PPHT-422 **Applications of Holography**
Registration #0920-422
This course is designed to give the student a range of experiences in the production and evaluation of holograms as applied to scientific and engineering problems. Instruction is given in both the theoretical and practical aspects of holographic interferometry and nondestructive testing as well as holographic optical elements, computer-generated holography and coherent optical processing. The student is expected to have previous experience in basic display holography.

Credit 4

PPHT-42S, 426,427 **Nature Photography**
Registration #0920-425,426,427
Students will learn the fundamentals of professional nature photography as exhibited by such magazines as *Audubon* and *National Wildlife.* Topics include selection and care of equipment, use of strobes, adapting to adverse weather conditions, sales of photographs, copyright law, free lance, and more. Students will be required to spend a minimum of several hours per week shooting in natural environments. (PPHT-203 or permission of instructor)

Class 4, Field 4, Credit 4

PPHT-441 **Introduction to Dye Transfer**
Registration #0920-441
An introduction to the dye transfer process using pan matrix film with emphasis on the understanding of its theoretical principles, and on the mastery of basic transfer techniques. This includes the preparation of transfer prints from the student's color negatives. (PPHT-312 or equivalent)

Class 1, Lab 6, Credit 4

PPHT-442 **Advanced Dye Transfer I**
Registration #0920-442
A continuation of the dye transfer process with emphasis on the understanding and mastery of masking and color separation (analysis) of a color transparency. The synthesis is accomplished by the making of a dye transfer print. (PPHT-441, PPHT-312 or equivalent)

Class 1, Lab 6, Credit 4

PPHT-443 **Advanced Dye IVansfer II**
Registration #0920-443
This quarter of the dye transfer program is devoted to the variations of standard techniques and further extension of improvement of procedures. Difficulty of procedure will determine number of assignments required. (PPHT-442 or equivalent)

Class 1, Lab 6, Credit 4

PPHT-444 **Reversal Color Printing**
Registration #0920-444
A one-quarter course on reversal color printing procedures, printing and processing. The student will gain proficiency in using reversal print material. (PPHT-312 or permission of the instructor)

Class 1, Lab 4, Credit 3

PPHT-446,447,448 **Advanced Color**
Registration #0920-446,447,448 **Printing I, II, III**
This course provides advanced study in color techniques and theory in relation to quality and creative use of photographic materials. The student may choose a section for intensive study such as the dye transfer process, quality control methods in printing and processing and special masking. (PPHT-312 or equivalent and permission of the instructor)

Lecture 1, Lab 6, Credit 4

PPHT-450 **Photographic Scanning Systems**
Registration #0920-450
The student will receive instruction and make photographs related to the ever-increasing application of scanning imaging systems in industry, especially as these relate to industrial, scientific, and technical applications. Simplified and experimental equipment will be demonstrated and used. Primary emphasis will be on demonstrating a thorough understanding of the imaging processes and controls at work in systems such as peripheral, photofinish, strip enlarging, and panoramic recording methods. (For upper-division PPHT students; others with permission of the instructor)

Credit 4

PPHT-460 **Special Effects Photography**
Registration #0920-460
A course designed for practicing photographers and students in which photographic effects beyond those encountered in everyday situations in illustrative, commercial and advertising photography are discussed and practiced. Among the topics to be covered are stroboscopic, peripheral, scanning, high-speed flash, matte box, and combination flash/tungsten photographic techniques. (For upper-division SPAS students)

Credit 4

PPHT-470 Introduction to Digital Image Processing
Registration #0920-470
Exploration of the technology, theory and application of digital image processing equipment and procedures, particularly in relation to photographic processes. Principles of input, output and computer processing techniques will be covered. Applications such as contrast enhancement, edge sharpening and smoothing will be included. (PPHT-210 or 213)

Class 2, Lab 4, Credit 4

PPHT-499 Co-op
Registration #0920-499
This course is designed to provide students with on-the-job experience in the field of imaging and photographic technology. The student will seek and acquire a school-approved co-op position in business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the co-op coordinator will assist the student in evaluating the experience.

Credit 0

PPHT-501 High-Speed/Time-Lapse
Registration #0920-501 Photography
This is a course in the theory and practice of photographic systems designed to permit analysis of events of very short or of extended duration. Included are operational characteristics of time-lapse cameras, sequencing and timing control devices, time magnification relationships. Also, characteristics of intermittent and rotating prism cameras, rotating mirror and drum cameras, synchronization system and timing controls and high speed flash and spark gap systems. Students gain experience not only in the use of the basic equipment but also in proper planning, set-up and data reduction techniques through a series of practical experiments. (For upper-division PPHT students; others with permission of the instructor)

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 projects, including selection of topics, searching the literature, and proposal evaluation.

Class 1, Credit 1

PPHT-503 Research Project
Registration #0920-503
Investigation of a topic in the area of applied, technical, or scientific photography, involving camera and/or laboratory work, evaluation, oral presentation of the results, and a written report in a standard format. (PPHT-502)

Class 1, Lab 4, Credit 3

PPHT-504 Survey of Nonconventional
Registration #0920-504 Imaging
A survey of imaging methods and imaging systems not normally encountered in other technical photography courses, including UV, IR, 3D, holography, electrophotography, x-ray, and non-silver applications. (For upper-division PPHT students; others with permission of the instructor)

Class 1 1/2, Lab 3, Credit 3

PPHT-520 Color Photography Workshop
Registration #0920-520
A creative color workshop with the goal of producing visually effective color photographs. The student is free to choose from a large variety of assignment suggestions to structure a program individually as an independent study. Besides creativity, principles of design and photographic controls will be important. Most photographs will be produced on color transparency material. The last two weeks can be spent color printing for those wishing this experience.

Students are expected to furnish their own small or medium format cameras and supplies. Large format cameras and chemicals are furnished. Color film and paper expenses can be expected to run as high as $75 to $100. (Some previous photographic experience required. Registration limited; permission of the instructor)

Credit **9** (SR)

PPHT-551,552,553 Special Topics in Imaging and
Registration #0920-551,552,553 Photographic Technology
A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered. Available to upper-level students.

Credit variable

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 GPA of 3.0 or higher.

Credit variable

Center for Imaging Science

All courses in the Center for Imaging Science are offered at least once annually, except as noted.

Imaging Science

PIMG-220 Introduction to Imaging Science
Registration #0925-220
This course is offered during Summer Quarter to students who wish to transfer to the Imaging Science BS degree program at the sophomore level. Prerequisites for the course include one year each of physics, calculus and chemistry (with lab) at the college level. Topics include basic materials and methods of imaging science, an introduction to RIT's computer system and the FORTRAN language. Laboratory experiments include image sampling and quantization, optical imaging, densitometry and sensitometry.

Credit 8

PIMG-221 Imaging Science for Microelectronic
Registration #0925-221 Engineers
This course provides an introduction to the fundamentals of imaging and photographic science. Topics include: radiometry and photometry, exposure, silver halide materials, photo resists, speed and spectral sensitivity, sensitometry, optics, resolving power, limits of optical microlithography, measurement and control of linewidth, special exposure effects, and contact and projection printing systems.

Credit 4

PIMG-231 Survey of Imaging Science
Registration #0925-231
Survey of Imaging Science is the first course in the curriculum. It describes the field of imaging science and introduces students to the component parts of many imaging systems.

Credit 3

PIMG-232 Imaging Science Seminar
Registration #0925-232
Imaging Science Seminar consists of a series of lectures by faculty and invited speakers designed to introduce students to various areas in the field.

Credit 1

PIMG-233 Introduction to Imaging Science
Registration #0925-233
Introduction to Imaging Science continues the work begun in PIMG-231 and PIMG-232, introducing students to several non-conventional imaging systems. The student designs and performs an independent project.

Credit 2

PIMG-241 Introduction to VAX/VMS and
Registration #0925-241 FORTRAN for Imaging Science
Introduction to VAX/VMS and FORTRAN is a course for freshmen in the Imaging Science Program designed to provide new students in the program with the necessary computer and programming skills.

Credit 2

PIMG-345 Interaction Between Light
Registration #0925-345 and Matter
This course emphasizes the interaction of electromagnetic energy with various states of matter. This includes the creation, propagation, and destruction of electromagnetic energy. Topics covered include: the electromagnetic spectrum; reflection, absorption, and transmission of energy; vibrations and simple excitations; molecular orbitals; band theory; and optical interactions.

Credit 4

PIMG-351,352 Math and Computation
Registration #0925-351,352 for Imaging Scientists
This two-quarter course covers mathematical topics of special importance and relevance to imaging science. Topics include: vector analysis, matrix analysis, complex variables and analysis, linear algebra, differential equations, and Fourier analysis.

Credit 4

PIMG-361 Geometrical Optics
Registration #0925-361
An introduction to the characteristics of optical components and optical imaging systems; refracting and reflecting surfaces and components; stops, pupils, and the propagation of energy through optical systems. Discussion of lenses, cameras, collimators, telescopes, and other instruments. Limitations on system performance.

Credit 4

PIMG-362 Physical Optics
Registration #0925-362
An introduction to the principles of wave optics. Topics include one- and two-dimensional vibrations; wave motion; superposition of waves; polarization; interference and interferometry; single, double, and multiple slit diffraction; and coherence. (SMAM-251, 252, PIMG-231,232, 233, or permission of instructor)

Credit 4

PIMG-365 Chemical Imaging Principles
Registration #0925-365
This course is a rigorous mathematical and quantitative treatment of the chemical principles underlying selected imaging systems. Lectures will emphasize both physical chemistry and organic chemistry principles involved in emulsion chemistry, polymer chemistry, surface chemistry, and electrochemistry. Laboratory sessions will emphasize instrumental analysis and spectroscopy.

Credit 4

PIMG-421,422,423 Photographic Chemistry
Registration #0925-421,422,423
The science of imaging with silver halide in all its aspects from making emulsions to product design. The course includes those relevant specialized topics in chemistry and physics necessary for complete understanding. It is designed both as a sound basis for further study of this aspect of imaging science and for work with expert professionals.

Class 3, Lab 3, Credit 4

PIMG-446 Statistics I
Registration #0925-446
An introduction to the theory and application of statistical methods; events and sample spaces; fundamental probability concepts; mathematical foundations of discrete probability functions and continuous probability density functions; moments and moment generating functions as a means for studying the properties of probability functions; central tendency and dispersion of probability functions. Fundamental examples of random processes encountered in imaging systems are used to illustrate the mathematical and statistical techniques developed. Programming assignments are required. (Junior status in CIS)

Credit 3

PIMG-447 Statistics II
Registration #0925-447
Introductory hypothesis testing of means and variances is developed in the context of evaluation of experimental objectives. Linear regressional analysis, techniques of analysis of variance, regression models. Analysis of variance is then developed as a general experimental tool. Methods of experimental error propagation are developed. Programming assignments are required, and statistical software packages are presented. Advanced topics such as spline fitting, simplex analysis, and principal components are discussed.

Credit 3

PIMG-451,452,453 Digital Image Processing
Registration #0925-451,452,453
The principles, techniques and applications of digital image processing are introduced. The course considers formation of digital images, sampling and quantization image input/output devices, image statistics and descriptors (e.g. histograms). Geometrical, point, neighborhood, and global mathematical operations on digital images will be considered, including kernel operators and discrete convolution. Other mathematical representations of discrete image information will be introduced, including the discrete Fourier transform. Applications of image processing will be described. Emphasis is placed on mathematical implementation of image operations.

Credit 3

PIMG-461 Radiometry
Registration #0925-461
This course considers the generation, propagation, absorption and measurement of electromagnetic radiation. Sources, detectors, spectrometers, and measurement devices are treated with an emphasis on approaches to quantification of electromagnetic radiation levels.

Credit 4

PIMG-462 Vision, Color and Psychophysics
Registration #0925-462
An intensive course covering aspects of the human visual system, psychophysics, and colorimetry which are fundamental to the field of imaging science. Topics include: spatial vision, temporal vision, color vision, machine "vision," psychophysical techniques, scaling, and colorimetry. (PIMG-452)

Credit 4

PIMG-463 Macroscopic Imaging
Registration #0925-463 Systems Analysis
This course consolidates the understanding gained in the previous three courses in this series (PIMG-345, 461, 462), and develops a general description for the way in which the macroscopic (large-scale) input/output properties may be defined and related. Image input/output variables are developed which are relevant for black-and-white and color imaging systems, for continuous and discrete imagery, for hard copy and soft display. Understanding of how these variables are related to the basic parameters used in image processing is developed. Methodology examples are given for chemical, optical and electronic imaging systems, and input/output models are derived for a selection of these systems.

Credit 3

PIMG-506 Technical Communication and
Registration #0925-506 Research Practices
This course is designed to develop skills in scientific research, including use of library resources, technical report writing, technical presentations. Students are required to research, write, and present a proposal for a research project. The proposed research is performed in PIMG-507, 508.

Credit 3

PIMG-507,508 Senior Project
Registration #0925-507,508
Students perform the independent research project defined in PIMG-506 under the direction of a faculty member in imaging science. The student presents the results of the project to a public meeting at the end of the spring quarter.

Credit 3

PIMG-511,512,513 Optical Instrumentation
Registration #0925-511,512,513
Principles of geometrical and physical optics, image evaluation, optical instruments, and instrumentation. (SMAM-305, SPSP-313)

Class 3, Credit 3

PIMG-541 Fundamentals of Optics
Registration #0925-541
An introduction to the principles of optics that form the basis for further study in the field. Topics include one- and two-dimensional vibrations, wave motion, superposition of waves, interference and interferometry, single, double, and multiple slit diffraction, and polarization. Lenses, mirrors, prisms, diffraction gratings, lasers and other radiation sources are described as fundamental components in optical systems. (SPSP-313)

Class 3, Lab 3, Credit 4

PIMG-543 Optical Engineering
Registration #0925-543
An introduction to the characteristics of optical components and their combination into instrument and imaging systems. Radiation sources. Refracting and reflecting optical components. Stops, pupils and the propagation of energy through optical systems with both image forming and image recording elements. Radiation measurement techniques and apparatus. Discussion of lenses, cameras, collimators, telescopes, alignment and measurement apparatus, and other instruments. Limitations of system performance. (PIMG-541)

Class 3, Lab 3, Credit 3

PIMG-551,552,553 Special Topics in Imaging
Registration #0925-551,552,553
Topics of special interest, varying from quarter to quarter, selected from the field of imaging science and not currently offered in the division's curriculum. Specific topics are announced in advance. (Not offered each quarter. Consult director of the Center for Imaging Science)

Class, Credit variable

PIMG-561,562,563 Microelectronic
Registration #0925-561,562,563 Chemistry I, II, III
Selected topics from organic, polymer, physical, and photographic chemistry important to the understanding of silver-halide, diazo and photo resist materials (EMCR-340, PIMG-221, PIMG-543)

Class 3, Lab 3, Credit 4

PIMG-566 Imaging Systems Analysis
Registration #0925-566
An analytical approach to evaluating imaging systems using linear systems theory. The concepts of convolution and Fourier methods and the use of frequency analysis and Fourier methods are emphasized.

Credit 3

PIMG-567 Quantum Limitations of
Registration #0925-567 Imaging Processes
The effects of random variations in collected radiant energy and/or detector response on image quality; characterizing stochastic processes and noise; film graininess and granularity; propagation of quantum effects through a linear sysum to the image.

Credit 3

PIMG-568 Advanced Image Systems Analysis
Registration #0925-568
This course is a continuation of PIMG-566 and extends the linear-systems formalism for analyzing and characterizing imaging systems; point, line, and edge spread functions; optical, modulation, and phase transfer functions; coherent and incoherent optical systems.

Credit 3

PIMG-599 Independent Study
Registration #0925-599
A student-proposed advanced project sponsored by an instructor. Approval required by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.

Class, Credit variable

School of Printing Management and Sciences

All courses in the School of Printing are offered at least once annually, except as noted.

Management Courses

PPRM-203 Printing Computer Seminar
Registration #0910-203
This seminar introduces Printing and Applied Computer Science students to the program. Students meet for one hour each week with the program coordinator for discussion of various topics of interest to entering students.

Class 1, Credit 1

PPRM-205,206,207 Newspaper Seminar I, II, III
Registration #0910-205,206,207
This three-quarter, sequential, one-credit-hour course is required for all Newspaper Operations Management majors, beginning in fall 1988 (881). All other majors must have faculty approval to enroll. Course topics revolve around the newspaper industry in relation to the printing industry in general. The basic purpose is to provide an understanding of how the newspaper industry is similar to, and different from, the printing industry in general.

Specific topics will include the technological and manag considerations unique to newspaper production. This course will also serve as an introduction to the technology and procedures applied in the Newspaper Production Laboratory (NewsLab), that will play a major role the other required newspaper courses.

There are no prerequisites for Newspaper Operations majors; all others must obtain instructor's approval to enroll.

Class 1, Credit 1 (each quarter)

PPRM-240 Printing Financial Controls
Registration #0910-240
Plant accounting systems covered as a tool for improving production management decisions. Topics include accounting's general philosophy and structure, inventory, equipment, job cost, standard cost and analysis of variance, budgeting and control techniques.

Class 4, Credit 4

PPRM-260 Printing Planning Concepts
Registration #0910-260
A required professional course designed to provide the student with the basic principles of price determination as it relates to marketing. Special emphasis on estimating will link those marketing concepts with practice to arrive at a selling price for printed materials. Class discussions, readings and problems will be directed toward a better understanding of the relationship of marketing and planning in a printing environment.

Class 4, Credit 4

PPRM-261 Standard Software Packages
Registration #0910-261
An introduction to software available at RIT on both the VAX/VMS system and on microcomputers housed in various locations on campus. Emphasis is placed on use of electronic mail, word processing, spreadsheets, statistical packages, database management and communications software to generate, analyze and present information relevant to the printing industry.

Class 2, Credit 2

PPRM-262 Technical Writing I
Registration #0910-262
A review of writing skills; an analysis of the purpose, problem, and audience of specific writing tasks. Consideration of the principles, techniques, organization, and appropriate format, style, tone, and word choice to achieve a desired writing purpose. Lectures presenting new material and reviewing assignments; and in-class writing, critiquing, and rewriting. (English Composition, GLLC-220)

Class 2, Credit 2

PPRM-263 Technical Writing II
Registration #0910-263
Discussion of fundamentals of modern technical and business writing: brief review of writing skills, audience analysis, and discussion, and selection of appropriate style, tone, and format. Discussion of research techniques, documentation, and presentation of a formal technical report. (PPRM-262)

Class 2, Credit 2

PPRM-280 Printing Management Leadership Concepts
Registration #0910-280
This required course is designed to give students basic knowledge of the systems approach to management by studying the management of functions in production organizations. Emphasis is on the people input and the system. Class sessions include lectures, films, discussions, etc., as appropriate. Homework includes reading and writing assignments.

Class 4, Credit 4

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 (SR)

PPRM-320 Introduction to Magazine Publishing
Registration #0910-320 and Management
A survey course designed to give the student insights into the editorial, production, management, fulfillment and distribution processes vital to the success of any magazine. Leaders from the magazine publishing industry are invited to present 3-hour guest lectures on a major aspect of their profession. Graduates of the printing program who have attained prominence within the industry are often guest speakers, encouraging interaction between current and former students.

Class 3, Credit 3

PPRM-330 Introduction to Business
Registration #0910-330 Forms Manufacture
A basic course intended to acquaint the student with the design and manufacture of business forms as practiced in the industry.

Class 3, Credit 3

PPRM-340 Non-impact Printing Technology
Registration #0910-340
The course will cover printing methods using electrostatic technology as practiced on high speed copier machines. Along with the theory of operation, the course will include: how these devices fit in the in-plant, commercial, and quick-print-shop installations, cost factors, quality, and profitability in comparison to offset. The use and principles of lasers in electronic printing, as well as color copiers, will be included. In addition, several other non-impact printing methods, such as ink jet and thermal, will be presented. Each student will have a training session on a modern high-speed, high-quality copier.

Class 3, Credit 3

PPRM-350 Economics of Production Management
Registration #0910-350
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-360 Estimating Practice
Registration #0910-360
A detailed study of the practice of estimating that will provide the student with the understanding that the final price of a printed job is the result of a series of planning decisions made during the estimating process. Development and the use of production standards and hourly rates will be analyzed to determine their importance in the pricing structure of printed materials. Knowledge of printing production processes is necessary to determine the optimum operating sequence at minimum cost. (PPRM-260)

Class 4, Credit 4

PPRM-370 Math Modeling for Printing
Registration #0910-370 Operations
Explores certain analytical models that 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-375 Printing Operation Measuremen
Registration #0910-375 and Improvemen
Explores practical techniques that printing companies can use it the areas of methods improvement, work measurement anc control, production standards and operations indicators equipment evaluation, proposals and financial analysis, systems analysis and standard practice instructions.

Class 4, Credit 4

PPRM-380 Supervision ir
Registration #0910-380 the Graphic Art:
This course is designed to enable the student to meet the social employee and management needs in the manning of a graphic arts operation. Subjects covered are: the nature of the employmem relation; hiring; motivation and training; discipline; firing; layoffs and plant closures. (PPRM-280)

Class 4, Credit 4

PPRM-415 Advanced Ink and Color
Registration #0910-415
Further study of ink and color with emphasis on relationship tc 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-332 or permission of instructor)

Class 4, Credit 4

PPRM-420 Electronic Communications in
Registration #0910-420 the Printing and Publishing Industries I
Presentation of an overview of electronic communication theory and its application to the publishing industry. The course provides the student with the background necessary to relate publishing requirements to electronic system parameters. Several practical newspaper systems are discussed. (SMAM-225, 226)

Class 4, Credit 4

PPRM-450 Expense and Capital Project
Registration #0910-450 Budgeting and Control
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 Dynamic Leadership and
Registration #0910-460 Committee Management
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.

Class 4, Credit 4 (SR)

PPRM-462 Computer Estimating Systems
Registration #0910-462
A continuation of PPRM-360 in which more complex jobs are estimated, including some on the web offset press. An introduction to the use of the computer in estimating: comparative estimates are made and graphed to determine optimum printing quantities for press size, imposition and cost. An analysis of computer estimating systems provides a guide to selection and use of these systems. (PPRM-360)

Class 4, Credit 4

PPRM-505 Management of Training in
Registration #0910-505 the Graphic Arts Industry
Students examine the role and issues associated with training in the graphic arts industry. Topics include the growth and importance of training in the industry, roles and responsibilities of training personnel, the nature of training, resources available to training managers, and financial considerations of training. (PPRT-500)

Class 3, Credit 3

PPRM-506 Business Law
Registration #0910-506
Elements of the laws of contracts, agency, sales, partnerships, corporations, taxes, insurance, workers' rights, and other laws pertaining to business, printing and publishing.

Class 3, Credit 3

PPRM-508 Legal and Ethical Conduct
Registration #0910-508 of Printing Businesses
A study of the legal and ethical implications faced by printing companies when involved in making day-to-day and long-term business decisions. Students become acquainted with current printing business ethics, as well as the various laws regulating competition in the printing industry marketplace. Students are shown the impact their various business decisions will have upon their companies, co-workers and themselves.

Class 4, Credit 4

PPRM-511 Labor Relations in Graphic Arts
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 United States Supreme Court and National Labor Relations Board decisions. Study includes rights of employees, their free choice of representation, duty of fair representation, right to strike, and future modification of the field.

Class 4, Credit 4

PPRM-512 Collective Bargaining
Registration #0910-512 in the Graphic Arts
An elective for students who have successfully completed PPRM-511. Study includes selection of representatives for the purposes of collective bargaining, negotiation of the agreement, and administration of the agreement. (PPRM-511)

Class 4, Credit 3

PPRM-513 Sales in the Graphic Arts
Registration #0910-513
Explores economic, psychological and sociological bases of selling, with emphasis on customer and salesmen interplay as well as techniques and practices of creative salesmanship in graphic arts companies. This course aims at benefiting both students considering a career in sales and those who will otherwise work with salesmen, either by supporting their company's salesmen in plant action or by buying from outside salesmen.

Class 4, Credit 4

PPRM-514 Newspaper Management
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 Supreme Court decisions as they relate to the unique rights granted to the graphic arts industry. Cases cover Article I, Section 8 of the United States Constitution and the First and other amendments thereto.

Class 4, Credit 4

PPRM-516 Marketing in Graphic Arts
Registration #0910-516
Key concepts and issues underlying the practice of marketing in graphic arts industries are discussed by the class. Discussion is encouraged to develop predisposition to *use* marketing rather than to merely acquire facts about marketing.

Class 4, Credit 4

PPRM-518 Purchasing in the
Registration #0910-518 Graphic Arts
Role of the purchasing agent in the printing plant. Methods of procurement, purchasing policies and sources of supply. Characteristics of graphic arts materials and supplies; quality assurance; inventory control; economic order quantity determination; make or buy decisions; blanket orders; capital investment decisions; the purchase order as a legal document.

Class 4, Credit 4

PPRM-520 Systems Planning
Registration #0910-520
An introduction to problem-solving techniques utilizing applied statistical tools in management situations.

Class 4, Credit 4

PPRM-530 Establishing a Graphic Arts
Registration #0910-530 Operation
This is an elective course for seniors only with permission of the instructor. The course is a study of the problems to be encountered in the establishment of a graphic arts operation. Students will organize their own printing-related operation as they study general planning, financing, physical requirements for operation, sales and merchandising, general management and operational problems. The purpose of the offering is to coordinate students' activities with a focus on the benefits and burdens of the responsibility of establishing a graphic arts business, (senior status with Instructor permission)

Class 3, Credit 3

PPRM-540 Electronic Communications in the Printing
Registration #0910-540 and Publishing Industries II
Development of the necessary mathematical and physical principles to understand the limitations of practical communication systems and the fundamentals of network operation. (PPRM-420)

Class 4, Credit 4

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 variable

PPRM-560 Computer Estimating
Registration #0910-560 Program Design
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 good program design, data structures, disk file handling techniques, and error handling subroutines. The class will use Turbo BASIC, a compiled language that runs on IBM-compatible personal computers under the MS-DOS operating system. (PPRM-462, some knowledge of BASIC, Turbo Pascal, C or another high-level programming language and willingness to undertake a non-trivial programming project)

Class 4, Open Labs, Credit 4

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 Management and Sciences. (Generally seniors with qualifying GPA)

Credit 1-5

Technical Courses

PPRT-200 Introduction to Printing
Registration #0911-200
An overview of the printing processes from design to the finished product. Laboratory experience for students to design and print a project consistent with their professional interests. Class lectures, demonstrations and hands-on lab experiences.

Class 1, Lab 3, Credit 3

PPRT-210 Newspaper Presses
Registration #0911-210
An introduction to the printing processes and press designs used in the production of newspaper products. Letterpress, offset and flexographic presses are considered along with modified processes now being adopted and tested for newspaper applications. (PPRT-320)

Class 2, Lab 3, Credit 3

PPRT-213 Principles of Copy
Registration #0911-213 Preparation
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-230 Printing Processes Concepts
Registration #0911-230
This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to both the printing process and press systems. Class sessions will consist of lectures, including films and videotape presentations. Outside assignments will consist of reading assigned portions of textbooks, vendor literature and journal articles relative to the lecture topics.

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

PPRT-232 Ink and Substrates
Registration #0911-232
Provides a basic understanding of the many different kinds of ink and substrates utilized by the various printing processes. Substrate composition, runability, printability, and end-use requirements are covered, as well as the different formulation of inks and their drying systems. Requirements of each printing process and the printed product as they relate to the ink and substrate properties are covered.

Class **3,** Credit **3**

PPRT-234 Print-Finishing and Distribution
Registration #0911-234
Most printed products must be finished into a marketable form and distributed by various means. Print-finishing may be done in-line on web presses or in a conventional bindery. Planning for such post-press operations requires extensive knowledge from design to the finished product. This course is designed as an introduction to pre-press planning for print-finishing and distribution.

The emphasis is on cost-effective planning and management, familiarization with the mechanical limitations in print production and on modern tools and methods in distribution technologies.

Class **3,** Credit **3**

PPRT-239 Gravure Process
Registration #0911-239 For Non-Printing Majors
Building upon concepts of the gravure process learned in Introduction to Printing, PPRT-200, this course expands on the theories and practices of the gravure process. The course includes both cylinder imaging and presswork and involves information on related techniques, equipment, materials and supplies. Course conducted by means of lectures, class discussions, demonstrations, and supervised laboratory exercises. (PPRT-200)

Class 2, Lab 3, Credit 3

PPRT-240 Lithographic Process
Registration #0911-240 For Non-Printing Majors
The primary objective of this course is to instill in the non-printing major a basic understanding of the capabilities, limitations and applications of lithography in the printing market. In lecture the student is presented the underlying theories of the lithographic process. The lab session will be used to teach the basic concepts which printing students are assumed to know from Printing Processes Concepts. The course also provides students with the knowledge necessary for more advanced and technical theory presented in Litho Press Problems, should the student desire more lithographic knowledge. (PPRT-200)

Class 2, Lab 3, Credit 3

PPRT-241 Screen Printing
Registration #0911-241 For Non-Printing Majors
This course is designed to acquaint non-printing majors with screen printing. Its primary focus is how screen printing can be used as a commercial printing process, stressing recent technological advances. Areas of emphasis include: frame construction; fabric selection; stretching of fabric; photomechanical stencil systems; screen printing inks; substrates; and an overview of modern screen printing presses. The economics of screen printing and its relationship to the total area of the graphic arts industry is stressed throughout the course. Laboratory session will be used to teach basic concepts that printing students cover in Printing Processes Concepts. (PPRT-**200)**

Class 2, Lab 3, Credit 3

PPRT-250 Concepts of Design and Typography
Registration #0911-250
This is an introductory course designed to acquaint students with the principles of two areas: 1) printing design; 2) typography. Extensive use of slides, overhead materials, handouts and, where appropriate, movies and videotapes will be shown.

Class 4, Credit 4

PPRT-270 Pre-press Imaging Concepts
Registration #0911-270
This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to image generation, capture, processing, storage display and transfer technologies used in the graphic arts industry. Class sessions will consist of lectures interspersed with films and other audiovisual aids. Homework assignments will consist of reading assigned portions of textbooks, vendor literature, and journal articles related to the lecture topics. In addition, written assignments consisting of paraphrasing of relevant technical articles will be required.

Class 4, Credit 4

PPRT-313 Copy Preparation
Registration #0911-313
Preparation of copy for camera, working from layouts, making analysis of requirements; pasteup techniques, methods of pre-separation mechanicals, "keyline" mechanicals, use of photographic and typographic copy. Relation to production is stressed by shooting copy on camera, stripping and proofing; proper instructional specification writing. Design and production of individual 4-color; process pre-separation. (PPRT-230, 250, 270)

Class 2, Lab 3, Credit 3

PPRT-317 Calligraphic Forms
Registration #0911-317
An introduction to the basics of calligraphy, exercises in use of broad edge pen to develop primary forms of Italic, Roman Capitals, and Uncial letter styles. Evolution of letter forms. Consideration of historical origins of letters, use of basic tools, understanding of methods and disciplines stressed.

Class 3, Credit 3

PPRT-319 Newspaper Design
Registration #0911-319
A study of the methods of designing modem 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-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-328 Flexography for Non-Printers
Registration #0911-328
An introductory course in the principles of the Flexographic printing process for non-printing major students. Course is designed to add background experiences to students in a wide variety of RIT majors. Emphasis is placed upon the application of flexographic printing technology in packaging and other fields. The elements of artwork, platemaking, inks, substrates and printing are taught. Lab work centers around all flexographic elements with hands-on experience in the production of printed products.

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, 303) (Offered once each year)

Class 2, Lab 3, Credit 3

PPRT-330 Advanced Concepts of
Registration #0911-330 Newspaper Production Systems
The production of a newspaper by photocomposition methods and the offset process. A continuation of PPRT-320, in more depth, with special emphasis on pre-press operations, and the production of special editions. Also, emphasis on the use of color in newspaper production. (PPRT-320)

Class 2, Lab 3, Credit 3

PPRT-331 Bookbinding
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 hand bookbinding, including sewing, adhesive binding, gilding and boxmaking. Basic conservation skills are taught. Library binding and end-use requirements of bound products are studied and tested in order to obtain thorough knowledge of the physical requirements of bound books. Course is designed for those who value good craftsmanship and have an interest in binding books. No prerequisite is required. However, a good dexterity is desired. Students should bring several books of their own for rebinding.

Class 3, Credit 3 (SR)

PPRT-332 Ink and Color
Registration #0911-332
Theory of light and color; basic theory of process color and corrections; theory and applications of CIE color system; color matching systems; theory and applications of various ink systems; correlation of ink properties with applications, with emphasis on relationships of ink to paper and press; study of ink problems and their correction.

Class 4, Credit 4

PPRT-333 Introduction to Book Production
Registration #0911-333
A course designed to introduce the student to the many-faceted role of the production manager in a book publishing firm. Production's role throughout the publishing cycle from manuscript to bound books is examined, and detailed emphasis is placed upon determining production and purchasing requirements for producing a variety of books, including trade books, textbooks, juveniles and special editions.

Class 3, Credit 3

PPRT-334 Print-Finishing Management
Registration #0911-334
Planning for successful print finishing requires in-depth knowledge of production phases from design through pre-press planning, press, bindery and distribution. Today's printers can no longer afford "makeovers." Good planning is the key to insuring quality product and efficiency. This course emphasizes cost-effective planning and management, based in part on an awareness of the mechanical limitations involved in print production and in a contemporary print-finishing environment. (PPRT-234)

Class 2, Lab 3, Credit 3

PPRT-335 The Printed Book
Registration #0911-335 In America
A course which traces the main currents in the development of the printed book in America by closely examining the books themselves. In addition, close study of the lives and works of the great printers, their equipment and available technology, and their aesthetic viewpoints is undertaken to determine their impact on their times and their relevance for today. Classes are held in the Melbert B. Cary, Jr., Graphic Arts Collection.

Class 3, Credit 3

PPRT-337 Art of the Printed Book
Registration #0911-337 1455-1955
This course presents masterpieces of the printer's art from the past five centuries. The lives and works of great European printers from Gutenberg to Mardersteig are examined, and their historical impact on Western civilization discussed with a view toward determining new perspective for today's graphic artisan and book printer. Classes are held in the Melbert B. Cary Jr. Graphic Arts Collection.

Class 2, Lab 6, Credit 4

PPRT-338 Flexographic Process
Registration #0911-338
A fundamental course based on the principles and practices of the flexographic printing process. Continues on from the basic information given in PPRT-230. Emphasis is placed on the elements of the technology from artwork, plates, platemaking, inks and presswork. Lab offers hands-on work centered around platemounting, ink formulation and presswork. Students print on a wide variety of presses and substrates. (PPRT-230)

Class 2, Lab 3, Credit 3

PPRT-339 Gravure Process
Registration #0911-339
Building upon concepts of the gravure process learned in PPRT-230, this course expands on the theories and practices of the gravure process. The course includes both cylinder imaging and press work and involves information on related techniques, equipment, materials and supplies. The course is conducted by means of lectures, class discussions, demonstration and laboratory exercises involving chemical etching of cylinders, helio engraving of cylinders, and four-color printing on a four-unit web press. (PPRT-230)

Class 2, Lab 3, Credit 3

PPRT-340 Lithographic Process
Registration #0911-340
This course builds upon the material encountered in PPRT-230. More detailed discussion is made of the equipment and materials that make the lithographic process. Topics include press, the image carrier and its chemistry, inks and fountain solutions. (PPRT-230)

Class 2, Lab 3, Credit 3

PPRT-341 Screen Printing Process
Registration #0911-341
This course is designed to acquaint students with screen printing and how it is used as a commercial printing process, stressing recent technological advances. Areas of emphasis include: frame construction, fabric selection; stretching of fabric; photomechanical stencil systems; screen printing inks; substrates; also including an overview of modern screen printing presses. The economics of screen printing and its relationship to the total area of the graphic arts industry is stressed throughout the course. (PPRT-230)

Class 2, Lab 3, Credit 3

PPRT-342 Properties of Paper
Registration #0911-342
This course begins with a discussion on papermaking fibers, pulping procedures, and papermaking machines and proceeds to show how they affect paper properties and printing characteristics. Laboratory experiences include stock preparation, making paper and paperboard, sizing and coating paper, physical and optical testing of paper and paper identification.

Class 3, Lab 2, Credit 3

PPRT-351 Applications of Typographic Concepts
Registration #0911-351
An elective course that allows the students to apply the concepts of typography to practical applications. By utilizing the equipment of the typographic laboratory, each student will be expected to produce finished typographic projects. The intent of this course is to build confidence in students and shaipen their ability to judge and produce works of a typographic nature. (PPRT-250)

Class 2, Lab 3, Credit 3

PPRT-352 Applications of
Registration #0911-352 Printing Design Concepts
An elective course that introduces students to the application of traditional rendering techniques and computer-aided technology as tools for creating visual solutions to printing design problems. Emphasis is placed on the arrangement of typographic and pictorial elements to illustrate and expand on the concepts gained from the prerequisite course. (PPRT-250)

Class 2, Lab 3, Credit 3

PPRT-372 Image Capture and Conversion
Registration #0911-372
This elective professional course introduces the student to the materials and processes used by the graphic arts industry to capture and store images. It also examines both optical and electronic methods of converting those images to forms suitable for producing the image carriers required by the major printing processes. A systems approach is used to prepare students to make sound business decisions in the development and management of pre-press facilities. (PPRT-270)

Class 2, Lab 3, Credit 3

PPRT-373 Techniques of Image Assembly
Registration #0911-373
An introductory course in black-and-white and color-image assembly. Lab projects are assigned with the purpose of covering a wide variety of layouts requiring different techniques and often the creation of necessary contact or duplicating films of the roomlight variety. In addition to standard practices the student also works with the latest model line-up tables and a Micromodifier for spreads and chokes and receives basic instruction in electronic page make-up (Autoprep 5000). Other automated pre-press imposition systems are covered in the form of slide-lectures. (PPRT-270)

Class 2, Lab 3, Credit 3

PPRT-375 Electronic Composition Systems
Registration #0911-375
An elective course in photocomposition. Formatting and code structures are utilized for typographic problems. Specialized typesetting hardware and software are analyzed for electronic composition systems with digital type storage. (PPRT-250, PPRT-270)

Class 2, Lab 3, Credit 3

PPRT-382 Tone Reproduction and
Registration #0911-382 Halftone Analysis
A comprehensive treatment of monotone graphic arts photography to an advanced level. Human visual perception, halftone sensitometry, and process control are emphasized as important factors for the aesthetic and consistency of printed pictorial reproduction. Topics include densitometry, contact screens, flare, reciprocity law, two-point and three-point halftone sensitometry, electronic screening, film contacting and automatic film processing and its control, plate/press characteristics, dot gain, criteria for subjective tone reproduction, and the Jones diagram for objective tone reproduction analysis. (PPRT-372)

Class 2, Lab 3, Credit 3

PPRT-390 Application of Electronics
Registration #0911-390 to Graphic Arts
A basic course in the fundamentals of electricity and electronics covering direct current, alternating current, semiconductors and transistors. Theory will be applied in lab experiments as well as with graphic arts machines and devices. Students will perform laboratory experiments using basic electronic components and instruments. (SMAM-220, SMAM-225)

Class 2, Lab 3, Credit 3

PPRT-415 Techniques in Hand
Registration #0911-415 Papermaking
This course offers a practical introduction to the many techniques used in hand papermaking. The class will begin by collecting natural raw materials that can be used in papermaking, and then proceed through the preparation of the pulp. The student will make a deckle box, design a watermark, and then make handmade paper. Fiber identification, pulp dyeing, paper layering, embedding objects into paper, adding pulp selectively to paper surfaces, molding and casting paper will provide the students with a very broad exposure to hand papermaking techniques. We will experiment with beating pulp, blending pulps, sizing paper, and coating paper.

Credit 3 (SR)

PPRT-417 Advanced Calligraphy
Registration #0911-417
A special 5-day workshop designed to sharpen the skills of serious calligraphers and graphic designers. Emphasis will be on finetuning traditional lettering styles for personal and commercial use. There will be exercises and discussions about traditional and contemporary techniques and how modern technologies are affecting alphabet design. Students will also see slide presentations, receive individual attention and have exposure to many School of Printing resources including the Melbert B. Cary, Jr. Graphic Arts Collection. (By selection only)

Class 3, Credit 3

PPRT-438 Advanced Flexography
Registration #0911-438
An advanced course in the principles and practices of the flexographic printing process. Expanded lab time allows students to get into greater depth in all phases of flexographic technology. Students perform all operations necessary to print a large variety of substrates on all lab presses. (PPRT-338)

Class 2, Lab 6, Credit 4

PPRT-439 Advanced Gravure
Registration #0911-439
Building upon PPRT-339, this is an advanced laboratory and technical course embracing the theories and practices of the gravure printing process. Classes include such new course content as electronic image processing, color proofing systems, quality assurance testing for packaging printing, press-side color testing, press design concepts, and the economics of the gravure process. Course includes lectures, laboratory exercises, guest speakers and plant tours. (PPRT-339)

Class 2, Lab 3, Credit 3

PPRT-441 Screen Printing II
Registration #0911-441
Further study of the theory and practice of screen printing that will include such topics as experiments with fabric in screen making, stretching screen fabrics on one or more of the tensioning devices, stencil films and the effect they have on a finished product, study of the inks and substrates common to the screen printer. Areas of concentration with this course may be one of the following: flat-bed cycling presses; automatic cylinder screen printing press; container press capable of printing cylinders, conicals, ovals and flat objects; GSP Graphix 2 for making positives from masking materials or cut stencils; and ultra violet curing inks common to the screen printing industry. (PPRT-341)

Class 2, Lab 3, Credit 3

PPRT-442 Lithographic Press Problems
Registration #0911-442
An advanced course in the theory, practice, and problems of offset presswork. Further development of technical knowledge of materials and equipment. Practice in running process color work. (PPRT-340)

Class 2, Lab 6, Credit 4

PPRT-444 Web Offset
Registration #0911-444
An analytical study of the technological development in web offset. Emphasis on the interrelationship of procedures, materials and equipment. Practical laboratory projects on a commercial four-unit perfecting web offset press. (PPRT-340)

Class 2, Lab 2, Credit 3

PPRT-452 Layout and Print Design II
Registration #0911-452
An advanced course involving discussion of traditional design, use of grids, historical evolution of design and contemporary design solutions. Typical commercial printing design problems are explored in laboratory projects, from rough to comprehensive layout. The laboratory problems incorporate traditional rendering techniques with desktop electronic publishing output to produce presentation pieces. (PPRT-352)

Class 2, Lab 6, Credit 4

PPRT-461 Development of Printing Types
Registration #0911-461
Historical development, identification, and classification. A lecture course that looks at the historical development of the typefaces that we use every day. Classification methods are discussed and analyzed. With slides, we look at representative typefaces, learn their visual characteristics for identification, who the designers are and the foundries, etc., that created them. (PPRT-351)

Class 3, Credit 3

PPRT-472 Color Separation Systems
Registration #0911-472
A study of basic color theory, materials and methods used in the printing industry for the reproduction of color originals. Emphasis is placed on color separation systems and the requirements for producing good quality color. Topics include the major separation methods, color proofing, electronic color scanning, production methods, quality color, and an introduction to color electronic pre-press systems. (PPRT-372 or PPRT-591)

Class 2, Lab 3, Credit 3

PPRT-500 Quality Control in the
Registration #0911-500 Graphic Arts
A study of what quality is and the importance of quality control in printing. Emphasis will be on how elementary statistics, management commitment and participation, and graphic arts "know-how" offer sensible approaches to quality control in printing. Topics include the conceptual aspect of quality and quality printing, defect detection versus defect prevention, establishment of the process capability via sampling and statistics, the use of statistical process control (SPC) tools, management role in creating quality environment, densitometry for measurement, ANSI standards on color printing, use of quality control devices for process control, and case studies on planning and implementing quality improvement programs in various printing environments. (SMAM-319)

Class 3, Credit 3

PPRT-510 Color Perception & Measurement
Registration #0911-510 in the Graphic Arts
To address principles of human color perception. To study correlation between subjective quality ratings and objective measurements such as densitometry, filter-colorimetry, and spectrophotometry. Class sessions are combination of lectures, discussions, and labs. In addition, guest lecturers and video tapes will also be utilized. (PPRT-500)

Class 2, Lab 3, Credit 3

PPRT-541 Typographic Workshop
Registration #0911-541
Allows students to create and solve typographic problems of their own choice. Complete freedom is given and experimentation is encouraged, giving students opportunities to meet their own objectives and satisfaction.

Class 2, Lab 6, Credit 4

PPRT-551 Special Topics-Printing
Registration #0911-551
This course presents and investigates technological topics which normally are not covered in the regular curriculum on a one-time basis. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Topics to be covered are announced in advance.

Credit variable

PPRT-572 Electronic Color Imaging
Registration #0911-572 and Color Control
An analytical study of color reproduction systems will give data to produce good quality color reproduction 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-472 and grade of B or higher in PPRT-472)

Class 2, Lab 3, Credit 3

PPRT-591 Reproduction Photography
Registration #0911-591
An intensive course designed for the photography major with the emphasis placed on the problems involved in achieving optimum tone reproduction from their photographs. A general understanding of the printing industry, basic printing processes, line and halftone photography, tone reproduction and image assembly techniques are covered through lecture and laboratory experiences.

Class 2, Lab 3, Credit 3

College of Liberal Arts

Criminal Justice

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**
Registration #0501-206 **Law Enforcement**
The course is intended to provide the student with an overview of the fundamental concepts of organization and administration, and to provide also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively. (GCJC-203, 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 30 years, including the movement of organized crime into a variety of legitimate business enterprises. In addition current enforcement strategies will be studied and evaluated. (GCJC-201, 203)

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 overview of the structure and function of the federal and state court systems. Emphasis will be placed on the relationship between the federal and state courts, judicial review, judicial decision making, and the courts as interpreters of constitutional rights. (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 deducting hypotheses from theoretical frameworks, identification of the relationships among variables, establishment models, creation of null hypothesis, quantitative methods of data collection and analysis using both parametric and nonparametric methods. Research methods presented range from traditional questionnaires to computer based information and techniques.

Class 3, Credit 4 (offered annually)

GCJC-403, 404 Field Experience
Registration #0501-403,404 and Field Seminar
This course is an internship practicum for all pre-service criminal justice students. The course is designed to give the student first-hand experience in the field of criminal justice in an appropriate organization which meets the needs of the student's career objectives. Students will be closely supervised at selected organizations developing their pre-professional skills while learning the organization's programs and methods. The student also will be required to attend a seminar which will run concurrently with field work.

Class variable, Credit 4 each (offered annually)

GCJC-405 Major Issues in the Criminal
Registration #0501-405 Justice System
This course will focus on contemporary issues and topics not otherwise distinctly incorporated in established criminal justice courses. The course will concentrate on student discussion and interaction surrounding required readings on topics such as deviance, crime prevention, issues in the prosecution/court system, deterrence, female criminality, and computer applications. Topics may vary from offering to offering.

Class 3, Credit 4 (offered on sufficient demand)

GCJC-406 Computer Application in
Registration #0501-406 Criminal Justice
This course is designed to introduce students to the use of computer-related terminology, historical, current and potential uses of computers, the classification and the use of various types of computer application programs on both super mini- and microcomputers. Standard application software packages and computer hardware systems will be discussed as they can be utilized in criminal justice settings. In addition, students will have practical experience that will include the use of text processing, data base and spreadsheet software commonly used in criminal justice agencies and academic settings.

Class 3, Credit 4 (offered annually)

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 annually)

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 that deals with convicted offenders, may find this course useful.

Class 3, Credit 4 (offered on sufficient demand)

GCJC-410 Management in Criminal Justice
Registration #0501-410
This course presents the history and development of the principles of management and organizational theory as they have been applied to the field of criminal justice. This developmental evaluation is followed by a presentation of principles and philosophies of agency administration which have been effective in business, industry, and government, with the intention of discussing their applicability throughout the criminal justice system. (GCJC-204 or permission of the instructor)

Class 3, Credit 4

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 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
Registration #0501-413 Criminal Justice
A survey of the philosophy and history of civil disobedience, civil disobedience as a political tactic, differentiation between civil disobedience and "ordinary crime," civil disobedience and "non-criminals," civil disobedience with the criminal justice system, and the role of riot commissions. (GCJC-201, 203)

Class 3, Credit 4 (offered annually) Class 3, Credit 4 (offered on sufficient deman

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
Registration #0501-416 Evidence
Basic photographic techniques applicable to the law enforcement profession or other investigative applications. The course will cover photographic fundamentals as they apply to the investigative photographer. This will lead to the more involved techniques of the police and fire photographer. Topics include photographing homicides and other deaths, tool mark and document photography, court presentations, surveillance and identification photography, and arson investigation.

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-507 Computer Crime
Registration #0501-507
This course examines the multifaceted issues associated with computer crime from a variety of perspectives. Topics include: techniques employed by offenders, etiology of behaviors, crime prevention, techniques of investigation, epidemiology, current and proposed legislation, civil/criminal statutory, and evidentiary issues. Computer crime, computer criminals, and victims are analyzed from a criminological foundation.

Class 3, Credit 4 (offered annually)

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 clients. Issues to be discussed will revolve around counseling and supervision strategies and conflicts among agencies, between administrators and staff, and clients. This course will present both the practical and theoretical aspects of these issues as well as devote attention to surveying prospective counseling strategies for accomplishing desired behavioral change. (GCJC-201)

Class 3, Credit 4 (offered annually) 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, halfway houses, work-release, study-release, prison furloughs, pre-trial release, pre-probation alternatives (fines, suspended sentences, conditional discharge, and a variety of diversion programs). Special emphasis is placed on a critical evaluation of the alternatives as they compare to the more traditional methods of handling offenders. Field trips and guest lecturers from non-traditional programs are typically included in the course. (GCJC-207, 411)

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-204)

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
Registration #0501-518 Relations
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 #0510-523
This course focuses on the outbreak and increase of violent crime and criminal trends in the United States as one of the more serious realities in this century. In addition to an historical review, contemporary problems are explored, covering such topics as violence in the streets, terrorism, riots, vigilantism, and the role of various criminal justice agencies in attempting to control these problems. (GCJC-201)

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 in regard to the courts, corrections and the community. Conflicts between theory and practice are examined and analyzed, and future trends in law enforcement will be explored. (GCJC-303)

Class 3, Credit 4 (offered annually)

GCJC-527 Seminar in Law
Registration #0501-527
This course will focus on the nature, function and limits of the rule of law. Attention will be paid to areas'of substantive and procedural criminal law to illustrate the nature and limits of the idea of law. Readings will draw from both the classical and modern view of law. (GCJC-301, 304)

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-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 **Research Methods in Criminal Justice**
Registration #0501-541
Through lecture, discussion, and activities associated with a research project, the techniques and methods of data collection and analysis are presented. Students will acquire the skills necessary to conduct criminal justice research and the ability to prepare a formal research/evaluation report. The required research projects typically include data gathering and coding procedures, entry of the data to a file on the VAX/VMS, the use of application software (e.g., SPSS, MINITAB, DATAPLOT), and preparation of a final report. (GCJC-401)

Class variable, Credit 4 (offered annually)

GCJC-599 **Independent Study**
Registration #0501-599
A combined student/faculty member effort on a chosen topic beyond the normal sequence of course selections. It provides the qualified self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.

Class variable, Credit variable (offered annually)

Economics

The following courses are required for the BS degree. See listings under Service Course area for full course descriptions, unless otherwise indicated.

GSSE-301 **Principles of Economics I**
Registration #0511-301

GSSE-302 **Principles of Economics II**
Registration #0511-302

GECN-310 **Managerial Economics**
Registration #0530-310
A further elaboration of the elementary principles of economic analysis in Principles I and II. Particular emphasis will be placed on the application of these principles to the decision-making process of the firm. (GSSE-302)

Class 3, Credit 4 (offered annually)

GECN-405 **Monetary Analysis and Policy**
Registration #0530-405
This course is the study of monetary behavior and the role of monetary institutions in the modem 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. (GSSE-302 or equivalent)

Class 3, Credit 4 (offered annually)

GECN-410 **Applied Econometrics I**
Registration #0530-410
This course is designed to provide students in the economics program with an opportunity to develop their skills in applied regression analysis. This course will cover the various regression models, estimation techniques, data preparation and transformation, and the interpretation of regression results. Particular emphasis on the dangers of misuse of regression techniques. (GECN-302, BBUQ-330, SMAM-226)

Class 3, Credit 4 (offered annually)

GECN-411 **Applied Econometrics II**
Registration #0530-411
This course introduces students to one of the major functions contemporary economists perform—economic forecasting. Students will be exposed to alternative theories and the manner in which economists in both the private and public sector use these frameworks of analysis, data and quantitative methods to generate economic forecasts. (GECN-410)

Class 3, Credit 4 (offered occasionally)

GECN-450 **Intermediate Microeconomic Theory**
Registration #0530-450
This course helps develop the tools of analysis utilized in contemporary economics to study the process of price formulation in a captialist 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. (GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GECN-451 **Intermediate Macroeconomic Theory**
Registration #0530-451
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. (GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GECN-460 **Math Methods: Economics**
Registration #0530-460
This course develops the mathematical skills used by the applied economist in computer-based research. Exercises and research projects for the course will be chosen to illustrate the kind of problems actually dealt with by the contemporary applied economist. (GSSE-302, SMAM-226)

Class 3, Credit 4 (offered occasionally)

GECN-510 **International Trade and Finance**
Restistration #0530-510
This course introduces the students to the theory and the practical issues of the export/import markets, the international flow of capital, and international investment decisions. In addition, the students study the foreign-exchange and the Eurodollar markets and the investment opportunities in them. The role of multinational corporations in international trade and finance is also discussed. (GSSE-301 and GSSE-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GECN-520 **Industrial Organization**
Registration #0530-520
This course is the study of the structure, conduct, and performance of contemporary American industy. 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 competitve market structure. (GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GECN-550 **Seminar in Applied Economics**
Registration #0530-550
A senior-level course emphasizing applications of economic analysis and quantitative methods to economic decision-making. Cases will be drawn from both the private and public sectors of the economy. (Limited to BS in economics and economics degree seniors)

Class 3, Credit 4 (offered occasionally)

Professional and Technical Communication

The following courses are required for the BS degree.

GPTC-200 Foundations of Communication
Registration #0535-200
This course is first an introduction to the theoretical and conceptual underpinnings of oral, visual and written communication. The course introduces basic communication models, the role of language in communication, symbols and symbolmaking, issues of audience analysis, and the development of different modes of discourse. Foundations also explores the history of communication. Finally, the course introduces students to basic research in communications studies.

Class 3, Credit 4

GPTC-210 Human Communication
Regjgjration #0535-210
This course is an overview of the field of communication, including the contexts of interpersonal, group, mass, and public communication. Required course.

Class 3, Credit (offered annually)

GPTC-220 Public Speaking
Registration #0535-220
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 expressions, poise. Required course.

Class 3, Credit 4 (offered quarterly)

GPTC-230 Writing and Thinking
Registration #0535-230
This course develops reasoning and advanced language skills needed to carry out applied logic and applied problem-solving writing processes. Required course. (GLLC-220)

Class 3, Credit 4 (offered annually)

GPTC-310 Conference Techniques
Registration #0535-310
Basic theories of conference techniques including leadership, participation, types, and functions of public and private conferences and their evaluations. Student participation in training, problem solving, and informational-developmental conferences. Required course. (GPTC-200)

Class 3, Credit 4 (offered quarterly)

GPTC-315,316 Research Methods I and II
Registration #0535-315,316
An introduction to the methods and ethics of scholarly communication research. It covers methods of locating, analyzing, and critiquing communication research literature, as well as the techniques of conducting descriptive, experimental, critical, and historical research. The course is offered in a sequence of two 2-credit courses to students in the third year of the Professional and Technical Communication Degree Program. Required course. (GPTC-200, GPTC-230, GPTC-310)

Class 1,315 Credit 2, 316 Credit 2 (offered annually)

GPTC-320 Small Group Communication
Registration #0535-320
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 this course will be on systematic methods of group problem solving and decision making. Professional elective.

Class 3, Credit **4** (offered occasionally)

GPTC-322 Interpersonal Communication
Registration #0535-322
Analysis and application of the major theories of interpersonal communication in various situations. The course focuses on perception of self and others, language use, nonverbal communication, and symbolic interaction in the communication of shared meanings in face-to-face interpersonal relationships. Professional elective.

Class 3, Credit **4** (offered occasionally)

GPTC-324 Interviewing
Registration #0535-324
This course examines dyadic communication as it occurs in the organizational, professional interviewing context. Emphasis is on the major types of interviews: informational, selective, and persuasive. Students are provided with theory, as well as opportunities for skills development. Professional elective. (GPTC-200)

Class 3, Credit **4** (offered occasionally)

GPTC-325 Persuasion
Registration #0535-325
A study in depth of theories, practices, effects and ethics of persuasion. Persuasion is defined as human communication designed to influence one's beliefs, values, attitudes and actions. Required course. (GPTC-200)

Class 3, Credit **4** (offered annually)

GPTC-332 Newswriting
Registration #0535-332
Practicum in basic techniques of newswriting and gathering for the daily press. Emphases will be primarily on writing for the print media and frequent writing against deadlines. Professional writing elective. (GPTC-200, GPTC-230)

Class 3, Credit **4** (offered occasionally)

GPTC-336 Creative Writing: Prose Fiction
Registration #0535-336
An exploration of some of the most important contemporary techniques of prose fiction in the short story form. Professional writing elective. (GPTC-200, GPTC-230)

Class 3, Credit **4** (offered occasionally)

GPTC-337 Creative Writing: Poetry
Registration #0535-337
Both traditional European forms, such as the ballad, villanelle and sonnet, and modern and non-European forms, such as the haiku, pantoum, blues and "free" verse, will be written by students. Technical exercises will concentrate on integration of rational mental processes (observation, reason, research) with non-rational processes (observation, visualization, dreaming) in the poetic act. Attention will be paid to poetry as performance as well as written artifact. Students will be required to write weekly.

Class 3, Credit 4 (offered annually) Class 3, Credit 4 (offered on sufficient demand

GPTC-350 Mass Communication
Registration #0535-350
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. Required course. (GPTC-200)

Class 3, Credit 4 (offered annually)

GPTC-415 Organizational Communication
Registration #0535-415
This course examines both interpersonal and small-group communication in organizational settings. Topics include information flow and networks, organizational theory, managerial decision making, interviewing, organizational development, and conflict resolution. Professional elective. (GPTC-316)

Class 3, Credit 4 (offered occasionally)

GPTC-420 Advanced Public Speaking
Registration #0535-420
This course blends classical and modern public address theory in an attempt to produce the speaker who is both wise and eloquent. The course focuses on ideas—how to invent, arrange, stylize and deliver them. Attention is given to the creative use of language, special-occasion speeches, speaking in front of a camera, and the ethics of public speaking. Professional elective. (GPTC-220)

Class 3, Credit 4 (offered occasionally)

GPTC-425 Teleconferencing Communication
Registration #0535-425 Management
This course examines interactive electronic communications technologies (teleconferencing) used in a growing number of organizations. Emphasis is on the effects these technologies have on human interaction, methods of management, and organizational processes. Students are required to engage in frequent interaction, perform research, and manage actual conferences. The majority of this course is conducted via computer conferencing. Professional elective. (ICSA-200, GPTC-310)

Class 3, Credit 4 (offered occasionally)

GPTC-430 Technical Writing
Registration #0535-430
This course develops in students those skills necessary for completing technical writing tasks, such as instructional memos; letters of inquiry; reports (trip, progress/status, accident, research, feasibility); problem analyses; specifications; flow charts; technical manuals. Enrolled students should have command of clear and logical standard written English prose. (GPTC-200, 230)

Class 3, Credit 4 (offered annually)

GPTC-432 History of the English Language
Registration #0535-432
What makes the English language so difficult? Where do our words come from? Why is it a challenge for native speakers to master English grammar? This course surveys the development of the English language from its beginning to the present to answer such questions as these about the nature and flexibility of English. Professional elective. (GPTC-200, 230)

Class 3, Credit 4 (offered annually)

GPTC-436 Advanced Creative Writing
Registration #0535-436
Students who have completed Creative Writing or who have satisfied the instructor, normally by presentation of a written 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 in conference with the instructor. The acceptability of the project will be determined on the basis of its intrinsic literary merit and its potential value to the student's development as a writer. Professional writing elective. (GPTC-336)

Class 3, Credit 4 (offered occasionally)

GPTC-445 Theories of Communication
Registration #0535-445
This course is an introduction to human communication theory, including a history of the major stages in development of modem theories of communication. Theories based both in thehumanities and the social sciences will be covered. Required course. (GPTC-316)

Class 3, Credit 4 (offered annually)

GPTC-450 Visual Communication
Registration #0535-450
This course examines communication processes and principles that use the visual mode. Through a survey of the several areas represented in the literature of visual communication, this course examines theories, analysis, and sender and receiver orientations to images. Emphasis is on communicative understanding rather than on the aesthetic, technical or skills approach. Discussion will primarily depend on, but will not be limited to, the photographic image. Required course. (GPTC-200, 210)

Class 3, Credit 4 (offered annually)

GPTC-452 Uses and Effects of Mass Media
Registration #0535-452
An analysis of the "effects" and the "uses and gratifications" of mass communication research with focus on building mass communication theory. (GPTC-350)

Class 3, Credit 4 (offered occasionally)

GPTC-454 Communication and
Registration #0535-454 Documentary Film
An examination of the documentary film and video as case studies in communication media. The course focuses on film techniques used as argument, persuasion, propaganda and reconstruction of reality. Such elements as director, subject, shooting style and editing techniques will be analyzed in terms of message, purpose and audience. Professional elective. (GPTC-200)

Class 3, Credit 4 (offered occasionally)

GPTC-515 Persuasion and Social Change
Registration #0535-515
Reading and analysis of selected public speeches and essays advocating or opposing major issues of social change in the United States from the 18th century through contemporary advocacy. Professional elective. (GPTC-325)

Class 3, Credit 4 (offered occasionally)

GPTC-520 Intercultural Communication
Registration #0535-520
This course is an examination of the role of culture in face-to-face interaction. Students may find a basic background in communication, anthropology or psychology useful. Professional elective. (GPTC-200)

Class 3, Credit 4 (offered occasionally)

GPTC-525 Special Topics in Communication
Registration #0535-525
A focused, in-depth study and analysis of a selected advanced topic in communication and associated issues. Specific topic will vary according to faculty assigned and will be published when the course is offered. Topics include: semiotics, public relations, communication technologies, gender differences in communication, legal communication, and censorship and propaganda. Professional elective. (For junior and senior PTC students; non-PTC students must receive permission of the instructor) (GPTC-200)

Class 3, Credit 4 (offered occasionally)

GPTC-530 Advanced Technical Writing
Registration #0535-530
This course develops in students those skills necessary for designing, writing and editing long technical documents, such as final reports and manuals. Special emphasis is given to computer-designed graphics and page layout. Students enrolling should have command of concise English prose. (This course will be taught with a Macintosh microcomputer.) Professional elective. (GPTC-430)

Class 3, Credit 4 (offered annually)

GPTC-532 Professional Writing
Registration #0535-532
This course develops in the student those professional writing skills necessary to the composition of in-house journals or newsletters; press releases; trade journals/books; speeches; general-interest writing; and ghost writing. Students enrolling in the course should have command of clear and logical standard written English prose. Required course. (GPTC-200, 230)

Class 3, Credit 4 (offered annually)

GPTC-550 Film and Society
Registration #0535-550
An inquiry concerning the relationship between motion pictures and society that will use historical, humanistic, and social science research to achieve an understanding of movies as a social force, industry and art form. Professional elective. (GPTC-350)

Class 3, Credit 4 (offered occasionally)

GPTC-595 Senior Thesis in Communication
Registration #0535-595
Senior Thesis is a guided research seminar culminating in a major project that brings communication studies and substantive work in the technical studies area together. The course focuses on designing, conducting and completing an independent research project. The progress of each project will be shared with the class for discussion and critiques. Required course. (GPTC-445)

Class 3, Credit 4 (offered annually)

Social Work

Core Courses

GSWS-210 The Professional
Registration #0516-210 Social Work Role
This course explores social work as a profession, the various fields in which social workers practice and the differing philosophies of human services and social work approaches. Also covered are strategies for developing self-awareness and professional self-assessment.

Class 3, Credit 4 (F)

GSWS-212 Self-Awareness in the Helping Role
Registration #0516-212
This course helps to develop students' helping skills in essentially three broad areas: 1) Skills in noticing or observing; 2) Observing one's professional use of self in the helping relationship and evaluating the appropriateness of such behavior; and 3) Observing the client and evaluating the effect one's response has on her/him.

Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills. (GSWS-210)

Class 3, Credit 4 (F,W)

GSWS-216 Introduction to Social Welfare
Registration #0516-216
This course is designed to introduce students to and expand their interest in the field of social welfare through exploration of practice settings in which social workers are employed. The primary method for students to learn about these settings is by developing basic informational interviewing skills and then practicing them in actual interviews with social workers in agencies. Through the collective efforts of students in the course, a overview of basic social welfare services and advocacy groups will be attained.

Class 3, Credit 4 (W)

GSWS-217 Community Services
Registration #0516-217
This beginning level social work course is designed to introduce students to service delivery systems and client systems. As volunteers, students will have the opportunity to observe professional practice, be exposed to a social work setting, and interact with agency clientele. (GSWS-216)

Class 3, Credit 4 (S)

GSWS-302 History of Social Welfare
Registration #0516-302
This course is designed to acquaint the student with the historical roots of our present system of social welfare, emphasizing its development in the United States, and the concurrent development of social work as a profession. It will examine the value bases and the economic, social and political factors of each era as reflected in the social welfare programs of that time and their effects on people. (GSWS-217)

Class 3, Credit 4 (F)

GSWS-305 Structure and Function
Registration #0516-305 of Social Welfare
Examines the provision of current social services in five major fields of social welfare: public welfare, traditional voluntary agencies, voluntary social movements, mental health and the legal system. Course also will explore organization theory as it applies to the structure of these services, as well as major patterns and sources of funding. (GSWS-302 or concurrent)

Class 3, Credit 4 (W)

GSWS-405 The Family from a Social
Registration #0516-405 Work Perspective

This course is designed to give the social work student a basic understanding of the family as client. Students will gain an understanding of the family dynamics and the choices and decisions about family life that are required in contemporary society. A major focus of the course is the family throughout its natural life cycle and areas of potential problems during its development when social work intervention may be beneficial. Students will also learn about changes which can affect the family such as divorce, single-parenthood, remarriage, AIDS, death in the family, alcoholism, and family violence. Also included are the influences currently affecting contemporary American families such as social class, racism, ethnicity, poverty, and the changing status of women. (GSSP-210,440, 442)

Class 3, Credit 4 (W)

GSWS-435 Computer Applications to
Registration #0516-435 Social Work Research

Introduction to the methodology of research in behavioral and social sciences. Emphasis will be on an introduction to bibliographic search procedures, becoming a practitioner/researcher, evaluation of one's own professional practice, formulation of research, the environmental contexts of research, ethics and confidentiality, research methods and design, sampling, measurement, validity, reliability, indexes, scales, instrument design and basic descriptive statistics. Instruction, practical demonstration and hands-on experience are provided in computer applications ranging from electronic communication including submission of assignments, storage of information, text formatting, ethics and confidentiality of electronically stored information, data processing and report writing. (SMAM-204, CTAM-361)

Class 3, Credit 4 (S)

GSWS-456 Group Theory in Social Work
Registration #0516-456

This course covers the theoretical foundations of group dynamics and group behavior within the context of social work. Such concepts as types of groups (prevention, rehabilitation), group development, composition, group processes (problem-solving, decision-making, affection), program, leadership, communication, structure and modes of intervention are covered. The course provides the knowledge and initial experiential base for the development of practice skills in working with groups. (GSWS-455, third-year standing)

Class 3, Credit 4 **(F)**

GSWS-465 Assessing Community Needs
Registration #0516-465

A study of assessment techniques for identifying the strengths and weaknesses of services provided within a community. Involves analysis of data using a computer statistical package. Topics covered include program evaluation, quality assurance procedures and community networking. Attention will be given to programs for minority groups, the disabled, the elderly, youth, persons with mental health problems and other special populations. (GSWS-405,456, third-year standing)

Class 3, Credit 4 (S)

GSWS-475 Interviewing and the Helping
Registration #0516-475 Relationship

This course is the first in a three-year course sequence offered concurrently with laboratory or field instruction dealing with generalist social work practice. All three courses emphasize the differential use of social work techniques (e.g., interviewing skills, assessment, data-collection and problem-solving) and 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-405, 456)

Class 3, Credit 4 (S)

GSWS-505 Assessment and Problem Solving
Registration #0516-505

See GSWS-475 (GSWS-435, 465, 475; corequisite with GSWS-506, 527, 535)

Class 3, Credit 4 (F)

GSWS-506 Field Instruction I
Registration #0516-506

Field Instruction I and II comprise a 20-week, 30-hour per week supervised field placement. Under the guidance of an instructor the student is placed in a cooperating social, governmental, health or educational agency in order to gain direct experience with its organization, programs and client services. Closely supervised work at the agency is supplemented by seminars designed to integrate theory and practice. (GSWS-435, 465, 475; corequisite with GSWS-505, 527, 535)

Field 300, Credit 5 (F)

GSWS-527 The Supervisory Process
Registration #0516-527

The Supervisory Process is a practicum seminar taken during the first quarter of field instruction. Students and instructor will discuss topics related to field experiences and concerns. The seminar will study the supervisory process and topics to be analyzed will include: staff structure; work loads and distribution; the responsibilities of supervisor and supervisee; the ethics of supervision and professional growth.

This practicum is taken concurrently with Field Instruction I, Assessment and Problem Solving, and Advanced Social Work Research. It is intended to help students integrate field experiences with their pre-field course content and the concurrently taken courses. (GSWS-435, 465, 475; corequisite with 412, 421,535)

Class 3, Credit 4 (F)

GSWS-535 Advanced Social Work Research
Registration #0516-535

This is the first of a two-course sequence in which students will conduct research on one or more aspects of professional social work practice during their concurrent field experience. Students will use information learned from their first social work computer research course and their statistics courses. The continued use of the computer as a research tool will be studied, with emphasis on the application of MINITAB and SPSS-X. Specific research designs and statistical analyses applicable to data generated during fied work experience will be reviewed. Major focus will be on idiographic "single subject" design research and a review of quantitative research, Chi-square, PPMCC, Spearman's rho, T-test, ANOVA, and qualitative analyses popular in social work research. (CTAM-361)

Class 3, Credit 2 (F)

GSWS-540 Evaluation of Practice
Registration #0516-540
This is the second of a two-course sequence and will be built on, material learned in Advanced Social Work Research and its prerequisite. Students will learn about baseline assessments, the ethics of research, and experimental research. They will also learn about report writing, grant writing, and the politics of research. Also, concerns and issues in research with special populations and cross-cultural research will be explored. (CTAM-361)

Class 3, Credit 2 (W)

GSWS-550 Social Intervention
Registration #0516-550
See GSWS-475 (GSWS-505, 506, 527, 535; corequisite with GSWS-551,560)

Class 3, Credit 4 (W)

GSWS-551 Field Instruction II
Registration #0516-551
See GSWS-506 (GSWS-505, 506, 527, 535; corequisite with GSWS-540, 550, 560)

Field 300, Credit 5 (W)

GSWS-560 Managing Community Services
Registration #0516-560
A weekly seminar, taken during the second quarter of field placement, in which students continue to read, write, think about and discuss issues directly related to their field practice and social work education. Continuing with the work of the first quarter seminar for field students, this course will focus on students' experiential and professional needs. Community service agency management issues will be explored; for example, the management of human resources through supervision, "accountability" and "termination" issues, and how they relate to agency morale and human service delivery.

The seminar is taken concurrently with Field Instruction II, Social Intervention, and Evaluation of Practice. All three courses share common objectives as well as the study of the Social Work Competencies and the generalist practice model. Effort will be made by faculty to ensure that students in the field education sequence successfully integrate course content and objects. (GSWS-505, 506, 527, 535; corequisite with GSWS-540, 550, 551)

Class 3, Credit 4 (W)

GSWS-595 Policy and Planning Processes
Registration #0516-595
For social work students who have completed field instruction. Course will explore the development of social welfare services as it proceeds from the determination of social need through program design to implementation. Concepts of policy process, large system change, and grant and proposal writing are considered. (GSWS-550, 551, 560)

Class 3, Credit 4 (S)

GSWS-598 ' Professional Seminar
Registration #0516-598
For social work students who have completed field instruction. Purpose of this course is to serve as a capstone in the student's social work education and to facilitate the integration of all content areas in the curriculum. This integration is achieved through presentations by faculty, practitioners and invited experts in order to cover the interrelationships between values and ethics of the profession; human behavior and the social environment; needs assessment and research techniques; methods of intervention; and policy, planning and funding processes. This integration is demonstrated by students through a major paper, which combines these areas with the student's chosen field of application, using a primary, secondary and tertiary prevention approach for a specifically shown target population-at-risk and underserved populations. (GSWS-550, 551, 560)

Class 3, Credit 4 (S)

Professional Elective Courses

GSWS-314 The Social Worker as Advocate
Registration #0516-314
This course will examine the role of social workers in advocating with and on behalf of clients and others for negotiating or bringing about needed change in institutions or policies of our society. Discussion of the forces in the social, economic and political environment today that directly affect poverty, racism and other issues will be related to examining techniques for achieving change.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-320 Alcoholism: Physiology
Registration #0516-320 and Psychology
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. (GSWS-302, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)

Class 3, Credit 2 or 4 (offered occasionally)

GSWS-321 Alcoholism: Interventive
Registration #0516-321 Skills and Techniques
Teaches a variety of interventive skills used by those giving care to alcohol abusers, their families and communities. Emphasis is on the method of use of these skills. Role play, videotaping and case study will be included. (GSWS-302, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)

Class 3, Credit 2 or 4 (every other year)

GSWS-322 Alcoholism: Employee Assistance
Registration #0516-322 Programs and Community Resources
The course analyzes symptoms and diagnosis of the alcohol abuser and current methods of rehabilitation. Explores structure, function and use of community resources including the increasing role played by Employee Assistance Programs (EAPs). (GSWS-302, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)

Class 3, Credit 2 or 4 (offered occasionally)

GSWS-330 Rural Social Services
Registration #0516-330
The course will identify the historical development, cultural makeup, family lifestyles and work habits of the nation's migrant population and the rural poor. The course will examine and critically analyze the differences between migrants and the rural poor and compare them to the characteristics of the urban poor found in contemporary American cities. The course considers governmental rural policies and service-delivery systems directed to the rural areas which reflect the economic, political and social conditions during the time they were developed. The skills of generalist social work as applied in the rural setting are compared to application in urban settings.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-340 Deafness: Fundamental Aspects
Registration #0516-340
This course is designed to provide the student with a basic understanding of deafness. The overview includes how we hear, techniques for diagnosis, the etiology of deafness, as well as a historical perspective on how education for the deaf has developed with its various philosophies. Language acquisition and modes of communication are explored, as well as the social, psychological and vocational development of deaf persons.

This is the first course in a sequence that will provide a knowledge base for the development of generalist social work practice skills. (GSWS-302,455, GSSP-210,440,442)

Class 3, Credit 4 (W)

GSWS-341 Psychosocial Implications
Registration #0516-341 of Deafness
The purpose of this course is to provide the student with an in-depth examination of the psychosocial implications of deafness for the individual. The various systems with which the deaf individual interacts will be examined for relevance to the development and functioning of the individual. The course also examines how the individual and these systems impact and influence each other. These systems will include family, school, service-delivery systems and society. (GSWS-340)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-342 Deafness: Intervention Strategies
Registration #0516-342
The purpose of this course is to build skills in applying the knowledge base developed in the prerequisite course to case situations. Students demonstrate collection and recognition of pertinent information, and development and implementation of appropriate intervention plans. Legal and political issues, as well as methods of assessing local resource networks, are considered. Professional roles and intervention goals are discussed as they relate to interfacing systems, including individual, family, school, medical, mental health, rehabilitation and employment. (GSWS-340)

Class 3, Credit 4 (every other year)

GSWS-357 Mental Health and Mental Illness
Registration #0516-357 from a Social Work Perspective
This course is designed to give social work students a basic understanding of mental health, mental illness and mental retardation from a social work perspective. The role of the social worker in working with individuals and their families will be included. Students will be given a general understanding of our current mental health systems. The medical model and alternative systems of diagnosis are considered. (GSWS-302, 455, GSSP-210, 440, 442)

Class 3, Credit 4 (every other year)

GSWS-360 Social Work with the Disabled
Registration #0516-360
This course provides an examination of the psychosocial aspects of disabilities, the course emphasizes the effects of disability on the individual's development and functioning and the accompanying stress on the family and society in attempts to respond to her/his needs. Interventive strategies and critical times for intervention by the social worker are examined. (GSWS-302, 455, GSSP-210,440, 442)

Class 3, Credit 4 (S, every other year)

GSWS-370 Child Protective Services
Registration #0516-370
This course examines the concepts and knowledge base of child abuse and neglect. Topics will include: definition of abuse and neglect; a historical perspective; possible causes and effects of abuse; intervention strategies; statutes and legislation; preventive approaches; child abuse services in New York State; provision of service; role of the social workers; and future concerns in this problem area. (GSWS-302,455, GSSP-210, 440,442)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-380 Social Work and the Law
Registration #0516-380
This course provides the student with the opportunity to develop a workable vocabulary and understanding of some of the basic legislative processes and laws that affect the practice of social work. Focus centers around significant issues and points of law that have affected the delivery of services. (GSWS-302, 455, GSSP-210,440,442)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-455 Contemporary Issues in Social Work
Registration #0516-455
This course is designed to offer students an opportunity to examine and discuss contemporary issues in the field of social work. Course content will vary from quarter to quarter depending on current issues and student interest. Areas related to expressed student interest, family expertise and developments in the field will be examined. (GSWS-302, GSSP-210,440,442)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-509 Services for Children
Registration #0516-509 and Their Families
This course is designed to give social work students a beginning knowledge of social work services to children and their families. Specific services included are preventive services, homemakers, day care, protective services, foster care, adoption, unmarried parents, institutional care and mental health services. The development of each type of service will be discussed, as well as the reasons why each service is needed and for what type of situation. The social worker's role in each area will also be considered. (GSWS-302,455, GSSP-210, 440,442)

Class 3, Credit 4 (every other year)

GSWS-512 Advanced Intervention
Registration #0516-512 with Individuals
This course builds upon the knowledge base of generalist social work practice and develops students' understanding of the specific way in which these concepts and theories are applied in social intervention with individuals. Use will be made of case studies and role playing to further develop the students' skills in this area. (GSWS-550,551, 560)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-513 **Advanced Intervention**
Registration #0516-513 **with Families**

This course is for students who have completed the practice sequence and field instruction, and have learned the theories and concepts of generalist social work intervention. This course builds on that knowledge base and develops the students' understanding of the specific ways in which these concepts and theories are applied in intervention with families. (GSWS-550, 551, 560)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-522 **Advanced Intervention**
Registration #0516-522 **in Communities**

This course examines community intervention as a social work method. The roles and functions of the community intervention practitioner and alternate methods of practice are analyzed, such as locality development, social planning and social action. The course will investigate specific applications of community intervention theory to political influence processes, coalition, neighborhood associations and regionalization. (GSWS-550, 551, 560)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-523 **Advanced Intervention**
Registration #0516-523 **with Groups**

This course examines social treatment as one form of group work practice. There are different service procedures and approaches which may be applied to client groups, and each may have utility in pursuing distinct service objectives. The course will investigate the scope, techniques and functions of generalist social work practice in such diverse settings as social service agencies, business, correctional institutions and communities. (GSWS-550, 551,560)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-525 **Grant Writing**
Registration #0516-525

This course is designed to provide the student with a series of readings and experiential exercises necessary for writing a grant proposal. Focus will be on funding sources which provide money for social welfare programs and for research into social work. (GSWS-302, 455, GSSP-210, 440, 442)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-536 **Aging and Society**
Registration #0516-536

This course considers concepts, issues and research techniques in the behavioral and biological aspects of aging. It examines the interaction of group processes in the family and community which influence society's attitudes toward the aging process. It further examines the culture, environmental and institutional changes as they relate to an increasing population of older people. (GSWS-302, 455, GSSP-210, 440, 442) (May also be taken for liberal arts elective credit. See GSSS-508)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-537 **Social Policy and the Aging**
Registration #0516-537

This course will be organized around culture and values as the context for policy formulation. Special attention will be given to the process of policy analysis and implementation. Several specific policy areas will be examined: social security and income maintenance; health and long-term care; work and retirement; social services and the aging network; housing and living arrangements for the elderly; and the role of the family and the elderly. (GSWS-302, 455, GSSP-210, 440, 442) (May also be taken for liberal arts elective credit. See GSSS-515)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-538 **Family Violence**
Registration #0516-538

This course is designed to acquaint social work students and practitioners with the problem of family violence. The causes and dynamics of various forms of violence in the family will be addressed. These include: child abuse, incest, spouse abuse, sibling violence, marital rape, abuse of parents by adolescents, and the abuse of the elderly by their adult children. Factors affecting intervention in families where these occur and techniques for intervention will be included. (GSWS-302, GSHH-493, GSSP-210,440, GSSS-210, 526,527, SBIG-211, 212)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-539 **Services for the Aging**
Registration #0516-539

This course deals with the variety of existing community-based services available for the elderly. The course also examines the tactics, assessment, coordination and evaluation of various direct and indirect services for the elderly. Particular attention will be given to such service groups as nursing homes, home health care, mental health and other formal and informal support systems. (GSWS-302,455, GSSP-210,440,442)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-599 **Independent Study**
Registration #0516-599

A combined student/faculty effort on a chosen topic beyond the normal course selections. It provides the self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement. Independent Study may include independent work in an agency setting or other field work away from the Rochester area.

Credit variable (F, W, S, SR)

Liberal Arts Courses

Language, Literature and Communication

GLLC-220 **English Composition**
Registration #0502-220

This course develops the language skills needed to write effectively. It should be taken in the freshman year.

Class 3, Credit 4 (offered quarterly)

GLLC-440 **Human Communication**
Registration #0502-440

This course 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. (GLLC-220 or equivalent)

Class 4, Credit 4 (offered quarterly)

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. (GLLC-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 commmunication 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. (GLLC-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. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-444 **Technical Writing**
Registration #0502-444
This course develops in students those skills necessary for completing technical writings tasks, such as instructional memos; letters of inquiry; reports (trip, progress/status, accident, research, feasibility); problem analyses; specifications; flow charts; technical manuals. Students enrolling in Technical Writing should have command of clear and logical standard written English prose. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-445 **History of the English Language**
Registration #0502-445
What makes the English language so difficult? Where do our words come from? Why is it a challenge for native speakers to master English grammar? This course surveys the development of the English language from its beginning to the present to answer such questions as these about the nature and flexibility of the English language. This course is designed for anyone who is curious about the English language. This course is part of the Language Concentration and also may be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-446 **Advanced Technical Writing**
Registration #0502-446
This course develops in students those skills necessary for designing, writing and editing long technical documents, such as final reports and manuals. Special emphasis is given to computer-designed graphics and page layout. Students enrolling should have command of concise English prose. (This course will be taught with a Macintosh microcomputer.) This course is part of the language concentration and may also be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-490 **Persuasion and Social Change**
Registration #0502-490
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. This course is part of the Peace Studies Concentration and also may be taken as a liberal arts elective.

Class 3, Credit 4 (offered occasionally)

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 occasionally)

GLLC-504 **Theories of Communication**
Registration #0502-504
This course is an introduction to human communication theory, including a history of the major stages in the development of modern theories of communication. Theories based both in the humanities and the social sciences will be covered. (GLLC-440 and either GLLC-442 or GLLC-502 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-507 **Professional Writing**
Registration #0502-507
This course develops in the student those professional writing skills necessary to the composition of in-house journals or newsletters; press releases; trade journals/books; speeches; general interest writing; and ghostwriting. Students enrolling in the course should have command of clear and logical standard written English prose. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-508 **Organizational Communication**
Registration #0502-508
This course examines both interpersonal and small group communication in organizational settings. Topics to be covered include information flow and networks, organizational theory, managerial decision making, interviewing, organizational development, and conflict resolution. (GLLC-440 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-510 **Visual Communication**
Registration #0502-510
This course examines communication processes and principles that use the visual mode. Through a survey of the several areas represented in the literature of visual communication, this course examines theories, analysis, and sender and receiver orientations to images. Emphasis is on communicative understanding rather than aesthetic, technical, or skills approach. Discussion will primarily depend on, but will not be limited to, the photographic image.

Class 3, Credit 4 (offered annually)

GLLC-513 **Interviewing**
Registration #0502-513
Inteviewing examines dyadic communication as it occurs in the organizational, professional interviewing context. Emphasis is on the major types of interviews: informational, selection, and persuasive. Students are provided with theory, as well as opportunities for skills development.

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 the focus on building mass communication theory. NOTE: Students may find GLLC-514 a useful introduction to this course.

Class 3, Credit 4

GLLC-516 Creative Writing/Poetry
Registration #0502-516
An exploration of the techniques of writing poetry in both open and closed forms. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-517 News Writing
Registration #0502-517
Practicum in basic techniques of news writing and gathering for the daily press. Emphases will be primarily on writing for the print media and on frequent writing against a deadline.

Class 3, Credit 4 (offered occasionally)

GLLC-518 Creative Writing/Prose Fiction
Registration #0502-518
An exploration of some of the most important contemporary techniques of prose fiction in the short story form. This is a writing elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered 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. (GLLC-220 or equivalent)

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. (0502-220 & 0504-332)

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-524 Communication and Documentary Film
Registration #0502-524
An examination of the documentary film and video as case studies in communication media. The course focuses on film techniques used as argument, persuasion, propaganda and reconstruction of reality. Such elements as director, subject, shooting style, and editing techniques will be analyzed in terms of message, purpose and audience.

Class 3, Credit 4 (offered annually)

GLLC-525 Special Topics in Communication
Registration #0502-525
A focused, in-depth study and analysis of a selected advanced topic in communication and associated issues. Specific course topic will vary according to faculty assigned and will be published when the course is offered. Topics include: semiotics, public relations, communication technologies, gender differences in communication, legal communication, and censorship and propaganda. (For junior and senior PTC students; non-PTC students must receive permission of the instructor)

Class 3, Credit 4 (offered annually)

GLLC-526 Advanced Public Speaking
Registration #0502-526
This course blends classical and modern public address theory in an attempt to produce the speaker who is both wise and eloquent. The course focuses on ideas—how to invent, arrange, stylize, and deliver them. Attention is given to the creative use of language, special occasion speeches, speaking in front of a camera, and the ethics of public speaking. (GLLC-501 or equivalent)

Class 3, Credit **4** (offered occasionally)

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). (Sign language)

Class 3, Credit 4 (offered occasionally)

GLLF-400,440-41 American Sign Language I, II, III
Registration #0503-400,440-41
This course presents a study of the origins, nature, and development of American Sign Language (ASL), and its variants, as used by the deaf population of North America. Integral to the course is the linguistic structure of ASL and the nature of signing as a linguistic modality. These courses are not part of any concentration.

Class 3, Credit 4 (offered annually)

GLLF-405,445-46 Beginning Arabic I, II, III
Registration #0503-405,445-46
This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is certified by NASILP and uses course material and examiners accredited by NASILP.

These courses will introduce students with no prior exposure to the language to modern standard Arabic. Arabic I will introduce the phonology and script. Throughout, the emphasis will be on acquiring oral skills. These courses are not part of any concentration. (Permission of the foreign language coordinator)

Class 3, Credit 4 (offered annually)

GLLF-408,451-55 Beginning Chinese I, II, III, IV, V,VI
Registration #0503-408, 451-55
This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is certified by NASILP and uses course material and examiners accredited by NASILP.

These courses will introduce students with no prior exposure to the language to elementary spoken Mandarin. The Chinese writing system will be introduced in Chinese III. Courses II and III are part of the Foreign Language/Culture Concentration and may also be taken as electives. (Permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLF-412,472-74 Beginning German I, II, III, IV
Registration #0503-412,472-74
This sequence of courses is designed to give students with no prior exposure to the language a sound basic knowledge of German as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the German-speaking countries. Courses II and III are part of the Foreign Language/Culture Concentration and may also be taken as electives.

Class 4, Credit 4 (offered annually)

GLLF-420,480-84 Beginning Japanese I, II, III, IV, V, VI
Registration #0503-420,480-84
This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is certified by NASILP and uses course material and examiners accredited by NASILP.

These courses will introduce students with no prior exposure to the language to elementary spoken Japanese. The Japanese writing system will be introduced in Japanese III. Courses II and III are part of the Foreign Language/Culture Concentration and may also be taken as electives. (Permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLF-430,490-92 Beginning Spanish I, II, III, IV
Registration #0503-430, 490-92 [4]
This sequence of courses is designed to give students with no prior exposure to the language a sound basic knowledge of Spanish as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the Spanish-speaking countries. Courses II and III are part of the Foreign Language/ Culture Concentration and may also be taken as electives.

Class 4, Credit 4 (offered annually)

GLLF-464-66 Beginning French II, III, IV
Registration #0503-464-66
This sequence of courses is designed to give students with one or two years of high school French a sound basic knowledge of French as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the French-speaking countries. These courses are not part of any concentration.

Class 3, Credit 4 (offered occasionally)

GLLL-332 . . Literature
Registration #0504-322
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 and 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, GLLL-338, are the only required literature courses in the student's career.

Class 2, Credit 2 (offered on sufficient demand)

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, GLLL-337, are the only required literature courses in the student's career.

Class 2, Credit 2 (offered on sufficient demand)

GLLL-440 Drama/Theatre
Registration #0504-440
Drama/Theatre studies drama as a genre and theatre as a performing art. Intensive study of at least one major playwright or period complements a general survey of drama/theatre from ancient Greece to modern Broadway. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-441 The Art of Poetry
Registration #0504-441
This course emphasizes the enjoyment and study of poetry with primary attention to major poetry in English. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

GLLL-442 Short Story
Registration #0504-442
The course is a study of a collection of short stores with critical commentary in order to provide source materials on the nature and development of this genre. The course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-443 The Novel
Registration #0504-443
The Novel provides a close reading and analysis of several novels selected to show the range of narrative techniques, methods of characterization and plot construction, and styles representative of the genre. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-444 Film as Literature
Registration #0504-444
This course examines the nature of narrative in both film and literature, the various aspects of adaptation of literature into film, and the relationship between social reality and storytelling in documentary film. This course is a non-technical, non-chronological study of film with a balance of roughly 50% literature and 50% film. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-445 Great Authors
Registration #0504-445
This course provides extended study of the works of specific great authors (listed in the course titles that follow). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also can be taken for the Literature Concentration or elective credit. Detailed descriptions, objectives and content/methods appear under each subtitle (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-445 Great Authors: Mark Twain
Registration #0504-445 and the American Dream
The course will consist of readings from the bitter-comic writings of the last part of Twain's career, focusing on his philosophy of total determinism, his disenchantment with the "damned human race" and its institutions of government, his trust in and later disillusionment with industrialism, and his romantic nostalgic desire to return to an idyllic pre-Civil War existence. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Ibsen-
Registration #0504-445 Drama and Film
Reading and/or viewing ten plays of Henrik Ibsen, the father of modern drama, enables attentive examination of values and structures of modern society that form and formulate the lives of women and men. Ibsen argues that the possibility of individual freedom and creativity can only be won by seeing beyond and acting in spite of formidable forces. The texts and films are analyzed for visual, as well as verbal, information. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Chaucer and
Registration #0502-445 His Times
A close reading of the major poetry of Geoffrey Chaucer and *The Pearl* poet in modern English translation, and a brief introduction to the history of the English language. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Jonathan Swift
Registration #0504-445 and the Age of Satire
Vicious satirical writings of Jonathan Swift and other early 18th century authors will be read and analyzed focusing on the intrigue and scandals marking the political and religious environment of the age. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Hawthorne
Registration #0504-445
This course provides an extended study of the works of Hawthorne that includes short stories, sketches, and novels. This course is part of the Literature Concentration and also may be taken as an elective. (0504-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Henry James
Registration #0504-445
This course will survey the writings of Henry James and examine his use of the "international theme"; his treatment of the relations between men and women; his fictional patterns of initiation, manipulation, and corruption; and his interest in the "psychological novel." We will also examine James's contributions to literary theory and his experiments with literary form. (GLLL-332 or equivalent)

Class 3, Credit 4

GLLL-445 Great Authors: James Joyce
Registration #0504-445
Careful study of three of James Joyce's major works: *Dubliners, A Portrait of the Artist as a Young Man,* and *Ulysses.* This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Shakespeare—
Registration #0504-445 Tragedy and Romance
A generous sample of Shakespeare's tragic and romantic plays is investigated to reveal literary excellence and theatrical power. Reference is made to his poems; to the sources of his plays; to the world of Shakespeare's time, its intellectual preconceptions, political stresses, and religious rivalries; and to the theatre and its traditions. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-445 Great Authors: Shakespeare—
Registration #0504-445 Comedy and History
Several of Shakespeare's comedy and history plays are read and analyzed to reveal their literary excellence and theatrical power. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

GLLL-445 Great Authors:
Registration #0504-445 Tolstoy and Dostoevsky
A study in the contrasting styles, themes and purposes of two of the world's greatest novelists. Either *War and Peace* or *The Brothers Karamazov* will be read—along with several of the shorter works by each author. The writers will be studied in the context of nineteenth century Russia and for the implications their works and lives continue to have for twentieth century Western culture. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-446 **Modern Literature**
Registration #0504-446
The course provides extended study of works written in the 20th century (the particular genres or topics are listed in the titles that follow). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also may be taken for concentration or elective credit. Detailed descriptions, objectives, and content/methods appear under each subtitle. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-446 **Modern Literature:**
Registration #0504-446 **Modern World Drama**
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 modem world. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-446 **Modern Literature:**
Registration #0504-446 **20th Century World Fiction**
Reading 20th century short stories and novels from the East, West and Third World reveals, in addition to stylistic innovation and excellence, a variety of perspectives, values, and problems that contribute to the delineation of contemporary global civilization. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-446 **Modern Literature:**
Registration #0504-446 **Modern Poetry**
A close examination of the poems of important English and American poets of the 19th and 20th centuries, including several living poets. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-446 **Modern Literature:**
Registration #0504-446 **Latin American Literature**
Reading short stories, novels, and poetry of modern Mexico, Central and South America reveals a literature and culture wherein the mythic functions as an integral part of the modern world view and the poetic functions as a political power. The impressive vitality of modern Latin American literature can be attributed to its indigenous roots and to its branches that, stemming from a common language and a shared continent, overarch national boundaries and political regimes to form an international literary community. This course is part of the Literature Concentration and the Foreign Language/Culture Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-446 **Modern Literature**
Registration #0504-446 **World Literature in English**
The course will cover short stories and novels written in English by Australian, African, Asian, and West Indian authors. The selections will be discussed against the background of the social, political, and cultural milieu in which the authors worked. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-446 **Modern Literature: American**
Registration #0504-446 **Literature of the 20s and 30s**
A study of American writers of the 20th century with particular attention to the beginnings of realism, naturalism, and symbolism. A survey of the literature of two decades: the '20s and the '30s, and the study and interpretation of the themes of myth, escape and protest. The work of Fitzgerald, Hemingway, Steinbeck, and others will be read. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic**
Registration #0504-447
The course provides extended study of special topics in literature (the particular topics will be listed in the subtitles). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also can be taken for concentration or elective credit. Detailed descriptions, objectives, and content/methods appear under each subtitle. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic: Technology**
Registration #0504-447 **in American Literature**
A study of 19th and 20th century American literature (short stories, essays, poems, and novels) commenting on the impact of technology on society. The works selected reflect mostly the skeptical response of American writers to the technological Utopia. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic: The Nightmare**
Registration #0504-447 **of Technology—Studies in**
19th Century British Writings
A study of 19th century British prose and poetry. Attention will be devoted to the effects of industrialism on a changing English society. The course will study, in general, the various social problems confronting 19th century England and how various writers responded to these problems in their works. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:**
Registration #0504-447 **The Romantic Vision**
A study of 19th century European prose and poetry (primarily British) with particular attention paid to the collapse of the Romantic vision, and its gradual absorption into the Aesthetic and Decadent literary traditions of late 19th century European literature. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topics:**
Registration #0504-447 **Literature of the Bible**
A close and rapid reading of selected Old and New Testament books to show the range and variety of literary genres and styles in the *Bible.* This course is part of the Literature Concentration and Perspectives on Religion Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:**
Registration #0504-447 **Myth, Legend, Folklore**
Scholarly investigation into the rationale, origins and sources of myths, legends, and folklore of the western world and the effect these primary forms have had on our literature. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic: The Epic**
Registration #0504-447
Advanced study of great representative works in the epic mode. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:**
Registration #0504-447 **Viking Myth and Saga**
Reading the myths, sagas, and folktales of the Viking world reveals the values of a people that created the world's oldest extant democratic society. Both women and men fiercely defend their honor and freedom, willing to risk death rather than to bow in submission. The sagas are analyzed as compelling narrative structures and as documents of a culture that continues significantly to shape Western civilization. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:**
Registration #0504-447 **Rites of Passage**
A survey of literary works providing a variety of insights into growing up, especially from adolescence into 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. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:**
Registration #0504-447 **Black Literature**
This course traces the literary contributions of selected black writers in the various genres from their roots in the African heritage through slavery to the present day. This course is part of the Literature Concentration and the Minority Relations Concentration. It also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic: The American**
Registration #0504-447 **Spirit in Literature**
This is a survey of the development of American philosophy through the study of selected works from the colonial period through the mid-19th century. Particular attention is given to the ideas of the writers under consideration and their effect on modern American thought. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:**
Registration #0504-447 **Literature of Suspense**
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 storytelling. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit **4** (offered occasionally)

GLLL-480 **Women in Literature**
Registration #0504-480
This course concentrates on literature by women about women primarily from the early 19th century to the present. The course considers the aspirations, frustrations, and achievements of women as documented by themselves, as well as the perceptions and representations of women in literature by male writers. Works are examined for their literary value as well as their documentation of broader feminist issues. This course is part of the Women's Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GLLL-481 **Literature of War and Peace**
Registration #0504-481
This course gives students an awareness of the different views on, war and peace in world literature and cinematic works. This course is part of the Peace Studies Concentration, but also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-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 also may be taken as an elective.

Class 3, Credit 4 (offered annually)

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GLLL-484 **Literature and Religion**
Registration #0504-484
A literature course which explores the complexity of religious experience, both personal and culture, as it is portrayed by writers from biblical times to our own day. The literature will be supplemented by readings from such disciplines as psychology, philosophy, history and theology. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GLLL-501 **Speculative Fiction**
Registration #0504-501
Speculative fiction is a survey course in contemporary literature presenting conjectural views of man, his world, his society and his belief. Attention is given to the historical development of the genre as well as those works which have become classics of science fiction and fantasy.

Class 3, Credit 4 (offered occasionally)

GLLL-516 **Literature and Society**
Registration #0504-516
Selected works by writers such as Sophocles, Dante, Dickens, Camus and Vonnegut as important works of art that reflect the human condition and implicitly prophesy against particular evils in attitudes or institutions of their times.

Class 3, Credit 4 (offered occasionally)

GLLL-524 **Contemporary Film**
Registration #0504-524
A study of contemporary world films, to be drawn from those presently showing in the Rochester area (theaters, television, film festivals). Emphasis will be on both technical and aesthetic aspects of the films.

Class 3, Credit 4 (offered annually)

GLLL-545 **The Deaf in Fiction**
Registration #0504-545
A study of literature of deafness, with special emphasis on literary works which identify and illuminate "the deaf experience."

Class 3, Credit 4 (offered occasionally)

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 annually)

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 historical and social analysis. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-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 also may 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 also may 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 also may be taken as an elective.

Class 3, Credit **4** (offered annually)

GSHF-445 **Issues in American Art**
Registration #0505-445
The purpose of this course is to offer the student a comprehensive oversew of American attitudes and philosophies as they have shaped and been embodied in our artistic heritage. Emphasis will be placed on American art from 1850 to the present. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-446 **American Film**
Registration #0505-446
This course will develop an understanding of theories, styles and trends in American film through a historical and sociological study of the medium. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit **4** (offered annually)

GSHF-447 **The American Musical Theatre**
Registration #0505-447
This course will survey the development of American opera and the American musical theatre, highlighting representative works, composers, librettists and performers of both the "cultivated and vernacular traditions." This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit **4** (offered annually)

GSHF-448 **20th Century American Music**
Registration #0505-448
This course will survey both the cultivated and vernacular traditions of American music in the 20th century, taking into account its political, social and historical frameworks. The course is part of the American Artistic Experience Concentration and 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 the period, current issues and status of women artists. This course is part of the Women's Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-481 **Oriental Art**
Registration #0505-481

A survey outlining the development of art in India, China, Japan and examining the philosophical circumstances that distinguish Eastern artistic traditions. There will be opportunity for each student to pursue special interests in depth. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-482 **Beethoven**
Registration #0505-482

This course introduces the music of Beethoven in the psychological, political and philosophical contexts that gave it shape and force. Using the classical style of Haydn and Mozart as background, it focuses on the development of the "Dionysian" personality in Beethoven's compositions and the creation of the sublime in music. This course is part of the Foreign Language/ Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-483 **Bach and the Baroque**
Registration #0505-483

This course is devoted to a study of Johann Sebastian Bach, his life and times, and his music in the context of Baroque styles and aesthetics. Compositions from each of the major periods of his creative life will be examined and discussed, particularly as they serve the social and religious purposes for which they were written, and as they reveal the psychology of so-called "Rhineland mysticism." This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-484 **Romanticism in Music**
Registration #0505-484

This course surveys the rise of German Romanticism from Beethoven to Strauss in the context of the development of 19th century musical styles in general. The course is part of the German Language Culture Concentration and may also be taken as an elective.

Class 3, Credit **4** (offered occasionally)

GSHF-501 **Craftsmanship in Gothic Art**
Registration #0505-501

A survey of religious and secular art in Europe from about 1100 to 1500 A.D. and its antecedents. Media to be studied include manuscript illumination, sumptuous objects, and church architecture (including associated sculpture, mosaics, paintings and stained glass).

Class 3, Credit 4 (offered occasionally)

GSHF-509 **Impressionism to Analytical Cubism**
Registration #0505-509

This course deals with the historical and stylistic aspects of the avant-garde painters of the second half of the 19th century and the first decade of the 20th century. It traces the struggles of these artists to break away from the traditional forms of expression and to attain a new vision of reality.

Class 3, Credit 4 (offered occasionally)

GSHF-512 **Master Drawings Since the**
Registration #0505-512 **Renaissance**

A study of drawings from the 15th to the 20th centuries, including the work by Leonardo da Vinci, Michelangelo, Durer, Rembrandt and Picasso.

Class 3, Credit 4 (offered occasionally)

GSHF-514 **Cubism to the Present**
Registration #0505-514

An investigation into modern man's struggle to preserve his identity in our fast developing technological world as reflected in the vitality and diversity of today's visual arts. Differences and similarities with art forms of earlier eras and other cultures also will be discussed.

Class **3,** Credit 4 (offered occasionally)

GSHF-519 **Rembrandt Van Rijn:**
Registration #0505-519 **His Art and Times**

A study of the life, art and times of the Baroque master. Emphasis will be placed on his stylistic evolution, his relation to his society and to the Baroque style, and on his humanistic world view.

Class **3,** Credit 4 (offered occasionally)

GSHF-520 **Picasso**
Registration #0505-520

The life and work of one of the most influential artists of our century.

Class **3,** Credit 4 (offered occasionally)

GSHF-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-530 **Art and Human Values**
Registration #0505-530

This course investigates the nature and value of the arts and their relation to other areas of human activity such as religion, economics, science and technology and personal freedom.

Class **3,** Credit 4 (offered occasionally)

GSHF-532 **African TYibal Art**
Registration #0505-532

After an investigation of the world of "primitive" man and the function of art in a tribal environment, this course will focus on preliterate societies of sub-Saharan Africa.

Class **3,** Credit 4 (offered occasionally)

GSHF-534 **Renaissance and Baroque Art**
Registration #0505-534

This course examines the stylistic development of painting in Europe from 1420 to 1650. The Renaissance style will be analyzed and studied through the works of painters, with emphasis placed on stylistic evolution through the 15th century and the classical synthesis created in the high Renaissance. Mannerist and Early Baroque paintings will be discussed from the point of view of the Renaissance style to investigate concepts of stylistic continuity, evolution, and change. Paintings also will be discussed within their culture and political contexts.

Class **3,** Credit 4 (offered occasionally)

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-539 **Music Performance**
Registration #0505-539
This course involves the historical and theoretical study of musical forms and styles in the context of active participation in the RIT Singers or the RIT Philharmonia. As an experiential outcome of such study, the group will prepare significant musical compositions for public performance. Credit: one hour per quarter. A total of four such credits may count as a Liberal Arts elective.

Class 1, Credit 1 (offered quarterly)

GSHH-301 **History: Modern America**
Registration #0507-301
This course examines the political, social, cultural, and economic development of the American people in the modern period. Studies the United States in its foreign relations.

Class 3, Credit 4 (offered quarterly)

GSHH-302 **History: Modern European**
Registration #0507-302
An examination of social, economic, political and intellectual movements of Europe from the Modern Period to the Twentieth Century, which played major roles in shaping our contemporary world.

Class 3, Credit 4 (offered quarterly)

GSHH-440 **United States Social and**
Registration #0507-440 **Intellectual History**
This course will examine the American people, their society and their culture, in relation to the nation's institutions: government, courts, business, labor and political and private associations. The interplay between the American people and the institutions which structure their lives sheds light on the dynamic forces which shape American history and help to explain the present. Instead of detailing day-to-day chronology, this study will highlight the sweep of major trends and movements over longer periods of the American experience. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

'GSHH-441 **20th Century American**
Registration #0507-441 **Diplomatic History**
An examination of the major events and forces which shaped American diplomacy from the opening years of the 20th century to the immediate post World War II era. This course is part of the 'History concentration and also the Global Studies Concentration, and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-442 **The Contemporary**
Registration #0507-442 **Middle East**
This course analyzes the making of the contemporary Middle East from the rise of Islam to the present with special emphasis on the patterns of political development in the 20th century. This course is part of the History Concentration and also the International Relations Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent for the History Concentration; GSSM-211 or GSSM-215 or equivalent for the International Relations Concentration)

Class 3, Credit 4 (offered annually)

GSHH-443 **European Social Intellectual**
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 also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-444 **Strategy and Diplomacy:**
Registration #0507-444 **Europe, 1871-1945**
This course investigates the origins and outcomes of the two World Wars with special emphasis on the conflicting strategies and secretive diplomacy adopted by the European Great Powers between 1871 and 1945. This course is part of the History Concentration and the International Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-445 **Modern Latin America**
Registration #0507-445
This course surveys the historical development of the Hispanic and Portuguese areas of the Americas from independence to the mid-twentieth century. The movement towards independence, the problems that emerged during the nineteenth century of forming unified nations, and the problems of modernization in the twentieth century are all covered. The histories of selected countries are used to illustrate these issues. This course is part of the History Concentration and also the Foreign Language/Culture Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-446 **Europe Since 1945**
Registration #0507-446
An analysis of the political, economic, social and cultural events that have shaped the new system of Europe since 1945. This course is part of the History Concentration and the Global Studies Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-447 **The United States Since 1945**
Registration #0507-447
An analysis of the major themes characterizing post-World War II United States history. The course aims to investigate the specific characteristics of America as a modern state. Selected themes will have an intellectual, cultural and political history focus. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-448 **The History of Russia**
Registration #0507-448
A study of the historical context and development of Russian society and the factors leading to the emergence of the Soviet regime. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-449 The History of the Soviet Union
Registration #0507-449
A study in depth of the Bolshevik revolution, the rise of Stalin, industrialization and collectivization, the terror and the purges, the process of de-Stalinization under Krushchev and his successors, and current developments in the Soviet Union. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-450 Europe of the Dictators:
Registration #0507-450 Stalin, Mussolini, Hitler
A study of the European states and peoples in the inter-war period, the diplomatic and military history of World War II, the reconstruction of Europe, the Cold War, detente, and contemporary Europe. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-480 History of American Women
Registration #0507-480
A history of women in North America from the colonial period to the present. Concentrates on the social, political, cultural, diplomatic and economic history of women in the United States and Canada. This course is part of the Women's Studies concentration and also may 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. This history of Christian thought is examined against the background of economic, political, social and intellectual currents. The study sheds light on both the conflicts within and the criticisms from outside and Christian tradition. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-485 Foundations of Asian Civilizations
Registration #0507-485
This course is primarily a study of the Confucian/Buddhist world in East Asia with the focus on China and Japan, their origins and cultural characteristics. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHH-486 China and Japan
Registration #0507-486 in the 20th Century
An examination of social, political, economic and intellectual developments of China and Japan in the 20th century with an analysis of how these two Asian powers have reached their respective significant status in the contemporary world. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-487 History of Chinese
Registration #0507-487 Communism
An analysis of the main characteristics of Chinese Communism, its native roots, Marxist/Leninist elements, and Maoist innovations. The course also will examine the causes for the rise of Communism in modern China, the context and process of its development, as well as contributions and problems Communism brought to the Chinese people. In addition, China and the world will be examined. This course is part of the Foreign Language/ Culture Concentration and the History Concentration and also may be taken as an elective.

Class 3, Credit **4** (offered occasionally)

GSHH-488 Modern Germany
Registration #0507-488
A study of Germany in the 19th and 20th centuries. This course will begin with the unification of Germany in 1871 and trace the political evolution of the nation to the present. Special emphasis will be placed on the rise of Nazism. Pertinent social and cultural factors will be considered as well. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit **4** (offered annually)

GSHH-489 Japan in the Modern World
Registration #0507-489
An examination of social, economic, political and intellectual developments of Japan in the nineteenth and twentieth centuries with an analysis of how Japan has reached such a significant status in the contemporary world. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHH-490 History of Mexico
Registration #0507-490
The historical development of Mexico, including the colonial period, independence movement, the liberal-conservative class, and the revolution of 1910. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered alternate years)

GSHH-491 Black Experience in America
Registration #0507-491
Examines the history of blacks in America, treating the subject primarily from a social and cultural perspective. Studies the impact of whites on black Americans and describes the contribution of blacks to the development of the United States. This course is part of the Minority Relations Concentration and also may be used as an elective.

Class 3, Credit 4 (offered annually)

GSHH-492 Selected Problems in Black History
Registration #0507-492
A seminar approach to the thought of key black leaders (Washington, Garvey, King) and the study of civil rights and black power movements. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHH-493 History of Social Discrimination
Registration #0507-493
A study of the discriminatory practices, present and historical, found in the United States. To include the cultural values and problems of acculturation for the American Indian, Black, Puerto Rican, Chicano, Asian, women, and religious groups, with emphasis on its implication to social work. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-494 The Immigrant in American History
Registration #0507-494
This course explores the personal and collective experience of immigrants arriving in North America from colonial times to the present. Categories of special interest include immigrant expectations and adaptation; the tension between ethnic exclusiveness and assimilation; the role of the immigrant in the urban communities of the United States and Canada; native-born reactions to immigrants; the ethnic revival of the 1960s and 1970s; and the condition of ethnicity and the new immigration in contemporary America. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-495 Black Civil Rights
Registration #0507-495 in the 20th Century
This course examines the social and legal history of civil rights in the U.S. with particular attention to the demonstrations of the 1950s and 1960s and the philosophy of the Rev. Dr. Martin Luther King, Jr. Finally, it will compare his views with those of the recent Black Power Movement. This course is part of the Minority Studies Concentration and 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. (GSHH-301 or 302 or equivalent)

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 1914-45. The course notes the impact of classical liberal economic theories in a period of rapid mechanization and industrialization. Rising social expectations in the period of exploding democratic and later social liberalism are observed in their relationship to revolution and reaction.This course considers the causes of World War I and examines the military operations in some detail.

Class 3, Credit 4 (offered occasionally)

GSHH-514 Race and Society
Registration #0507-514
A social, historical, political, religious and anthropological appraisal of the factors which have produced the differences between social appearances and social attainments of the world's population. Primary emphasis will be placed upon the fact that such differences are not sufficient reason for believing that there are underlying disparities or innate capacities among races.

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 occasionally)

GSHH-520 Crime, Violence, and Urban Crisis
Registration #0507-520
This course will analyze the causes of the outbreak and rapid increase of violent and criminal trends in the world as the most serious realities of the 20th century. The course will be a comparative study on America's and the world's problems of violence, crime, and urban crisis.

Class 3, Credit 4 (offered occasionally)

GSHH-524 The Italian American
Registration #0507-524 Experience
Examines the history and culture of the Italian Americans from the colonial period to the present. Stresses their role in the arts, business, politics, the Church, and the labor movement. Italian history is studied as it relates to the Italians in America.

Class 3, Credit 4 (offered occasionally

GSHH-526 The United States and
Registration #0507-526 The Third World Revolutions
in the 20th Century
One of the dominant features of the 20th century has been the revolution of rising expectations in the countries of the Third World. 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 occasionally)

GSHH-528 The History of Popular
Registration #0507-528 Culture in America
American myths, icons, heroes, and institutions as represented in American popular culture from the late nineteenth century to the present. Examine the history of popular entertainment and the mass media in the United States.

Class 3, Credit 4 (offered occasionally)

GSHH-530 19th Century American
Registration #0507-530 Diplomatic History
An examination of American diplomacy from the early years of American independence to the emergence of the United States as a world power. The War of 1812, Monroe Doctrine, and Manifest Destiny are among the topics considered.

Class 3, Credit 4 (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. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-538 Social Justice and the
Registration #0507-538 Constitution in American History
This course will analyze how well the Constitution has met the social and political expectations of citizens. Emphasis will be on analyzing Supreme Court cases that explain the current state of social justice. This is a companion course to GSHH-532, Civil Liberties in American History. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

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 1940s, Fidel Castro's revolution in Cuba; and Salvador Allende's electoral victory in Chile in 1970. By studying these three "revolutionary" movements, it is hoped that the student will come to an understanding of the historical perspective and nature of social discontent in Latin America.

Class 3, Credit 4 (offered annually)

GSHH-550 The Ascent of Man
Registration #0507-550
The course is a multi-disciplinary study in societal, historical, intellectual, technological and scientific perspectives of man's development from prehistoric times to the present. The course is partially based on the television series, "The Ascent of Man," created and narrated by J. Bronowski.

Class 3, Credit 4 (offered occasionally)

GSHH-552 War and Crises, 1945-Present
Registration #0507-552
World backdrop for American foreign policy and relations from 1945 to the present, dealing with the Greek Civil War, the Chinese Civil War, the Korean War, the American assumption of Western leadership in the Cold War, economic warfare, the Cuban crisis, war in Southeast Asia, the roles of Presidents Truman to Reagan, detente, multinational business, the press, and crises in the Middle East. Background is developed for decisions of the 1980s.

Class 3, Credit 4 (offered occasionally)

GSHH-556 The Renaissance World
Registration #0507-556
The thematic study of the Renaissance in Europe from 1300 to 1600. The course explores the art, literature, philosophy, society and institutions of the Renaissance that have contributed to the revival of the western culture and heritage.

Class 3, Credit 4 (offered occasionally)

GSHH-557 Communism, Fascism and Democracy in Their Theoretical Foundations
Registration #0507-557
A political and historical appraisal of these philosophies. Emphasis is placed upon the claims they make with regard to the individual and the state and the changes they demand for the future.

Class 3, Credit 4 (offered occasionally)

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 also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-441 Science and Technology Policy
Registration #0508-441
This course will examine how local, state, Federal, and international policies are developed to influence innovation, the transfer of technology, and industrial productivity in the United States and other selected nations. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-442 History of American Technology
Registration #0508-442
This course presents an examination of the cultural context of American technology and its influence on American social, economic, political, and cultural institutions. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered 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 also may 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 Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-445 Biomedical Issues in Science and Society
Registration #0508-445
A study of the impact of science and technology on life, our view of life, and of the value issues that arise from this impact. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-446 Makers of Modern Science
Registration #0508-446
This course is designed to help the student understand the life of modern science through the lives of modern scientists. Modern science is understood to be science from the Scientific Revolution of the 16th and 17th centuries to the present. Much recent scholarship has been devoted to analyzing science in context; i.e,, the way it actually develops in particular social and political enviornments as well as through the lives of individuals. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-481 Introduction to Environmental Studies
Registration #0508-481
This course seeks to make students aware of the environmental consequences of modern technology by investigating to what degree various technological systems conflict with the basic ecological principles. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-482 Energy and the Environment
Registration #0508-482
In this course we will look at the current situation, its environmental implications, and try to determine how we got here, why we got here, and where we may be able to go in the next 20 to 50 years. We will look at the nature, uses, and relative importance of our sources of energy; high technology and low or appropriate technology; hard energy paths and soft energy paths. We will look especially at the role of government policy in the energy area. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-483 Environmental Values
Registration #0508-483
We seek to identify, interpret, and trace the values associated with concern for the environment, and the factors that induced change in these values. Concern with the environment is not a new concept; its history reaches to ancient times, but the values related to this concern have drastically changed. Understanding environmental values helps one become a better prepared participant in the environmental decision making. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-484 Environmental Policy
Registration #0508-484
Public compliance with environmental regulations has become increasingly complicated as a result of many laws and regulations instituted since the mid 1960s. The purpose of this course is to study the consequences of major environmental legislation and regulations and to examine the actions of both citizens and the corporate sector as they comply with these laws. The course also will focus on the economic and social implications and value of environmental regulation and enforcement and will identify current developments in the area. This is a concentration course in the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-485 Development of U.S. **Energy Policy**
Registration #0508-485
An examination of the development of U.S. energy policy from the mid-19th century to the present. A number of policies have affected the supply of and demand for energy for many years, and an examination of the development of these policies will aid in understanding some of the current energy conflicts and debates. This course is part of the Environmental Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHN-486 Modern Warfare Technology
Registration #0508-486 and Arms Control Problems
In this course we will study the importance of science and technology to defense matters. We investigate how modem weapons, both nuclear and conventional, their delivery systems, and reconnaissance and surveillance methods have seriously affected the character of armed conflict and of preventing wars. However, we shall also see how scientists, by providing their expertise, have been able to influence national security and attempts to control arms. This course is part of the Peace Studies Concentration and also may be used 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 leam the conceptual development of the 20th century theories of time and space with major emphasis on their applications in the present decade. These views, which grew out of the rigorous mathematical logic of relativity theory and quantum theory, represent one of the most profound revisions of intellectual thought in human history. We leam 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
Registration #0508-508 Environmental Studies
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 in-depth 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
Registration #0508-509 of 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)

GSHN-512 Science as a Humanity
Registration #0508-512
A telecourse designed to present the way of the humanist and reveal it as commanding more of the hidden potential of the individual, and to present science as an expression of the human spirit that commands more of the hidden potential of nature. Science is presented as one lifestyle—a human one based on the need for understanding, and not for the sake of progress, survival, or upgrading one's position in the world.

Class varies, Credit 4 (offered on sufficient demand)

GSHN-514 History of American Medicine
Registration #0508-514
A survey of the development of medical thought and practice in America from the 17th century to the present.

Class 3, Credit 4 (offered occasionally)

GSHN-515 Community Environmental Issues
Registration #0508-515
This course will explore three general areas of community environmental concern: land use, solid waste, and energy. These issues focus attention on potential conflict over technology and societal values. While the emphasis in this course will be on events and issues relating primarily to Monroe County, the topics are prevalent in any community in the United States today. The intent of the course is to allow the student to learn how to evaluate different options for dealing with land use, solid waste, and energy in a community context; and to be able to see that these decisions, involving technology and society, can and should be made by all affected parties.

Class 3, Credit 4

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 abut the language we use when we talk and write about religion. This course is part of the Philosophy Concentration and the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-441 Logic
Registration #0509-441
An introduction to the basic principles of logic. The main emphasis will be on symbolic, or formal logic, but some attention may be paid to informal logic as well. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

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 also may 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 enterprises; possible discussion topics include the presuppositions of science, its logic, its claims to reliability, and its relationships to society and to problems of human values. This course is part of the Philosophy Concentration and also may be taken as an elective. (At least one prior course in either philosophy or one of the natural sciences-physics, chemistry, biology)

Class 3, Credit 4 (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. The course is part of the Philosophy Concentration and also may 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 also may be taken as an elective. (At least one prior course in philosophy, political science, or sociology)

Class 3, Credit 4 (offered annually)

GSHP-446 Philosophy of Law
Registration #0509-446
This course is 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. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-447 Contemporary **Moral Problems**
Registration #0509-447
This course will present moral issues which arise in the professions and other areas of technical expertise. These problems in applied ethics will be studied through contemporary literature by moral philosophers (Donegan, Frankena, Gadamer, Habermas, Jonas, Singer, and Wellmer), as well as key classical texts (Plato, Locke, Reid, Kant, and Dewey).

Each section of the course will apply moral theory to one of a number of professional areas, such as business, communications, medicine and bioethics, public policy, and technology. This course is part of the Philosophy Concentration and also may be taken as an elective. (GSHP-211)

Class 3, Credit 4 (offered annually)

GSHP-448 **Philosophy and Peace**
Registration #0509-448
An introduction to some of the philosophical dimensions of the search for world peace including the elements that would constitute a just and lasting peace, nations as moral entities, justice and national self-interest, force and violence, the morality of the use of force, peace-making and peace-keeping groups. This course is part of the Peace Studies Concentration and Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-449 **Special Topics in Philosophy**
Registration #0509-449
This course will be a critical examination of issues in some area of philosophy not covered in any other concentration course. Examples of likely topics are metaphysics, epistemology, the philosophy of mind, and the philosophy of language. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHP-450 **Undergraduate Seminar in**
Registration #0509-450 **Philosophy**
This course will examine some area of philosophy at an advanced undergraduate level. The area examined will probably vary from quarter to quarter. The seminar is designed especially for those whose interest in philosophy goes beyond the requirements of the Liberal Arts curriculum. This course is part of the Philosophy Concentration and also may be taken as an elective. (Two courses in philosophy, or permission of the instructor)

Class 3, Credit 4 (offered occasionally)

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 also may be taken as an elective. (GSSA-210 or GSSS-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 on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSSA-501 **Anthropological Research Methods:**
Registration #0510-501 **Explorations 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 homogeneous society. The primary emphasis in the course will be involvement of students in the actual observation of human behavior and collection of data in a subculture of their own selection in the Rochester area.

Class 3, Credit 4 (offered occasionally)

GSSA-502 **American Culture:**
Registration #0510-502 **The Archaeology of Us**
American history and contemporary American society are examined through the only unexpurgated record of our behavior, the material remains. This course illustrates how the techniques of archaeology can throw new light on the lives of our Pilgrim forebearers, the founding fathers, on slaves and free blacks, on the American industrial revolution, and even on the contemporary middle-class of a city like Tucson, Arizona.

Class 3, Credit 4 (offered occasionally)

GSSA-504 **American Culture:**
Registration #0510-504 **The Anthropology of Us**
Call them Nacirema, American backward. This course takes an anthropologist's eye view of the "Nacirema" way of life now, what they say and think about themselves, and how they actually act, their myth, ritual, music, humor, religion, class structure, regional subcultures, and ethnic groups. (GSSA-210 or permission of instructor)

Class 3, Credit 4 (offered occasionally)

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 Economics Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-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 also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSSE-442 Contemporary International
Registration #0511-442 Economic Problems
This course aims to prepare the student to deal with foreign exchange market, international trade decisions, the macroeconomic effects of trade on domestic economics, and the effects of domestic business fluctuations on international trade and finance of each country. Though the course is basically a theory course in economics, the applied aspects of international trade and finance are emphasized. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSSE-443 Current American
Registration #0511-443 Macroeconomic Problems
This course is an in-depth analysis of selected macroeconomic problems such as economic growth, inflation, and business cycles. The primary focus is consideration of current macroeconomic theory and policy application in the context of the U.S. economic problems, e.g., tax-based incomes policies, wage-price controls. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSE-444 Public Finance
Registration #0511-444
This course is a study of the economics of the public sector. Topics include but are not limited to: taxation and public expenditures and their effect on the allocation of resources, distribution of income, and employment; market failure; public goods; the economics of public choice; and the application of public finance principles and normative questions to public economic issues. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-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 also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)

Class 3, Credit **4** (offered annually)

GSSE-446 Economics, Public Policy
Registration #0511-446 and Competition
This course is a study of society's responses to imperfections in an otherwise competitive marketplace. Economic analysis, along with some legal analysis, is used to examine not only the problems but also some solutions to such problems as monopolies, externalities, and other forms of market failure. Responses examined include: regulation, antitrust, public enterprise, and other forms of government action. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSSE-448 Economics of Less
Registration #0511-448 Developed Countries
This course introduces students to the economic problems of less developed countries (LDC). Students study the historical causes of underdevelopment gap between developed and underdeveloped countries, and the theories and the policies aimed at accelerating the rate of growth in LDC. In addition, the role of international organizations in the economic development of LDC is discussed. This course is part of the Global Studies Concentration and the Economics Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-449 Comparative Economic Systems
Registration #0511-449
This course provides a comparative analysis of different economic systems. The three major economic systems to be studied are the Capitalist Mode of Production, the Planned Economy, and the Mixed Economy. The student will study the economic decision-making process in each system including the economic structure, operation, and relative efficiency in achieving its macroeconomic goals. Upon completion of this course, the student will be able to critically evaluate each economic system, recognize the advantages and disadvantages of each, and propose general policy recommendations to improve each system's relative efficiency. This course is part of the Global Studies Concentration and the Economic Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSE-450 Benefit-Cost Analysis
Registration #0511-450
This course explores the use and abuse of benefit-cost and related analytical techniques commonly encountered in economic policy making. Many expenditure and regulatory programs of governmental agencies now are routinely evaluated in a benefit-cost or cost-effectiveness framework, and debate about policy decisions increasingly draws upon benefit-cost findings. Yet application of benefit-cost analysis often attracts much controversy, in part because of disagreements about how to conduct such analysis and about the role that economic efficiency should play in societal decisions. The mechanics, power, and limitations of this form of analysis form the primary elements of the course. It is part of the Economics Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSSE-451 Forensic Economics
Registration #0511-451
Forensic economics is the application of economics to the law. A major subset of this discipline involves the determination of economic damages resulting from personal injury and wrongful death. More recently, forensic economists have been involved in measuring damages arising from malpractice claims, division of marital property in divorce cases and the determination of damages resulting from loss of employment. In addition, a major obstacle faced by the forensic economists involves the methodological issues in determining damages. Analysis of these and other issues will be the foundation of this course. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-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 the labor force, as owners of other factors of production, and in business decision-making process. The impact of the changing role of women on GNP, labor market, and other economic variables is elaborated. Through the analysis of some economic models and their application to real world situations, it is shown that the social, political, and individual equality of women depends, to a great extent, on their economic role in family and society.

Class 3, Credit 4 (offered on sufficient demand)

GSSE-481 Environmental Economics
Registration #0511-481
The course will examine the relationship and apparent conflict between economic growth and environmental quality, the economics of environmental issues and policy, the environment as a resource and a public good, and the ability and lack of ability of free markets and the government to deal adequately with pollution and other environmental problems. This course is part of the Environmental Studies Concentration and the Economics Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSE-520 Intermediate Micro Theory
Registration #0511-520
This course helps develop 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. (GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSE-521 Intermediate Macroeconomic Theory
Registration #0511-521
The central question of macroeconomics is the determination of output, employment and prices. This course develops models which incorporate behavioral assumptions concerning consumption, investment, and the role of money and their relationship to macroeconomic variables. (GSSE-301 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSE-522 International Trade
Registration #0511-522 and Finance
This course introduces the students to the theory and the practical issues of the export/import markets, the international flow of capital, and international investment decisions. In addition, the students study the foreign-exchange and the Eurodollar markets and the investment opportunities in them. The role of multinational corporations in international trade and finance is also discussed. (GSSE-210 or GSSE-301 and GSSE-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. (GSSE-210 or GSSE-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. (GSSE-302 or equivalent)

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 quarterly)

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, the Global Studies Concentration, the Peace Studies Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or 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 systems, and the foreign relations of China. This course is part of the International Relations Concentration and the Foreign Language/Culture Study Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215)

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 also may be taken as an elective. (GSSM-211 or GSSM-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 also may be taken as an elective. (GSSM-211 or GSSM-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 also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-445 **Comparative Politics**
Registration #0513-445
This course provides a mode of analysis for the study of political systems. Basic concepts of political science are utilized to present a descriptive and analytical examination of various political systems that can be classified as western democracies, communist, or third world. Particular attention is paid to the governmental structure, current leadership, and major issues of public policy of those selected political systems under review. This course is part of the International Relations Concentration and the Global Studies Concentration, and also may be used as an elective.

Class **3,** Credit 4 (offered annually)

GSSM-450 **State and Local Politics**
Registration #0513-450
This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. It will illustrate differences in state governments by comparing other states to New York, and will use the Rochester area for comparisons with local governments found elsewhere. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class **3,** Credit 4 (offered annually)

GSSM-451 **The Legislative Process**
Registration #0513-451
This course examines the role of the legislature in the U.S. political process. The primary emphasis will be the study of the U.S. Congress, but some attention also will be directed to state legislatures. Topics to be studied include elections, party organization, committees, interest group activities, and executive-legislative relations. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class **3,** Credit 4 (offered annually)

GSSM-452 **The American Presidency**
Registration #0513-452
This course is a study of the role of the presidency in the American political system. Among the topics to be considered are: the nomination and election process, evolution, expansion and limitation of presidential powers, factors in decision making, and the various leadership functions performed by the American Presidency. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class **3,** Credit 4 (offered annually)

GSSM-453 **American Foreign Policy**
Registration #0513-453
A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures and philosophies shaping the development and implementation of foreign policy. This course is part of the American Politics Concentration and the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-454 Political Parties and Voting
Registration #0513-454
Political parties are a crucial part of the democratic process. Parties serve as a critical link between citizens and their government, as parties promote policies favored by their voters. This course studies parties; their history, their future and their role in the democratic process. Its overall emphasis is on the degree to which parties perform or fail to perform as links between citizens and government. This course is part of the American Politics Concentration and also may be taken as an ejective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-455 Politics and Public Policy
Registration #0513-455
This is a course in the politics of the policy process. The basic questions of the course are: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government implement public policy? How does government evaluate public policy? This course is part of the American Politics Concentration and also may be taken as an elective (GSSM-21 lor GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-456 The Judicial Process
Registration #0513-456
This course examines the structure and function of the state and federal courts in the American political system. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215)

Class 3, Credit 4 (offered annually)

GSSM-457 Constitutional Law
Registration #0513-457
This course has been designed to provide the student with a basic understanding of the constitutional principles frequently encountered in the criminal justice profession. Landmark court decisions relating to due process, equal protection, unlawful arrest, unreasonable search and seizure, compulsory self-incrimination, the assignment of counsel, and fair trial guarantees are discussed and critically evaluated.

Class 3, Credit 4

GSSM-502 Politics of Developing Countries
Registration #0513-502
Since World War II more than 100 new countries have joined the global political system and they are searching for appropriate political means to serve their societies' ends. In addition, many older and established countries have been struggling to adjust their political arrangements to cope more effectively with modern problems. Several elements are involved in this complex process: social mobilization, economic development, and political modernization. This course will focus on the political problems of the developing countries which occupy roughly the southern half of the earth's land mass.

Class 3, Credit 4 (offered occasionally)

GSSM-504 20th Century America
Registration #0513-504
An examination of the major political, social and economic developments affecting the United States in the 20th century. Emphasis will be placed upon the reactions of the various presidential administrations to conditions in both the domestic and foreign fields.

Class 3, Credit 4 (offered occasionally)

GSSM-514 Theories of Political Systems
Registration #0513-514
An examination of the basic questions in political theory, a survey of the major political philosophers, and an inquiry into the major political ideologies.

Class 3, Credit **4** (offered occasionally)

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 Childhood and Adolescence
Registration #0514-440
This course explores human development from conception through adolescence. The developmental approach provides the opportunity to integrate many areas of psychological research such as cognition, personality, perception, social interaction and moral development as they apply to human development. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-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 Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit **4** (offered annually)

GSSP-442 Adulthood and Aging
Registration #0514-442
This course encompasses the psychology of the span of life from young adulthood through the middle years. The developmental approach, presented in an interdisciplinary framework, provides a systematic orientation to the study of the individual during early adulthood. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-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 Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSP-444 Social Psychology
Registration #0514-444
This course will attempt to give a general overview of those areas of social psychology currently under the most intensive investigation, and likely to be of most interest to the student, including nonverbal communication, attraction, aggression and group effects. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-445 Psychology of Perception
Registration #0514-445
This course covers topics of all sense modalities with emphasis on visual perception. It traces what happens to the physical stimulus as our sensory systems analyze it to produce complicated perceptions of the world around us. Many complex perceptual phenomena draw upon explanations at the physiological, psychological and cognitive levels. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-446 Psychology of Personality
Registration #0514-446
This course examines the strengths and weaknesses of the major psychological theories of personality. Methods of assessing personality, research, and applications of theory to real-life situations are included in the evaluation of each theory. This course is part of the Psychology Concentration and also may be used as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-447 Abnormal Personality
Registration #0514-447
This course examines the major categories of mental disorder not only from the descriptive point of view, but also in terms of the major theoretical explanations of the causes of disorder. The major treatment modalities also are covered. This course is part of the Psychology Concentration and also may be used as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-448 Industrial Psychology
Registration #0514-448
Consideration of principles and application of, and current research in, industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership, and communication. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-449 Behavior Modification
Registration #0514-449
This course will teach you the skills of changing your behavior by controlling your environment and the consequences of your behavior. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSP-450 Psychology of Altered
Regitration #0514-450 States of Consciousness
This course will cover such topics as the specialized consciousness in the two halves of the brain, dreaming, hypothesis, meditation, systematic relaxation, and parapsychology. The course format will combine discussion and demonstration. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)
Class 3, Credit **4**

GSSP-480 [4] 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 also may 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 also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSP-504 Attitude Formation and
Registration #0514-504 Persuasion Techniques
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. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

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. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSP-515 Psychology of Human Adjustment
Registration #0514-515
This course will teach you the skills of coping with a variety of everyday experiences. Particular attention will be given to the areas of self validation, interpersonal tactics, and interpersonal relations. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSP-517 Death and 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. (GSSP-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. (GSSP-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. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSS-210 Foundations of 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 the workplace and variations in social class. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210)

Class 3, Credit 4 (offered annually)

GSSS-443 Sociology of Work
Registration #0515-443
This sociology course analyzes the essential properties of work, its structure, the group processes involved in it, and its social meaning. The course treats work as emerging, like other social realities, out of social relationships between individuals and groups. It. looks at ways in which people can develop a positive self-regard or a sense of alienation in their occupations and professions and various types of work organizations. It also considers leisure as a complement to work. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210 or instructor's permission)

Class 3, Credit 4 (offered annually)

GSSS-444 Social Change
Registration #0515-444
Few people need to be more prepared to deal with social change than professionals in technical fields. In this culture, technology is often at the center of change and technical people are expected not only to cope with change but to help guide it. The purpose of this course is to help RIT students understand and deal with change rather than to simply react to it. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSS-446 Sociology of Health
Registration #0515-446
This course is a survey of the sociological aspects of health and illness. Some areas of study will be the definition, causes (etiology) and cure of disease in various societies and social groups. Also included will be a discussion of the epidemiology of disease, access to, and delivery of health care in contemporary U.S. society, problems of patient care and the study of mental illness and death and/or dying. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSS-447 **Women in Contemporary**
Registration #0515-447 **U.S. Society**
This sociology course will examine three major social institutions which shape the lives of women in contemporary U.S. society: the family, the workplace, and political structure. This course is part of the Social Change in a Technological Society Concentration and the Women's Studies Concentration, and also may be taken as an elective. (GSSS-210 or GSSA-210)

Class 3, Credit 4 (offered annually)

GSSS-448 Minority Group Relations
Registration #0515-448
This course will deal with the principal concepts and research findings of those who have studied racial and ethnic minorities and their relations. Taking into account the growing body of theory and data on the dynamics of ethnic prejudice and discrimination, the course is concerned with the subcultures of minorities, the nature of prejudice and discrimination, the etiology, patterns and consequences of intergroup conflict, and the reactions of minorities to differential and discriminatory treatment. Concepts such as assimilation, amalgamation, and desegregation will be analyzed as forms of conflict resolution. This course is part of the Social Change in a Technological Society Concentration and the Minority Group Relations Concentration, and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSS-482 African-American Culture
Registration #0515-482
This course is designed to analyze past, present and future social policies, programs and practices from their actual and predictable effects on black people. These analyses and solutions will include particular emphasis on how the black community has been forced to develop mechanisms for coping with the debilitating effects of poverty, environmental deprivation, and institutional racism. The course is designed to present a systematic means of facilitating-change in people's attitudes and behaviors. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSS-483 Hispanic American Culture
Registration #0515-483
This course offers the study of the social experiences and conditions of Hispanic Americans and the degree to which they have been assimilated into the mainstream dominant culture. Various Hispanic groups will be studied with the goal of defining and outlining their differences and similarities. The Puerto Ricans in the Northeast and the Mexican-Americans in the Southwest will be specifically selected for analysis. The course will help students to better understand the problems faced by Hispanic Americans by looking at specific socio-economic indicators such as: their access to health care, job opportunities, educational institutions, and the degree to which Hispanics have "progressed" in the U.S. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSS-506 Social Inequality
Registration #0515-506
This is a survey course that will examine different dimensions of stratification in the U.S. and elsewhere. Explanations for the existence of inequality will be addressed at individual, group and institutional levels.

Class 3, Credit 4 (offered occasionally)

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 occasionally)

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 also will examine the question of how social values and economy influence policy development.

Class 3, Credit 4 (offered occasionally)

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 and 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, 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. (GSSS-210 or GSSA-210)

Class 3, Credit 4 (offered annually)

GSSS-515 Social Policy and the Aging
Registration #0515-515
This course will be organized around culture and values as context for policy formulation. Special attention will be given to the process of policy analysis and implementation. Several specific policy areas will be examined: social security and income maintenance; health and long-term care; work and retirement; social services and the aging network; housing and living arrangements for the elderly; and the role of the family and the elderly.

Class 3, Credit 4 (offered annually)

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. (Permission of instructor)

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, premarital and marital sexual behavior, and alternative sexual choices. Frequently these issues raise questions of sexual attitude and value and these will be examined and clarified.

Class 3 + 2 hr. weekly seminar, Credit 4 (offered biannually)

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 for Liberal Arts credit.

GLAA-201,202,203 History of Airpower
Registration #0519-201, 202,203
This course is a study of the development of airpower from its origins to the present. This course deals with the impact of airpower upon 20th century warfare. It also traces the evolution of airpower as a factor in military and nonmilitary operations in support of U.S. foreign and domestic policy.

Class 1 (201, Credit 1); (202, Credit 2); (203, Credit 1) (offered annually)

GSSM-401 National Security Forces in
Registration #0513-401 Contemporary American Society I
This course will examine the sociology aspects of officership, the military criminal justice system, and introduce National Security Policy. Topics of interest focus on the military as a profession, officership, Air Force doctrine, civilian control of the military, and a comparison of the military/civilian justice systems. (Approval of the Aerospace Studies Department)

Class 4, Credit 5 (offered annually)

GSSM-402 National Security Forces in
Registration #0513-402 Contemporary American Society II
This course will examine the American National Security Policy by analysis of the evolution of the American defense strategy and policy. Topics include methods for managing conflict, international terrorism, alliances and regional security, an analysis of arms control and the threat of war, and the formulation of American defense policy and strategy. (Approval of the Aerospace Studies Department)

Class 3, Credit 4 (offered quarterly)

GLAI-201 Seminar: Academic Fields of
Registration #0520-201 Study (Tech. and 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-301,302 College Writing I, II
Registration #0502-301,302
This course sequence develops minimal college-level writing competencies. The credits earned, however, may not comprise part of the student's normal Liberal Arts curriculum. Furthermore, this sequence may not be substituted for English Composition.

Class 1, Credit 1 (offered quarterly)

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-403 Effective Technical
Registration #0502-403 Communication
This course provides knowledge and practice of written and oral communication skills generally required in technical professions. Focus is on individual and group writing and speaking tasks. All written work must be prepared on word processor.

Class 3, Credit 4 (offered annually)

GLLC-404 Communication with the
Registration #0502-404 Handicapped
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. (GSSP-210)

Class 3, Credit **4** (offered occasionally)

GSSE-301 Principles of Economics I
Registration #0511-301
This is the first course is 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)

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)

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, cellular respiration and photosynthesis; nutrient procurement in plants and animals.

Class 3, Credit 3 (F)

SBIB-202 **General Biology**
Registration #1001-202
A study of the physiological processes of gas exchange, internal transport, osmoregulation, excretion, and hormonal control in plants and animals; nervous system and behavior in animals.

Class 3, Credit 3 (W)

SBIB-203 **General Biology**
Registration #1001-203
A study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology.

Class 3, Credit 3 (S)

SBIB-205,206,207 **General Biology Laboratory**
Registration #1001-205,206,207
Laboratory work to complement the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve ability to make, record and interpret observations. (Corequisite SBIB-201,202, 203)

Lab 3, Credit 1 (205-F; 206-W; 207-S)

SBIB-230 **Introduction to Co-op Seminar**
Registration #1001-230
Exploration of cooperative education opportunities in the biological sciences. Practice in writing letters of application, resume writing, and interviewing procedures.

Class 1, Credit 1 (W, S)

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 emphases on phylogeny and functional morphology. (One year of general biology or permission of instructor)

Class 2, Lab 6, Credit 4 (F)

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

SBIB-303 **Comparative Vertebrate Anatomy**
Registration #1001-303
A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)

Class 3, Lab 6, Credit 5 (F)

SBIB-304 **Botany**
Registration #1001-304
Distribution of the major groups of plants and their adaptations to their particular environment. (One year of general biology or permission of instructor)

Class 3, Lab 3, Credit 4 (F)

SBIB-305 **Physiology and Anatomy**
Registration #1001-305
An integrated approach to the structure and function of the nervous, endocrine, integumentary, muscular and skeletal systems. Laboratory exercises include histological examination, anatomical dissections and physiology experiments with human subjects. (One year of general biology or permission of instructor for non-science majors)

Class 4, Lab 3, Credit 5 (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 instructor)

Class 4, Lab 3, Credit 5 (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 (F, W)

SBIB-320 **Histology**
Registration #1001-320
Detailed microscopic studies on the structure and function of normal human tissues. (One year of general biology; SBIB-305, 306, recommended)

Class 3, Lab 3, Credit 4 (F)

SBIB-330 **Small Animal**
Registration #1001-330 **Laboratory Techniques**
A course designed to prepare the student for small animal handling, biological administrations and preparations, minor surgery and autopsies. (3rd-, 4th-, 5th-year status and permission of instructor)

Class 1, Lab 3, Credit 3 (S)

SBIB-340 **General Ecology**
Registration #1001-340
Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments. A study to include such ecological concepts as energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography and representative ecosystems. (One year of general biology)

Class 3, Lab 3, Credit 4 (F)

SBIB-350 Molecular Biology
Registration #1001-350
The study of structure, function, and organization of proteins, nucleic acids and other biological macromolecules. (One year of general biology; second- or third-year status)

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

SBIB-360 Horticulture
Registration #1001-360
A basic introduction to horticulture with a study of the interconnections of plants, gardens and their environment and discussion relating to applications of principles to indoor and outdoor gardening.

Class 3, Lab 3, Credit 4 (S)

SBIB-370 Biological Writing
Registration #1001-370
Written technical communication in the biological sciences with emphasis on components of report writing: analysis, definition, description, instruction, data presentation, literature research, abstracting and editing. (Third-, fourth-, fifth-year status)

Class 1, Rec. 1, Credit 2 (W, S)

SBIB-380 Human Gross Anatomy
Registration #1001-380
This course is designed to expose students to details of human anatomy through cadaver dissection. Lecture material stresses functional and clinical correlates corresponding to laboratory exercises. (SBIB-305, 306 and permission of instructor)

Class 2, Lab 6, Credit 4 (W)

SBIB-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)

Class 3, Credit 3 (F, W)

SBIB-403 Cell Physiology
Registration #1001-403
Functional eucaryotic cytology, nuclear and cytoplasmic regulation of macromolecular synthesis, exchange of materials across cell membranes, regulation of cellular metabolism and control of cell growth. (SBIB-350)

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

SBIB-404 Introductory Microbiology
Registration #1001-404
Introduction to microorganisms and their importance. Principles of structure, metabolic diversity, taxonomy, environmental microbiology, and infectious diseases of procaryotes will be discussed. Basic laboratory techniques, microscopy, staining, bacterial identification, and food testing. (One year of general biology, one year of organic chemistry)

Class 3, Lab 4, Credit 5 (F, W)

SBIB-407 Microbial and Viral Genetics
Registration #1001-407
The study of the molecular genetics of bacteria, bacteriophages, fungi, and eucaryotic viruses. (SBIB-350,421; SCHO-334)

Class 3, Lab 3, Credit 4 (F)

SBIB-417 Industrial Microbiology
Registration #1001-417
Practical applications of yeasts, fungi and bacteria in industrial fermentations. Industrial aspects of fermentor design, pilot plan operations, strain development, and recovery of fermentation end products. Microbiology, biochemistry and engineering of large-scale processes. (SBIB-404, one biochemistry course)

Class 3, Lab 3, Credit 4 (S)

SBIB-420 Plant Ecology
Registration #1001-420
A consideration of the nature and variation of plant communities with a discussion of factors which limit, maintain, and modify communities both locally and regionally. Laboratories will involve field studies of various plant communities and the gathering and analysis of data. (SBIB-340)

Class 3, Lab 3, Credit 4

SBIB-421 Genetics
Registration #1001-421
Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (SBIB-350)

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

SBIB-424 Descriptive Embryology
Registration #1001-424
Study of the developmental processes leading to the mature vertebrate form, with emphasis on early human development and its clinical variations. Course requires extensive use of independent study materials. (One year of introductory biology or permission of instructor)

Class 2, Credit 4 (F)

SBIB-430 Radiation Biology
Registration #1001-430
Effects of radiation upon living tissue, both harmful and beneficial. Morphological changes, genetic effects, and pathological changes in both plant and animal tissues. Use of radioisotopes in plant and animal research. (Minimum of 20 credits in biological science)

Class 3, Lab 3, Credit 4 (W)

SBIB-431 Histological Techniques
Registration #1001-431
Preparation of plant and animal tissues on slide mounts. Techniques in paraffin and frozen sectioning. Sectioning on the rotary and sliding microtomes and multiple staining techniques. (One year of general biology)

Class 1, Lab 4, Credit 3

SBIB-442 Hybridoma Techniques
Registration #1001-442
Designed to acquaint each student with the basic methods employed in the production of hybridoma cell lines and monoclonal antibodies. To include preparation of viable cell suspensions, cell culture fusion techniques, cloning, and monoclonal antibody production and characterization. (SBIB-445)

Lab 3, Credit 2 (W, S)

SBIB-445 **Tissue Culture**
Registration #1001-445
Study of the techniques and applications of culturing cells, tissues, and organs in vitro. Emphasis on mammalian systems. (One year of general biology)

Class 2, Lab 3, Credit 4 (F, W)

SBIB-446 **Plant Tissue and Cell Culture**
Registration #1001-446
Study of the techniques and applications of plant organ, tissues, and cell culture in vitro, with emphasis on plant regeneration and protoplast manipulation. (One year of general biology)

Class 2, Lab 3, Credit 4 (W, S)

SBIB-450 **Genetic Engineering**
Registration #1001-450
Introduction to the theoretical basis, laboratory techniques, and applications of gene manipulation. (SBIB-350,404)

Class 3, Lab 6, Credit 5 (W, S)

SBIB-471 **Freshwater Ecology**
Registration #1001-471
A study of the physics, chemistry and biology of inland waters. The course will emphasize the physical and chemical properties of water and how these properties affect the associated biological communities. Planktonic, benthic and littoral communities will be considered. Field trips to streams and lakes will be conducted to gather physical, chemical and biological data. (SBIB-340 or permission of instructor)

Class 3, Lab 3, Credit 4 (W)

SBIB-472 **Introduction to Oceanography**
Registration #1001-472
An introduction to the study of the world ocean, with emphasis on fundamental principles, concepts and processes of biological, geological, chemical, and physical oceanography. (SBIB-340 or permission of instructor)

Class 3, Lab 3, Credit 4

SBIB-473 **Marine Biology**
Registration #1001-473
The biology of marine life, with emphasis on the roles that marine plants and animals assume in their environmental situations, and the structural and physiological adaptations necessary to fulfill those roles. (Minimum of 20 credits in biological science)

Class 3, Lab 3, Credit 4 (S)

SBIB-490 **Transmission Electron Microscopy**
Registration #1001-490
A lecture/laboratory course covering operation, maintenance and calibration of transmission electron microscopes; preparation of biological, chemical and physical specimens for the transmission electron microscope; black-and-white photographic darkroom techniques. (Fourth- or fifth-year status and permission of instructor)

Class 1, Lab 6, Credit 4

SBIB-491 **Scanning Electron Microscopy**
Registration #1001-491
A lecture/laboratory course covering operation, maintenance and calibration of scanning electron microscopes; preparation of biological, chemical and physical specimens for the scanning electron microscope; black-and-white photographic darkroom techniques. (Third-, fourth- or fifth-year status)

Class 1, Lab 6, Credit 4

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 credits in biology and successful completion of the departmental writing requirement)

Class 2, Credit 2 (W, S)

SBIB-559 **Special Topics: Biology**
Registration #1001-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures.

Class variable, Credit variable (offered upon sufficient request)

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. (Fourth- or fifth-year biotechnology major status)

Class 3, Credit 3 (F, W)

SBIB-599 **Independent Study: Biology**
Registration #1001-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (One year of general biology)

Class variable, Credit variable (F, W, S, SR)

SBIB-720 **Introduction to Pharmacology**
Registration #1001-720
A survey of the pharmacodynamic properties and physiological effects of drugs used clinically to treat disease. Emphasis will be placed on anti-cancer drugs, antibiotics, and drugs which will affect the central and peripheral nervous systems. (SBIB-305, 306 or equivalent; SBIB-403; SCHO-233)

Class 3, Credit 3

SBIB-721 **Introduction to Pharmacology**
Registration #1001-721 **Laboratory**
Laboratory work to accompany the lectures in Introduction to Pharmacology. (Corequisite SBIB-720)

Lab 3, Credit 1

NOTE: The following courses may not be taken for biology credit by biology or biotechnology majors.

SBIG-2iO **Microbiology in Health and Disease**
Registration #1004-210
An introduction to microorganisms; their relationship to the environment and human health; the causes, prevention and treatment of infectious diseases; and the role of microorganisms in the preparation and spoilage of foods. (One year of high school biology or equivalent)

Class 4, Credit 4 (F)

SBIG-211 Human Biology I
Registration #1004-211
A general study of human anatomy and physiology. This course includes discussions of cellular biology, skeletal, muscular, nervous, and endocrine systems.

Class 3, Lab 3, Credit 3 (W)

SBIG-212 Human Biology II
Registration #1004-212
A general study of human anatomy and physiology with emphasis on mechanisms by which the nervous and endocrine systems coordinate and integrate body functions. This second course includes discussion of nutrition, metabolism and respiratory, circulatory, lymphatic, urinary and reproductive systems.

Class 3, Lab 3, Credit 3 (S)

SBIG-231 Human Biology I Laboratory
Registration #1004-231
Laboratory to complement the lecture material of SBIG-211. Experiments are designed to illustrate the dynamic characteristics of cells, tissues, and organ systems.

Lab 3, Credit 1

SBIG-232 Human Biology II Laboratory
Registration #1004-232
Laboratory for dietetic and medical illustration students complements the lecture material of SBIG-212. Experiments are designed to illustrate the dynamic anatomy and physiology of major organ systems.

Lab 3, Credit 1

SBIG-289 Contemporary Science: Biology
Registration #1004-289
A study in various biological topics relevant to contemporary problems of society. Topics may include population biology, pollution, disease control, human heredity, contagious diseases, marine biology, bioethics.

Class 4, Credit 4 (F, W, S)

SBIG-315 Medical Genetics
Registration #1004-315
A survey of selected human variations and diseases of medical importance, with emphasis on the underlying genetic principles. (SBIB-203 or equivalent)

Class 2, Credit 2 (S)

Chemistry

NOTE: SCHG courses, except SCHG-309, may not be taken by chemistry or polymer chemistry majors.

SCHA-261 Introduction to Chemical
Registration #1008-261 Analysis I
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. (Corequisite SCHC-251)

Class 2, Lab 5, Credit 3 (offered every year) (F)

SCHA-262 Introduction to Chemical
Registration #1008-262 Analysis II
Systematic treatment of acid-base equilibria, titrations, analytical oxidation-reduction processes; complexometric methods. (Corequisite SCHC-252) (SCHA-261)

Class 2, Lab 5, Credit 3 (offered every year) (W)

SCHA-263 Introduction to Chemical
Registration #1008-263 Analyses III
Introduction to electrochemical and spectroscopic methods, potentiometric and spectrometric titrations. Electrodeposition and pH measurements included in lab. (Corequisite SCHC-253) (SCHA-262)

Class 2, Lab 5, Credit 3 (offered every year) (S)

SCHA-311 Analytical Chemistry:
Registration #1008-311 Instrumental Analysis
Elementary treatment of instrumental theory and techniques; properties of light and its interaction with matter; ultraviolet, visible, and infrared absorption spectroscopies; atomic absorption and molecular fluorescence spectroscopy; nuclear magnetic resonance spectroscopy. (Corequisite SCHA-318) (SCHC-253)

Class 3, Credit 3 (offered every year) (F, W)

SCHA-312 Analytical Chemistry:
Registration #1008-312 Separations
Inorganic and organic separations; Raoult's and Henry's Laws; phase rules; distillation; extraction; adsorption and surface effects; chromatography including gas, liquid, column, paper, thin layer, and ion exchange. (Corequisite SCHA-319) (SCHC-253)

Class 3, Credit 3 (offered every year) (S, SR)

SCHA-317 Instrumental Analysis for
Registration #1008-317 Imaging Science
Instrumental methods of chemical analysis, including infrared and atomic absorption spectroscopy, high performance liquid chromatography, gas chromatography, and potentiometry. Written laboratory reports will be emphasized. (Corequisite SCHG-310) (SCHG-207 or equivalent)

Lab 3, Credit 1 (offered every year) (S)

SCHA-318 Instrumental Analysis Lab
Registration #1008-318
Lab accompanying SCHA-311. Quantitative and qualitative experiments in ultraviolet, visible, infrared, fluorescence, and atomic absorption spectroscopies. Laboratory report writing is emphasized. (Corequisite SCHA-311) (SCHC-253 or equivalent)

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. (Corequisite SCHA-312) (SCHC-253)

Lab 4, Credit 1 (offered every year) (S, SR)

SCHA-620 Building Scientific Apparatus
Registration #1008-620
Basic skills associated with the construction of scientific laboratory apparatus, some of which is not commercially available, will be covered: machine shop skills, working with glass, vacuum technology, optics, and electronics. Special emphasis will be placed on function-structure relationship between an instrument and its intended use. Several references on construction techniques will be provided and information about current manufacturers and suppliers of necessary components will be given. (Corequisite SSEG-621) (SCHP-441, SPSP-212, 213 or 312, 313)

Class 3, Credit 3 (offered upon sufficient request)

SCHB-334 Biochemistry
Registration #1009-334
Introduction to biological chemistry. An in-depth survey of the molecular organization, physiological functions and bio-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
A basic course in safe chemical laboratory practices. Topics include protective equipment, toxicity, safe reaction procedures, storage and disposal methods, and handling all chemicals including flammable materials, compressed gases, cryogens, radioactive materials and other special chemicals.

Class 1, Credit 1 (offered every year) (F)

SCHC-230 Introduction to Co-op Seminar
Registration #1010-230
Exploration of cooperative education opportunities; practice in writing letters of application, resume writing, and interviewing procedures.

Class 1, Credit 1 (offered every year) (F)

SCHC-251 General Chemistry I
Registration #1010-251
A detailed study of fundamental tools of chemistry; atomic theory; stoichiometry (elements, compounds, reactions); properties of gases and thermochemistry (First Law). (Corequisite SCHA-261)

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). (Corequisite SCHA-262) (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; chemical bonding theories; transition elements and coordination chemistry; introduction to organic chemistry, biochemistry and polymers; nuclear chemistry. (Corequisite SCHA-263) (SCHC-252)

Class 3, Credit 3 (offered every year) (S)

SCHC-301 Elements of Chemical Research
Registration #1010-301
The nature of chemical research will be presented in terms of the concepts, approaches, and procedures. Special attention will be given to methods of keeping research records and notebooks. Opportunities and projects available for undergraduate and graduate research will be described by Department of Chemistry faculty. (Corequisite SCHP-340) (SCHO-431)

Class 1, Credit 1 (offered every year) (F, W)

SCHC-401 Chemical Literature
Registration #1010-401
Instruction will be given on the use of chemical literature resources such as *Chemical Abstracts, Science Citation Index, Beilstein, Current Contents,* and computerized information retrieval. Students will prepare a library-based research paper on a chemical topic of their choice as a culmination of instruction on planning a research paper, outlining, using correct scientific English and formats for documentation (footnotes, endnotes, bibliographies), and preparing visuals, abstracts, and letters of transmittal.

Class 2, Credit 2 (offered every year) (F-X;* W)

SCHC-541,542,543 Chemistry Research
Registration #1010-541,542,543
Faculty directed student projects or research usually involving laboratory work and/or calculations that would be considered original. (SCHC-401 or permission of research advisor)

Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHC-559 Special Topics:
Registration #1010-559 Undergraduate Chemistry
Courses in which topics of special interest to a sufficiently large group of students, and not covered in other courses, may be offered upon request.

Class variable, Credit variable (offered upon sufficient request)

SCHC-599 Independent Study:
Registration #1010-599 Chemistry
Faculty directed Study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (Permission of independent study advisor)

Class variable, Credit variable (offered every year) (F, W, S, SR)

NOTE: SCHG courses, except SCHG-309, may not be taken by chemistry or polymer chemistry majors.

SCHG-201 Survey of 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. (Corequisite SCHG-221)

Class **3,** Credit **3** (offered every year) (F)

SCHG-202 Survey of Organic Chemistry
Registration #1011-202
One quarter survey of the fundamentals of organic chemistry that are essential for an understanding of biological molecules, biochemistry, and the basics of polymer chemistry. Topics covered include alkanes, alkenes, alkynes, aromatics, alcohols, ethers, aldehydes, ketones, carboxylic acids and derivatives, amines, and addition and condensation polymers. (Corequisite SCHG-222) (SCHG-201 or equivalent)

Class **3,** Credit **3** (offered every year) (W)

*X, extended day (after 5 p.m.)

SCHG-203 Biochemistry I
Registration #1011-203
Structure and reactions of the major classes of biomolecules are studied. Topics include amino acids and proteins, lipids, carbohydrates and nucleic acids. (SCHG-202 or equivalent)

Class 4, Credit 4 (offered every year) (S)

SCHG-204 Biochemistry II
Registration #1011-204
The fundamentals of the metabolism of major classes of biomolecules are covered. Topics include biochemical energetics; the metabolism of carbohydrates, lipids and proteins; and the functions of nucleic acids. (SCHG-203 or equivalent)

Class 4, Credit 4 (offered every year) (F)

SCHG-205 Chemical Principles I
Registration #1011-205 Laboratory
A laboratory course for photoscience, microelectronics, and science majors and others who are taking SCHG-211. Laboratory experiments are designed to complement the lecture material and may cover the following topics: analytical balance, volumetric measurements, titrations, syntheses, and analyses. (Corequisite SCHG-211)

Lab 3, Credit 1 (offered every year) (F, W)

SCHG-206 Chemical Principles II
Registration #1011-206 Laboratory
A laboratory course for photoscience, microelectronics, and science majors and others who are taking SCHG-212. Laboratory experiments are designed to complement lecture topics and may include the following: titrations, thermochemistry, kinetics, spectrophotometry (visible), and redox reactions. (Corequisite SCHG-212) (SCHG-205)

Lab 3, Credit 1 (offered every year) (W, S)

SCHG-207 Introduction to Organic
Registration #1011-207 Chemistry Laboratory
An introduction to organic laboratory techniques. Methods of separating, purifying, and characterizing organic compounds are covered. (Corequisite SCHG-213) (SCHG-206)

Lab 3, Credit 1 (offered every year) (S)

SCHG-208 College Chemistry I
Registration #1011-208
Primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stoichiometry, First Law of Thermodynamics, thermochemistry, electronic theory of composition and structure, chemical bonding.

Class 4, Credit 4 (offered every year) (F, W)

SCHG-209 College Chemistry II
Registration #1011-209
A continuation of SCHG-208. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry and the chemistry of metals. (SCHG-208)

Class 4, Credit 4 (offered every year) (S)

SCHG-211 Chemical Principles I
Registration #1011-211
For science, microelectronics, and photoscience majors and others who desire an in-depth study of general chemistry. Atomic structure and chemical bonding, chemical equations and chemical analysis; gases; acids and bases. (Corequisite SCHG-205)

Class 3, Credit 3 (offered every year) (F, W)

SCHG-212 Chemical Principles II
Registration #1011-212
Problem solving applications of chemical principles. Topics include thermodynamics and equilibrium, oxidation-reduction, and chemical kinetics. (Corequisite SCHG-206) (SCHG-211)

Class 3, Credit 3 (offered every year) (W, S)

SCHG-213 Introduction to Organic Chemistry
Registration #1011-213
Introduction to the structure and reactivities of organic molecules for physical science majors. An overview of the structure, nomenclature, bonding, and reactivities of major functional groups. Special topics will include spectroscopy, organometallics, polymers, and biomolecules. (Corequisite SCHG-207) (SCHG-212)

Class 3, Credit 3 (offered every year) (S)

SCHG-215 General & Analytical Chemistry I
Registration #1011-215
General chemistry for students in biology, medical technology, and the life sciences. Introduction to chemical symbols, formulas, equations, stoichiometry, atomic structure, chemical periodicity and bonding. Emphasis on an early introduction to solutions, concentrations, acid-base and precipitation reactions; analytical chemistry problem-solving applications are stressed. (Corequisite SCHG-225)

Class 3, Recitation 1, Credit 4 (offered every year) (F)

SCHG-216 , General & Analytical Chemistry II
Registration #1011-216
Introduction to quantitative gravimetric analysis, oxidation-reduction, nomenclature, chemical equilibrium and equilibria in aqueous solutions. Particular emphasis on solution equilibria including weak acids, bases, buffers, hydrolysis, pH titrations and heterogenous equilibria. (Corequisite SCHG-226) (SCHG-215)

Class 3, Credit 3 (offered every year) (W)

SCHG-217 General & Analytical Chemistry III
Registration #1011-217
The concepts of polyprotic equilibria, spectrophotometry instrumentation and analyses, electrochemistry, nuclear chemistry and chemical kinetics are presented with an emphasis on the analytical applications of these principles to the life sciences. (Corequisite SCHG-227) (SCHG-216)

Class 3, Credit 3 (offered every year) (S)

SCHG-221 Survey of General Chemistry
Registration #1011-221 Laboratory
Laboratory course to accompany SCHG-201. Emphasis on introduction to methods of chemical analysis, qualitative and quantitative techniques. (Corequisite SCHG-201)

Lab 3, Credit 1 (offered every year) (F)

SCHG-222 Survey of Organic Chemistry
Registration #1011-222 Laboratory
Laboratory course to accompany SCHG-202. Emphasis is on representative examples of typical organic techniques and synthesis. (Corequisite SCHG-202) (SCHG-221 or equivalent)

Lab 3, Credit 1 (offered every year) (W)

SCHG-225 General & Analytical Chemistry
Registration #1011-225 Laboratory
Introduction to analytical chemistry laboratory techniques and methods of qualitative and quantitative analysis. Topics include use of the Sartorius balance, volumetric calibration, density and chemical formula analysis, and an introduction to volumetric titration and spectrophotometric analysis. Emphasis is placed on laboratory methods, notebook documentation, report writing, and quantitative evaluation of laboratory data. Experiments are designed to complement lecture material in SCHG-215. (Co-requisite SCHG-215)

Lab 3, Credit 1 (offered every year) (F)

SCHG-226 General & Analytical Chemistry
Registration #1011-226 Laboratory
Continuation of SCHG-225 laboratory. Topics include gravimetric analysis; atomic absorption analysis; redox titration; visible spectrophotometric titrations; and thin layer, gas and gel filtration chromatographies. Emphasis is placed on analytical methods of analysis, report writing and quantitative unknown reports. Experiments are designed to complement lecture material in SCHG-216. (Corequisite SCHG-216) (SCHG-225)

Lab 3, Credit 1 (offered every year) (W)

SCHG-227 General & Analytical Chemistry
Registration #1011-227 Laboratory
Continuation of SCHG-226 laboratory. Topics include pH measurement, buffers and pH indicators, polyprotic acid multi-endpoint titrations, spectrophotometric analysis of equilibrium constants, a redox titration contest, enzyme catalysis, and an independent laboratory practical on the quantitative analysis of an unknown solution by various analytical methods. Experiments are designed to complement lecture material in SCHG-217. Emphasis is on independent laboratory analysis, experimental design, and data analysis. (Corequisite SCHG-217) (SCHG-226)

Lab 6, Credit 2 (offered every year) (S)

SCHG-271 Basic Chemistry I
Registration #1011-271
Basic training in general chemistry assuming no prior experience, concentrating on atomic structure, chemical formulas and reactions, stoichiometry, solutions, acids and bases, and oxidation-reduction. (SCHG-275 should be taken concurrently)

Class 3, Credit 3 (offered every year) (F, W)

SCHG-272 Chemistry of Water and Waste Water
Registration #1011-272
Chemistry of water analyses, including solids, pH, alkalinity, acidity, chloride, phosphate, BOD, COD, nitrogen, metals, radioactivity, residual chlorine and chlorine demand. Polymers will also be covered. (Corequisite SCHG-276) (SCHG-271 or equivalent)

Class 3, Credit 3 (offered every year) (F)

SCHG-273 Basic Chemistry II
Registration #1011-273
A basic survey of organic chemistry and functional groups with an emphasis on addition and condensation polymers, inorganic polymers (silicates, glasses, ceramics), structure and properties of metals, and oxidation-reduction applications, including corrosion (SCHG-271; SCHG-277 is a corequisite)

Class 3, Credit 3 (offered every year) (W, S, SR)

SCHG-275 Basic Chemistry I 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) (F, W)

SCHG-276 Chemistry of Water and
Registration #1011-276 Waste Water Lab
Laboratory to be taken concurrently with SCHG-272. Techniques used in water and waste water analysis will be covered. (SCHG-271 or equivalent)

Lab 3, Credit 1 (offered every year) (F)

SCHG-277 Basic Chemistry II Lab
Registration #1011-277
Experiments with organic chemistry, polymers, metals, and oxidation-reduction. (SCHG-275; SCHG-273 is a corequisite)

Lab 3, Credit 1 (offered every year) (W, S, SR)

SCHG-281 Chemical Foundations I
Registration #1011-281
Basic concepts of general chemistry including measurement, atomic theory, chemical bonding, stoichiometry, the liquid and solid states, properties of water. (SMAM-204)

Class 3, Recitation 1, Credit 4 (offered every year) (W)

SCHG-282 Chemical Foundations II
Registration #1011-282
Basic concepts of general chemistry including solutions, colligative properties, acid-base theory, pH, titrations, oxidation-reduction, organic functional groups, addition and condensation polymers. (SCHG-281)

Class 3, Recitation 1, Credit 4 (offered every year) (S)

SCHG-289 Contemporary Science:
Registration #1011-289 Chemistry
This course examines a broad range of contemporary scientific topics with a chemical basis. These may include nuclear power, sources of energy, air and water pollution, medicines and drugs in addition to the chemical laws and structure of the atom.

Class 4, Credit 4 (F, W, S)

SCHG-309 Glassblowing Techniques
Registration #1011-309
This course is designed to introduce and train each student in small-scale scientific glassblowing techniques. Proficiency will be developed in rod manipulation, ring seals, construction of apparatus, annealing, use of a simple lathe and hand-torch work. (May be taken by chemistry, polymer chemistry, and other majors.)

Class 4, Credit 2 (offered upon sufficient request)

SCHG-310 Chemical Principles for
Registration #1011-310 Imaging Science
Fundamentals of atomic and molecular structure of stable ground-state and excited-state atoms and molecules and of reactive intermediates in chemical reactions. The principles of chemical thermodynamics and kinetics will be developed in the context of understanding chemical transformations which occur in imaging systems. Elements of polymer science and photo/radiation chemistry are also included. (Corequisite SCHA-317) (SCHG-213 or equivalent)

Class 3, Credit 3 (offered every year) (S)

*X, extended day (after 5 p.m.)

SCHO-231,232 Organic Chemistry
Registration #1013-231,232
Survey of the structure, nomenclature, reactions, and synthesis of the major functional groups. Mechanisms of main classes of reactions are discussed. (Corequisites SCHO-235, 236) (SCHG-216 or 212, or 209)

Class 3, Credit 3 (offered every year) (231-F; 232-W)

SCHO-233 Organic Chemistry
Registration #1013-233
Structure, nomenclature, reactions, and properties of the important classes of bio-organic molecules (carbohydrates, lipids, amino acids, proteins, and nucleic acids) are covered in depth. Emphasis is on structure and reactivity in relation to biochemical processes. (Corequisite SCHO-237) (SCHO-232)

Class 3, Credit 3 (offered every year) (S)

SCHO-235,236,237 Organic Chemistry Lab
Registration #1013-235,236,237
Laboratory work emphasizes techniques, preparations, and analyses. SCHO-237 emphasizes reactions and properties of biomonomers and polymers. (Corequisites SCHO-231, 232,233)

Lab 3, Credit 1 (offered every year) (235-F; 236-W; 237-S)

SCHO-431 Organic Chemistry I
Registration #1013-431
A rigorous survey of the reactions of major organic functional groups, emphasizing alkanes, alkenes, alkyl halides, and alkynes. Stereochemistry is also included. (Corequisite SCHO-435) (SCHC-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, aldedydes, and ketones. Organometallics and spectral analysis (IR, UV, NMR) are also included. (Corequisite SCHO-436) (SCHO-431)

Class 3, Credit 3 (offered every year) (F, W)

SCHO-433 Organic Chemistry III
Registration #1013-433
A continued survey of reactions of major organic functional groups, including carboxylic acids, carboxylic acid derivatives, amines, and enolate anions. Structure, nomenclature, reactions, and properties of important classes of bio-organic molecules are also included. (Corequisite SCHO-437) (SCHO-432)*

Class 3, Credit 3 (offered every year) (S, SR)

SCHO-435,436 Preparative Organic Chemistry
Registration #1013-435,436
Synthesis of organic compounds utilizing a variety of laboratory techniques. Purification techniques and spectral characterization will be routinely used. (SCHO-431 should be taken concurrently with SCHO-435, SCHO-432 with SCHO-436.) (SCHC-253 or equivalent)

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 synthesis, and chemical and spectral (IR, NMR, and GC/MS) techniques to identify and characterize organic compounds. (Should be taken concurrently with SCHO-433.) (SCHO-432,436)

Lab 6, Credit 2 (offered every year) (S, SR)

SCHO-6OI Organic Chemistry of Polymers
Registration #1013-601
The chemistry of high molecular weight organic polymers and their properties are introduced and discussed in depth. Mechanisms of step-growth and chain-growth polymerization reactions, polymer reactions and degradations are studied. (SCHO-433)

Class 4, Credit 4 (F-X*)

SCHP-301 Introduction to
Registration #1014-301 Polymer Technology
Introduction to the history of polymer chemistry, the terminology of polymers, the structures, methods of synthesis, and properties of commercially significant polymers, and the major polymer processing techniques. (SCHO-432 or equivalent)

Class 2, Credit 2 (offered every year) (F)

SCHP-340 Introduction to Physical Chemistry
Registration #1014-340
Properties of gases, kinetic theory of gases, energy and the First Law; thermochemistry; entropy and the Second and Third Laws; introduction to Helmholtz and Gibbs free energy, gas equilibrium. (SCHC-253, SMAM-252, SPSP-311)

Class 3, Credit 3 (offered every year) (F, W)

SCHP-441 Physical Chemistry I
Registration #1014-441
Review of the thermodynamic laws; criteria for equilibrium and spontaneity; chemical equilibrium; phase rule; equilibrium in ideal and non-ideal solutions; electrochemistry. (Should be taken concurrently with SCHP-445.) (SCHP-340)

Class 3, Credit 3 (offered every year) (S-X* 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. (Should be taken concurrently with SCHP-446.) (SMAM-306, 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. (Should be taken concurrently with SCHP-447.) (SCHP-441)

Class 3, Credit 3 (offered every year) (S,-D,X,* SR)

SCHP-445 Physical Chemistry
Registration #1014-445 Laboratory I
Introduction to physical chemistry laboratory; chemical thermodynamics and equilibrium. (Should be taken concurrently with SCHP-441)

Lab 3, Credit 1 (offered every year) (S-X* SR)

SCHP-446 **Physical Chemistry**
Registration #1014-446 **Laboratory II**
Experiments in the application of quantum chemistry, atomic and molecular spectroscopy, and radioactivity. (Should be taken concurrently with SCHP-442.)

Lab 3, Credit 1 (offered every year) (F, W)

SCHP-447 **Physical Chemistry**
Registration #1014-447 **Laboratory III**
Laboratory experiments in chemical dynamics. (Should be taken concurrently with SCHP-443.)

Lab 3, Credit 1 (offered every year) (S, SR)

SCHP-602 **Physical Chemistry of Polymers**
Registration #1014-602
Study of the theoretical and experimental aspects of polymer characterization. In addition, theoretical considerations of the configuration of polymer chains and statistical thermodynamics of polymer solutions will be related to experimental results. (SCHP-443)

Class 4, Credit 4 (offered every year) (S-X*)

SCHP-603 **Structure-Property**
Registration #1014-603 **Relationships in Polymers**
An introduction to the microstructure and morphology of amorphous and semicrystalline polymeric systems and their influence on thermomechanical, tensile and impact properties of polymers. Topics include: rubber elasticity, viscosity, viscoelasticity and composites. (SCHO-6OI or SCHP-602)

Class 4, Credit 4 (F-X*)

SCHP-604 **Characterization of High Polymers**
Registration #1014-604
Experiments on dilute solution viscosity, gel permeation chromatography, vapor phase osmometry, differential scanning calorimetry, thermogravimetric analysis, tensile testing, infrared spectroscopy, NMR spectroscopy and other aspects of polymer characterization. (SCHO-6OI or SCHP-602)

Lab 6, Credit 2 (S)

SCHP-605 **Synthesis of High Polymers**
Registration #1014-605
Experiments on condensation, free radical, ring opening, and ionic polymerizations and polymer modification. (SCHO-437)

Lab 6, Credit 2 (F)

SCHP-630 **Magnetic Resonance Imaging**
Registration #1014-630
This course introduces the principles of magnetic resonance imaging (MRI) at a level understandable by both the scientist and non-scientist. The course begins with the basics of nuclear magnetic resonance, the foundation of MRI. Magnetic resonance imaging techniques and instrumentation will be explained. Emphasis will be placed on understanding the imaging process. A discussion of information available for water proton content images of body parts and tissue types will be presented. Future directions of MRI will be presented. (SPSP-311, 312, 313 or SPSP-211, 212, 213; SCHP-648)

Class 4, Credit 4 (W) (X*)

*X, extended day (after 5 p.m.)

Note: All 700- and 800-level courses are extended day (after 5 p.m.) courses

SCHP-648 **Basics of Pulsed NMR**
Registration #1014-648
An introduction to the principles of pulsed nuclear magnetic resonance (NMR) spectroscopy. Lectures on instrumentation, pulse sequences, Fourier transforms, and artifacts will be presented. (SCHA-311)

Class 1, Credit 1 (offered every year) (F)

SCHA-711 **Instrumental Analysis**
Registration #1008-711
Theory, applications, and limitations of selected instrumental methods in qualitative, quantitative, and structural analysis. Topics covered include mass spectroscopy, nuclear magnetic resonance, electrochemistry, surface methods and new analytical methods. (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, "C and 'H NMR, polarography. Assignments depend on student background. (Corequisite SCHA-711)

Class 6, Credit 2 (offered every year) (F,W)

SCHB-702 **Biochemistry: Biomolecular**
Registration #1009-702 **Conformation & Dynamics**
Introduction to biological chemistry. Chemical structures, reactions, molecular organization and physiological functions of the molecular components of cells; amino acids, proteins, enzymes, enzyme kinetics, co-enzymes, biochemical thermodynamics, carbohydrates and lipids, membrane structure, and function. Emphasis is on the structure-function relationships of biomolecules, their solution behavior and dynamics. (SCHO-433, SCHP-340 or 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. Biochemical aspects of viral and bacterial infection. (SCHB-702)

Class 3, Credit 3 (offered every year) (S, SR)

SCHC-772 **Special Topics**
Registration #1010-722
Advanced courses which are of current interest and/or logical continuations of the course already being offered. These courses are structured as ordinary courses and will have specified prerequisites, contact hours and examination procedures. Recent courses taught as Special Topics include Nuclear Chemistry, Polymer Morphology, Advanced Chromatographic Methods, and Applications of Computer Interfacing.

Class variable, Credit variable (offered every year)

SCHC-870 Chemistry Seminar
Registration #1010-870

Credit 1 (offered every year)

SCHC-877 External Research
Registration #1010-877
Industrial internship research

Credit 1-16 (offered every year)

SCHC-879-00 . Continuation of Thesis
Registration #1010-879-99

Credit **0** or 1

SCHC-879 Research and Thesis Guidance
Registration #1010-879
Hours and credits to be arranged. Chemical research in a field chosen by the candidate, subject to approval of the department head and advisor.

Credit variable (offered every year)

SCHC-899 Independent Study: Chemistry
Registration #1010-899

Credit variable (offered every year)

SCHI-762 Inorganic Chemistry I:
Registration #1012-762 Periodicity and Reactivity
For the common elements, mastery will be required of chemical reactions which describe: (1) their isolation, (2) their characteristic chemical reactivities, and (3) large volume industrial processes. Relationships between the reactivities of neighboring elements will be elucidated and justified according to current theories. (SCHO-433,SCHP-442)

Class 3, Credit 3 (offered every year) (S, SR)

SCHI-763 Inorganic Chemistry II:
Registration #1012-763 Isomerism, Symmetry, and Bonding
This course provides an in-depth view of how bonding theories endeavor to account for and predict the physical properties (e.g., color, magnetism, stability, chemical potential, electrical conductivity, and others) of a wide variety of inorganic compounds. (SCHO-433, SCHP-442)

Class 3, Credit 3 (offered every year) (F, W)

SCHI-764 Inorganic Chemistry III: Physical
Registration #1012-764 Methods and Recent Advances
This course introduces the student to the more sophisticated tools with which an inorganic chemist investigates inorganic materials. These physical methods with the bonding theories from SCHI-763, are applied to inorganic reactions that exemplify the similarities and anomalous behavior of the elements in each family of the periodic table. Application of this knowledge to contemporary research areas of inorganic chemistry is conducted. (SCHI-763)

Class 3, Credit 3 (offered every year) (S, SR)

SCHI-765 Preparative Inorganic Chemistry
Registration #1012-765
The complexity of many inorganic "building blocks" requires a detailed understanding of inorganic theory, special handling precautions, and special methods to investigate inorganic products. Different areas of the periodic table, new synthetic methods, and new characterization techniques are examined. (Corequisite SCHI-763) (SCHI-762 or permission of instructor)

Class 1, Lab 6, Credit 3 (offered every year) (W, S)

SCHO-730 Chemical Toxicology
Registration #1013-730
This course provides a comprehensive introduction to the basic science of toxicology, with emphasis on a) basic principles, methods of approach and applications of toxicological data; b) types and mechanisms of toxic injury produced in major mammalian organ systems; and c) characteristics and effects of major classes of environmentally and occupationally significant toxicants. (College biology and chemistry, some biochemistry helpful, or permission of instructor)

Class 4, Credit 4 (F, offered upon sufficient request)

SCHO-736 Spectrometric 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 4, Credit 4 (offered every year) (W)

SCHO-737 Advanced Organic Chemistry
Registration #1013-737
Several of the following advanced topics in organic chemistry are covered: poly functional compounds, modern synthetic methods, anion chemistry, stereospecific syntheses, protecting group chemistry, total synthesis, with strong emphasis on recent chemical literature. (SCHO-433)

Class 4, Credit 4 (offered every year) (F)

SCHO-739 / Advanced Organic Chemistry
Registration #1013-739
Selected topics in physical organic chemistry including: techniques for elucidation of mechanism (kinetic, linear free, energy relationships, isotope effects), molecular orbital theory, electrocyclic reactions. (SCHO-433, SCHP-443)

Class 4, Credit 4 (offered alternate years) (S).

SCHO-832 Stereochemistry
Registration #1013-832
Advanced treatment of steric relationships, conformational analysis and stereoisomomerism in organic compounds. (SCHO-433, SCHP-433)

Class 4, Credit 4 (offered upon sufficient request)

SCHO-833 Heterocyclic Chemistry
Registration #1013-833
This course will contain a general treatment of heterocyclic chemistry. Syntheses and relative reactivities of heterocyclic compounds as demonstrated by their chemical reactions. (SCHO-433)

Class 4, Credit 4 (offered alternate years)

SCHP-741 Chemical Thermodynamics
Registration #1014-741
A study of the basic fundamentals of thermodynamics, including an introduction to statistical mechanics, and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases will be calculated based on spectroscopic data. Theory of solutions and phase equilibria are discussed. (SCHP-443, SMAM-306)

Class 4, Credit 4 (offered alternate years)

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 in applications to the life sciences. Not acceptable for BS in chemistry.

Class 3, Credit 3 (offered alternate years) (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 4, Credit 4 (offered alternate years)

SCHP-744 Quantum Mechanics
Registration #1014-744
Review of basic quantum theory and models. Variation and perturbation methods; atomic and molecular orbital theory; emphasis on relationship of spectroscopy and quantum chemistry. (SCHP-442)

Class 4, Credit 4 (offered alternate years)

SCHP-747 Principles of Magnetic Resonance
Registration #1014-747
A series of lectures designed to introduce the principles of magnetic resonance spectroscopies with emphasis on pulsed nuclearmagnetic resonance (NMR) spectroscopy. Topics covered include classical and quantum mechanical theory, Fourier transform techniques, pulse sequences, instrumentation, instrumental techniques, and modern applications such as 2D-NMR and solid state NMR. (SCHP-443; SCHP-648)

Class 4, Credit 4 (offered upon sufficient demand)

Mathematics

SMAM-200 Algebra
Registration #1016-200
An algebra course including such topics as operations involving polynomials, algebraic fractions, factoring, exponents and radicals, solution of linear and quadratic equations, and graphing linear equations.

Class 4, Credit 4 (F,W,S)

SMAM-204 College Algebra and
Registration #1016-204 TYigonometry
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 (205-F, S; 206-F, W; 207-S, SR)

SMAM-210,211 Freshman Seminar
Registration #1016-210,211
210: Orientation program for entering applied statistics, applied mathematics and computational mathematics majors. Several 2-3 week modules introducing students to various non-traditional areas of mathematics; brief orientation to co-op.
211: A continuation of 210 including a four-week introduction to co-op with cover letter and resume writing. Additional mathematical and statistical topics will be discussed. A technical report is required.

Class 1, Credit 1 (offered every year) (210-F; 211-W)

SMAM-214,215 Introduction to Calculus I, II
Registration #1016-214,215
214: Introduction to the study of differential calculus. The following topics will be covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, maxima and minima. (SMAM-204 or equivalent)
215: A continuation of SMAM-214, dealing with an introduction to integral calculus. The following topics will be covered: definite integral, area, work and distance problems, volumes, fundamental theorem of calculus, approximation techniques, exponential and logarithmic functions, applications, introduction to differential equations. (SMAM-214)

Class 3, Credit 3 (offered every year) (214-F, W, S; 215-W, S)

SMAM-220 Fundamentals of Trigonometry
Registration #1016-220
A study of the fundamental concepts in trigonometry including terminology, radian measures, trigonometric ratios, graphs of trigonometry, applications, and vectors.

Class 1, Credit 1 (offered every year) (S)

SMAM-225 Algebra for Management Science
Registration #1016-225
Introduction to functions including linear, quadratic, polynomial, exponential, logarithmic, and rational functions with applications to supply and demand, cost, revenue, and profit functions. Additional topics include matrices, linear programming, and mathematics of finance. (3 years of high school mathematics)

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-226 Calculus for Management Science
Registration #1016-226
A course stressing applications of calculus concepts to solving problems in business and economics. Topics include the limit concept; differentiation and integration of algebraic, logarithmic, exponential, and multivariate functions. (SMAM-225)

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-228 Analytic Geometry
Registration #1016-228
A course covering topics in analytical geometry such as slopes, lines, and conic sections. Also additional topics in polar coordinates, determinants, parametric equations, trigonometry, and two- and three-dimensional vectors. (SMAM-204)

Class 4, Credit 4 (W)

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 Discrete Mathematics I
Registration #1016-265
An introduction to discrete mathematics with applications in computer science and mathematics with an emphasis on proof techniques. It covers the basics of combinatorics, sets, functions, the natural numbers, and the integers modulo n. (Sophomore standing)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-266 Discrete Mathematics II
Registration #1016-266
A continuation of discrete mathematics with applications in computer science and operations research. It covers finite state machines, relations, graphs, trees, optimization and matching. **NOTE: The course may not be taken for credit if credit is to be earned in SMAM-467.** (SMAM-265)

Class 4, Credit 4 (W,S)

SMAM-289 Contemporary Science:
Registration #1016-289 Mathematics
A basic survey of mathematical structures as well as an introduction to problem solving. Topics will be chosen from foundations of mathematics, algebra, topology, number theory, graph theory, probability and statistics. These structures will be examined as they occur naturally in modern settings. **NOTE: Not acceptable for science credit for College of Science majors.**

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-305 Calculus IV
Registration #1016-305
A continuation of SMAM-253 treating 3-dimensional analytic geometry and vector algebra, partial derivatives, multiple integrals and applications. (SMAM-253, or may be taken concurrently)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-306 Differential Equations I
Registration #1016-306
This course provides an introduction to the study of ordinary differential equations and their application. Common first order equations and linear second order equations are solved. Method of undetermined coefficients, variation of parameters, linear independence and the Wronskian, numerical solution techniques of Runge Kutta, vibrating systems, Laplace transforms. (SMAM-305)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-307 Differential Equations II
Registration #1016-307
Second quarter course in ordinary differential equations which includes power series solution to ordinary differential equations about ordinary and regular singular points; Legendre's equations; Bessel's equations; hypergeometric equation; Picard's theorem; solution of systems of linear differential equations; phase plane analysis and stability. (SMAM-306)

Class 4, Credit 4 (offered every year) (S)

SMAM-309 Elementary Statistics
Registration #1016-309
An introduction to elementary techniques of statistical description and inference. Topics include descriptive statistics, probability, estimation of parameters, hypothesis testing, and simple linear regression. The statistical software package MINITAB will be used to introduce students to the use of computers in statistical analysis. **NOTE: This course may not be taken for credit if credit is to be earned in** SMAM-314 **or** 319. (SMAM-204 or equivalent)

Class 4, Credit 4 (offered every year) (W, S, SR)

SMAM-314 Statistics
Registration #1016-314
Basic statistical concepts for engineers and scientists covering descriptive statistics, probability, and inference. Calculus will be used where appropriate and one of the software packages, RS/1 or MINITAB, will be incorporated. **NOTE: This course may not be taken for credit if credit is to be earned in** SMAM-309 **or** 319. (SMAM-253)

Class 4, Credit 4 (offered every year) (W)

SMAM-318 Matrices and Boundary
Registration #1016-318 Value Problems
This course provides an introduction to matrix algebra and boundary value problems. Topics will include: matrix operations with applications to the solution of linear systems of algebraic equations, Fourier series, separation of variables, the heat equation, and the wave equation. **NOTE: This course may not be taken for credit if credit is to be earned in** SMAM-338. (SMAM-306)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-319 Data Analysis
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 will be used to introduce students to the use of computers in statistical analysis. **NOTE: This course may not be taken for credit if credit is to be earned in SMAM-309 or 314.** (SMAM-204)

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-328 Engineering Mathematics
Registration #1016-328
This course provides an introduction to matrix algebra and vector calculus. Topics include: matrix operations with applications to the solution of linear systems of algebraic equations; gradient, divergence and curl; line and surface integrals; independence of path and the divergence theorem; and Stoke's theorem with discussion of engineering applications. (SMAM-306)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-331 Matrix Algebra
Registration #1016-331
An introduction to the basic concepts of linear algebra, with an emphasis on matrix manipulation. Topics will include Gaussian elimination, matrix arithmetic, determinants, Cramer's rule, vector spaces, linear independence, basis, null and column space of a matrix, eigenvalues, and numerical linear algebra. Various applications will be interspersed throughout the course. (SMAM-306)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-338 Series Solutions for Differential
Registration #1016-338 Equations
The course includes: power series solutions of ordinary differential equations at ordinary and regular singular points; Fourier series and an introduction to their use in the solution of heat and wave equations. NOTE: **This course may not be taken for credit if credit is to be earned in SMAM-318.**

Class 4, Credit 4 (offered every year) (S)

SMAM-3S1 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. (Corequisite SMAM-305) (SMAM-253)

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 nonparametric methods. A statistical software package will be used for data analysis. (SMAM-351)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-353 Applied Statistics 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) (W, 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 331 or permission of instructor)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-355 Design of Experiments
Registration #1016-355
A study of the design and analysis of experiments. Includes extensive use of statistical software. Topics include: single-factor analysis of variance; multiple comparisons and model validation; multifactor factorial designs; fixed, random, and mixed models; expected mean square calculations; confounding; randomized block designs; other designs and topics as time permits. (SMAM-353)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-358 Statistical Quality Control
Registration #1016-358
A review of probability models associated with control charts, control charts for continuous and discrete data, interpretation of control charts, acceptance sampling, O.C. curves, standard sampling plans. A statistical software package will be used for data analysis. (SMAM-352)

Class 4, Credit 4 (offered every year) (S)

SMAM-365 Combinatorial Mathematics
Registration #1016-365
An introduction to the mathematical theory of combination, arrangement and enumeration of discrete structures. Topics include: enumeration; recursion; inclusion-exclusion; block design; general functions. (SMAM-265 or permission of instructor)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-399 Co-op Seminar
Registration #1016-399
Exploration of cooperative education opportunities; practice in writing letters of application; resume writing; and interviewing procedures.

Class 1, Credit 0 (offered every year) (W)

SMAM-411,412 Real Variables
Registration #1016-411,412
411: An investigation and extension of the theoretical aspects of elementary calculus. Topics include: mathematical induction, real numbers, functions, limits, continuity, differentiation, l'Hopital's rule, Taylor's theorem. (SMAM-305 and either SMAM-265 or permission of the instructor)
412: A continuation of SMAM-411 which concentrates on integration; definition of integral—its existence and its properties, improper integrals, infinite series, sequences and power series. (SMAM-411)

Class 4, Credit 4 (offered every year) (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-432 Linear Algebra
Registration #1016-432
A further development of the basic concepts of linear algebra, including orthogonality. Topics will include similarity, linear transformations, diagonalization, inner products, Gram-Schmidt, quadratic forms, and various numerical techniques. Several applications of these ideas will also be presented. (SMAM-331)

Class 4, Credit 4 (offered every year) (F, W, SR)

SMAM-437 Computer Methods in Applied
Registration #1016-437 Mathematics
Emphasizes the formulation of problems to allow solutions by standardized techniques and library routines. A study of numerical techniques such as direct and iterative methods for solving linear and nonlinear equations and optimizing functions, discrete methods for boundary value problems, and other techniques for solving problems. Computer-based homework. (SMAM-306, 331)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-451,452 Mathematical Statistics I, II
Registration #1016-451,452
451: Brief review of basic probability concepts and distribution theory; mathematical properties of distributions needed for statistical inference. (SMAM-352)
452: Classical and Bayesian methods in estimation theory; chi-square test; Neyman-Pearson lemma; mathematical justification of standard test procedures; sufficient statistics and further topics in statistical inference. (SMAM-451)

Class 4, Credit 4 (offered every year) (451-F, W; 452-S, SR)

SMAM-454 Nonparametric Statistics
Registration #1016-454
This course provides an in-depth study of inferential procedures that are valid under a wide range of shapes for the population distribution. Topics include: tests based on the binomial distribution, contingency tables, statistical inferences based on ranks, runs tests, and randomization methods. A statistical software package will be used for data analysis. (SMAM-353)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-457 Research Sampling Techniques
Registration #1016-457
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. A statistical software package will be used for data analysis. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-461 Mathematical Modeling
Registration #1016-461
The course will explore 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-306, 352, 331)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-465 Linear Programming
Registration #1016-465
A presentation of the general linear programming problem. A review of pertinent matrix theory, convex sets and systems of linear inequalities; the simplex method of solution; artificial bases; duality, parametric programming; and applications. (SMAM-432)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-466 Advanced Mathematical
Registration #1016-466 Programming
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. (SMAM-265)

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-352; 461; ICSP-241, 242)

Class 4, Credit 4 (offered every year) (S, SR)

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-338)

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, ICSA-220)
512: Continuation of 511 that treats systems of equations, eigenvalue problems, boundary value problems, splines, additional topics at the discretion of the instructor. (SMAM-511)

Class 4, Credit 4 (offered every year) (511-F, W; 512-S, SR)

SMAM-521 Probability Theory
Registration #1016-521
Selected topics in applied probability and statistics to meet the needs and interest of the students. (SMAM-305, 352 or permission of instructor)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-524 An Introduction to Time Series
Registration #1016-524
A study of the modeling and forecasting of time series. Topics include ARMA and ARIMA models, autocorrelation function, partial autocorrelation function, detrending, residual analysis, graphical methods, and diagnostics. A statistical software package will be used for data analysis. (SMAM-353)

. Class 4, Credit 4 (offered upon sufficient request)

SMAM-525 Stochastic Processes
Registration #1016-525
This course will explore Poisson processes and Markov chains with an emphasis on applications. Extensive use will be made of conditional probability and conditional expectation. Further topics, such as renewal processes, Brownian motion, queuing models and reliability will be discussed as time allows. (SMAM-331, 351, or permission of instructor)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-531,532 Abstract Algebra
Registration #1016-531,532
531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265,432)
532: The basic theory of rings, integral domains, ideals and fields GF (pn), applications to coding theory or abstract vector spaces, function spaces, direct sums, applications to differential equations, and to scientific problems. (SMAM-531)

Class 4, Credit 4 (offered 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-265,412)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-555 Statistics Seminar
Registration #1016-555
This course introduces the student to statistical situations not encountered in the previous course of study. Topics include: open-ended analysis of data, motivating use of statistical tools beyond the scope of previous courses, introduction to the statistical literature, development of statistical communication skills, and the pros and cons of statistical software packages. (SMAM-354, 355)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-558 Multivariate Analysis
Registration #1016-558
A study of the multivariate normal distribution, statistical inference on multivariate data, multivariate analysis of covariance, canonical correlation, principal component analysis, and cluster analysis. A statistical sotware package will be used for data analysis. (SMAM-354, 331)

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 Analysis I, II
Registration #1016-561,562
Introduction to the theory of functions of one complex variable. Limits, continuity, differentiability; analytic functions; complex integration; Cauchy integral theorem and formula; sequences and series; Taylor and Laurent series; singularities; residues; analytic continuation; conformal mapping. A more in-depth study of analytic function theory than SMAM-420. (SMAM-411)

Class 4, Credit 4 (offered upon 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-person games; and Pareto optimality. (SMAM-331 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-305,432)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-571,572 Topology
Registration #1016-571,572
Metric spaces, topological spaces, separation axioms, compactness, connectedness, product spaces. (SMAM-412 or permission of instructor)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-581 Introduction to Linear Models
Registration #1016-581
Introduction to the theory of linear models. Least squares estimators and their properties, matrix formulation of linear regression theory, random vectors and random matrices, the normal distribution model and the Gauss-Markov theorem, variability and sums of squares, distribution theory, the general linear hypothesis test, confidence intervals, confidence regions, correlations among regressor variables, ANOVA models, geometric aspects of linear regression, and less than full rank models. (SMAM-331, 354)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-599 Independent Study: Math
Registration #1016-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature and not taught in regularly offered courses.

Class variable, Credit variable (offered every year)

SMAM-620 The Fourier Transform
Registration #1016-620
This course provides an introduction to an important mathematical tool for the analysis of linear systems. Topics covered are: a Fourier integral theorem; the Fourier transform and its inverse; an introduction to generalized functions; the Dirac delta functions; evaluating transforms; convolution, serial products; the sampling theorem; Rayleigh, power convolution, and autocorrelation theorems; the discrete Fourier transform; the fast Fourier transform. (SMAM-420)

Class 4, Credit 4 (offered 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, S, 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)

SMAT-423 Linear Mathematics for
Registration #1019-423 Technologists
An introduction to aspects of linear mathematics, both finite and infinite dimensional. Topics include matrices and determinants, a survey of series, Fourier series, Laplace and Fourier transforms, and Dirac delta functions. (SMAT-422 or equivalent)

Class 4, Credit 4 (offered every year) (S)

Physics

SPSP-200 Physics Orientation
Registration #1017-200
An introduction to the nature and scope of physics for freshmen interested in physics as a profession. Topics include: (a) what is physics? (b) professional opportunities in physics; (c) the physics profession; (d) the literature of physics; (e) communicating in physics. Laboratory includes safety instruction; measurement and recording techniques; graphical analysis; error analysis and report writing. Each student will present a formal written or oral report on some topic of interest at the end of the course.

Class 1, Lab 2, Credit 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. **NOTE: Not acceptable for science credit for College of Science majors.**

Class 2, Lab 2, Credit 3 (offered upon sufficient request) (W, S)

SPSP-211 College Physics I
Registration #1017-211
An elementary course in college physics. Mechanics: Newton's laws of motion, momentum, rotational motion, energy, (Competency in algebra, geometry, and trigonometry) (See SPSP-271 for lab)

Class 3, Credit 3 (offered every year) (F, W)

SPSP-212 College Physics II
Registration #1017-212
Heat and thermodynamics, fluids, wave motion, sound. (SPSP-211) (See SPSP-272 for lab)

Class 3, Credit 3 (offered every year) (W, S)

SPSP-213 College Physics III
Registration #1017-213
Geometrical and wave optics, electricity and circuits, magnetism, some elements of modern physics. (SPSP-211) (SPSP-212 is highly recommended) (See SPSP-273 for lab)

Class 3, Credit 3 (offered every year) (F, S)

SPSP-271 College Physics Lab I
Registration #1017-271
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-211)

Lab 2, Credit 1 (offered every year) (F, W)

SPSP-272 College Physics Lab II
Registration #1017-272
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-212) (SPSP-271)

Lab 2, Credit 1 (offered every year) (S, W)

SPSP-273 College Physics Lab in
Registration #1017-273
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in SPSP-213) (SPSP-271)

Lab 2, Credit 1 (offered every year) (F, S)

SPSP-289 Contemporary Science:
Registration #1017-289 Stellar Astronomy
An introduction to the basic concepts of stellar astronomy such as celestial sphere, physical properties of the stars, principles of spectroscopy as applied to astronomy, double stars, variable stars, star clusters, stellar evolution, gaseous nebulae, stellar motions and distribution, Milky Way system, external galaxies, cosmology. (Algebra) **Note: Not available for science credit for College of Science majors**

Class 4, Credit 4 (F, S, odd academic years; W, even academic years)

SPSP-289 Contemporary Science:
Registration #1017-289 Solar System Astronomy
An introduction to basic concepts of solar system astronomy such as sun, moon, eclipses, earth as a planet, planets and their satellites, comets, meteors, and theories of the origin of the solar system and related matters such as celestial sphere and constellations, and astronomical telescopes. (Algebra) **Note: Not available for science credit for College of Science minors**

Class 4, Credit 4 (W, odd academic years; F, S even academic years)

SPSP-289 Contemporary Science:
Registration #1017-289 Physics
Introductory science for non-science students. One or more topics such as astronomy, space exploration, relativity, nuclear energy, and lasers are discussed and explained simply, to given 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. **NOTE: Not available for science credit for College of Science majors.**

Class 4, Credit 4 (F, W, S)

SPSP-300 Introduction to Semiconductor
Registration #1017-300 Device Physics
An introductory survey, using some calculus, of the physics underlying operation and manufacture of modern semiconductor devices used in integrated circuits and microcomputers. Review of classical physics, classical free-electron gas, atomic physics, molecular bonds and band theory, theory of metals, structure and properties of semiconductors and semiconductor devices. (SPSP-212,213, 273; SMAT-422)

Class 4, Credit 4 (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. (Credit or coregistration 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. (Credit or coregistration SMAM-253) (SPSP-311) (See SPSP-372 for three-hour lab, SPSP-376 for two-hour lab)

Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-313 University Physics III
Registration #1017-313
Electrostatics, Gauss'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, 312) (See SPSP-373 for three-hour lab, SPSP-377 for two-hour lab)

Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-314 Introduction to Modern Physics
Registration #1017-314
An introductory survey of modern physics at the sophomore level. Fundamentals of relativity, photons, interaction of radiation with matter, deBroglie waves, Bohr model, introduction to quantum mechanics, nuclear systematics, radioactivity, alpha, bet|, and gamma decays, Q-values, nuclear fission, nuclear fusipn. (SMAM-305; SPSP-312,313)

Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-31S Introduction to
Registration #1017-315 Semiconductor Physics
Kinetic theory of gases and transport phenomena; Drude's theory of metals; quantum mechanics of a particle in a box; atomic orbitals; band theory qf metals, insulators, and impurity semiconductors; Fermi-Dirac distribution; equilibrium charge-carrier densities in metals, insulators, and semiconductors; operation principles of diodes, bipolar junction transistors, and MOSFETs. (SMAM-306, SPSP-314)

Class 4, Credit 4 (offered every year) (W, S)

SPSP-317 Introduction to Computational Physics
Registration #1017-317 with FORTRAN Applications
An introduction to techniques of computational physics including: numerical differentiation, integration, solutions of the equations of Newtonian mechanics, and error propagation. FORTRAN programming including: type, conditional, and format statements; loops, subscripted variables, intrinsic functions, subprograms, reading from and writing to files. Introduction to the mainframe (VAX) environment. (Credit or coregistration in SPSP-312 and SMAM-252)

Class 4, Credit 4 (S)

SPSP-319 Electrical Processes in Solids
Registration #1017-319
Introduction to statistical mechanics; Planck's formula; transport equation; electronic properties of conductors and semiconductors; characteristics of metal-metal, metal-semiconductor, and pn junctions; operating principles of solid state devices; theory and application. (SPSP-315)

Class 4, Credit 4 (offered upon sufficient request) (S)

SPSP-321 Introduction to Laboratory
Registration #1017-321 Techniques
An introduction to equipment and procedures common to the physics research laboratory. The oscilloscope and ac circuit analysis, statistics, vacuum systems including vacuum pumps and gauges, the laboratory notebook, and writing for publication. (SPSP-312,313, 372, 373)

Class 3, Lab 3, Credit 4 (offered every year) (F, transfer students only; W)

SPSP-331 Introduction to Electricity
Registration #1017-331 and Electronics
Fundamentals of electricity; construction and measurements of electrical and electronic circuits encountered in a scientific laboratory. (Two quarters of college-level physics)

Class 3, Lab 3, Credit 4 (offered upon sufficient request) (S)

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; competency in algebra, geometry, and trigonometry; SMAM-309 recommended)

Class 4, Lab 3, Credit 5 (offered every year) (F)

SPSP-352 Radiation Physics II
Registration #1017-352
Interaction of x-rays and gamma-rays with matter. Radiation detectors; scintillation detectors, solid state detectors. Radionuclide imaging instrumentation. (SPSP-351)

Class 4, Lab 3, Credit 5 (offered every year) (W)

SPSP-353 Radiation Physics III
Registration #1017-353
Principles of radiation protection. Radiation protection instrumentation. Internal and external dose calculations. Practical radiation health physics. Introduction to electronics, including laboratory. (SPSP-352)

Class 4, Lab 3, Credit 5 (offered every year) (S)

SPSP-355 Radiation Protection
Registration #1017-355
Principles and practical aspects of radiation protection; calculation of external and internal radiation dose measurements. (Permission of instructor and one year of college-level physics)

Class 3, Credit 3 (offered every year) (S)

SPSP-361 Ultrasonic Physics
Registration #1017-361
A course in the basic physics of ultrasound, covering ultrasonic wave generation and propagation, transducers, Doppler effect, reflection and refraction, biological effects, and applications of ultrasonic physics in medicine. (Permission of instructor and one year of college-level physics)

Class 4, Lab 3, Credit 5 (offered every year) (F)

SPSP-371 University Physics Lab I
Registration #1017-371
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (See SPSP-375 for a 2-hour lab)

Lab 3, Credit 1 (offered every year) (W)

SPSP-372 University Physics Lab II
Registration #1017-372
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (SPSP-371) (See SPSP-376 for a 2-hour lab)

Lab 3, Credit 1 (offered every year) (S)

SPSP-373 University Physics Lab III
Registration #1017-373
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (SPSP-371, 372) (See SPSP-377 for a 2-hour lab)

Lab 3, Credit 1 (offered every year) (F)

SPSP-374 Modern Physics Laboratory
Registration #1017-374
Basic experiments representative of the experimental foundations of modem quantum physics, such as: photoelectric effect; Franck-Hertz experiment; X-ray diffraction; optical diffraction and interference; atomic spectroscopy; electron microscopy; nuclear spectroscopy; radioactive half-life; Millikan oil drop; black-body radiation. Students enrolled in SPSP-315 may include experiments in semiconductor solid state physics. (SPSP-314, SPSP-321)

Lab 3, Credit 1 (offered every year) (S)

SPSP-375 University Physics Lab I
Registration #1017-375
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-376 University Physics Lab II
Registration #1017-376
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (SPSP-375 or 371) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-377 University Physics Lab III
Registration #1017-377
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (SPSP-375 or 371, SPSP-376 or 372) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-401,402 Intermediate Mechanics
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-312,313)

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's law and Faraday's law, vector potential, displacement current, Maxwell's equations, wave propagation in dielectrics and conductors; production and propagation of radiation. (SMAM-307; SPSP-312, 313,480)

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-312, 313)

Class 4, Credit 4 (offered every year) (F)

SPSP-421,422 Experimental Physics
Registration #1017-421,422
The elements of advanced laboratory work, including the importance of detailed experiment planning, are presented. The requirement of effective communication of results is also an integral part of the course. Experiments are chosen from any area of physics compatible with department facilities: optics, thin films, cryogenics, semiconductors, acoustics, nuclear, etc. (SPSP-314, 321, 431 plus coregistration or credit in any one of these: SPSP-401,411,415,455)

Class 1, Lab 5, credit 3 (offered every year) (421-F; 422-S)

SPSP-431 Electronic Measurements
Registration #1017-431
Laboratory course in electronic measurements and instrumentation, with theory arid applications of discrete and integrated circuits in analog and digital electronics. (SPSP-313, 321)

Class 3, Lab 3, Credit 4 (offered every year) (S)

SPSP-432 Computer Interfacing to Laboratory
Registration #1017-432 Instrumentation
An introduction to microcomputer interfacing with associated laboratory exercises. Emphasis on the interface circuits and TTL logic design using an 8088 based microprocessor. Covers elementary logic circuits, computer architecture, assembly language programming, serial and parallel interfaces, A/D and D/A conversion, RS-232C, IEEE488, and other industry standards. (SPSP-331 or 431 or equivalent)

Class 3, Lab 3, Credit 4 (offered upon sufficient request) (F)

SPSP-455 Optical Physics
Registration #1017-455
Physical optics including interference, diffraction, and polarization. Brief introduction to modern optics. (SMAM-305; SPSP-312, 313,480)

Class 4, Credit 4 (offered every year) (F)

SPSP-480 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-312, 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 coregistration or credit in SPSP-401 and 411)

Class 4, Credit 4 (offered every year) (F)

SPSP-521 Advanced Experimental Physics
Registration #1017-521
Advanced laboratory experiments and projects in atomic physics, nuclear physics, or solid state physics. Special emphasis on experimental research techniques. (SMAM-307; SPSP-421)

Lab 6, Credit 2 (offered every year) (F)

SPSP-522 Introduction to Quantum Mechanics
Registration #1017-522
A study of the concepts and mathematical structure of non-relativistic quantum mechanics. Exact and approximate techniques for solving the Schroedinger equation are presented for various systems. (SPSP-315,402,455,480)

Class 4, Credit 4 (offered every year) (S)

SPSP-531 Solid State Physics
Registration #1017-531
The structure of solids and their thermal, mechanical, electrical and magnetic properties. (SPSP-315, 415, 480 and 522) (SPSP-501 is recommended)

Class 4, Credit 4 (offered every year) (F)

SPSP-541,542, 543 Physics Research
Registration #1017-541,542,543
Faculty-directed student project or research usually involving laboratory work or theoretical calculations that could be considered of an original nature. (Permission of the instructor)

Class variable, Credit variable (offered every year)

SPSP-550,551 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) (F)

SPSP-559 Special Topics: Physics
Registration #1017-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specific prerequisites, contact hours and examination procedures. Topics could include: introductory statistical mechanics; plasma physics; general relativity; linear integrated circuits; cryogenics; radio astronomy; history of physics; astrophysics; astronomy.

Class variable, Credit variable (offered upon sufficient request)

SPSP-599 Independent Study: Physics
Registration #1017-599
Faculty-directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.

Class variable, Credit variable (offered every year)

General Science

SSEG-621 Building Scientific Apparatus
Registration #1018-621 Laboratory
Basic skills associated with the construction of scientific laboratory apparatus, some of which is not commercially available, will be covered: machine shop skills, working with glass, vacuum line technology, optical spectrometer design, and instrument electronics. (Corequisite SCHA-620) (SCHP-441; SPSP-212, 213 or 312, 313; or permission of instructor)

Lab 4, Credit 1 (offered upon sufficient request)

Clinical Sciences

SCLG-205 Introduction to Diagnostic Medical
Registration #1026-205 Imaging
An entry-level exploration of the historical, professional and occupational development of medical imaging. Current uses and future trends will be discussed in the areas of radiography, computed tomography, magnetic resonance, nuclear medicine, and ultrasound imaging.

Class 2, Credit 2 (F, S)

SCLG-289 **Contemporary Science:**
Registration #1026-289 **Health Sciences**

This course will examine areas within the health field, including evolutionary structural development and future projects, with emphasis on methods of diagnostic testing, selected disease conditions and the utilization of computers.

Class 4, Credit 4 (W)

SCLG-301 **Medical Terminology**
Registration #1026-301

Emphasizes etymology, definition, pronunciation and correct utilization of medical terms, which enables students to develop a vocabulary essential to the understanding of and communication with the various health areas in which allied health professionals will serve.

Class 3, Credit 3 (offered every year) (F,S)

SCLG-415 **Pathophysiology**
Registration #1026-415

This course combines knowledge of human physiology with disease processes. The etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, diagnostic and therapeutic procedures of common diseases will be covered. Topics include cellular and tissue response to pathogenic agents, neoplasia, developmental disorders, disorders of body systems, and disease of major organs. (SBIB-306)

Credit 4 (S)

SCLG-559 **Special Topics**
Registration #1026-559 **Clinical Sciences**

Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures.

Class variable, Credit variable (F, W, S)

SCLG-599 **Independent Study:**
Registration #1026-599 **Clinical Sciences**

Faculty directed study of appropriate topics on a tutorial basis. This course will be used to enable an individual to pursue studies of existing knowledge available in the literature.

Class variable, Credit variable (F, W, S)

SCLB-201 **Introduction to**
Registration #1027-201 **Biomedical Computing**

An introduction to the applications of computers in health care. Information concerning career opportunities and cooperative education will be provided.

Class 1, Credit 1 (offered every year)

SCLB-305 **MUMPS Programming**
Registration #1027-305 **Language**

An in-depth study of the MUMPS programming language and its data base capabilities. Programming projects will be required and will be taken from the health care field. Direct mode, local/global/special variables, commands, arguments, operators, writing and executing routines, MUMPS editors, screen/printer formatting, string manipulation, pattern matching, concatenation, globals and arrays (trees), multilevel and string subscripts, input/output using devices, cross reference files, indirection. (ICSP-241,242)

Class 4, Credit 4 (S)

SCLM-210 Medical Technology Seminar
Registration #1024-210

This course is designed to introduce the student to the profession of medical technology through a series of lectures which provide an overview of the major departments within the modem clinical laboratory. Historical perspectives, development 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 Science Department.

Class 1, Credit 1 (F)

SCLM-350 Special Topics in Medical Technology
Registration #1024-350

Topics related to the practice of medical technology are presented in a series of seminars. Each series is devoted to a specific aspect of the field and includes a discussion of contemporary issues affecting the practice of medical technology.

Class 1, Credit 1 (F, W, S)

SCLM-401 Hematology/
Registration #1024-401 Immunohematology

A study of the blood (erythrocytes, leukocytes, platelets,, coagulation factors and blood group antigens). Descriptions of the cellular components of the blood in health and in disease. Cellular and immunological functions and their interrelationships. Hemostasis and coagulation mechanisms. Structures of antigens and antibodies and mechanisms of antigen-antibody reactions. Lab procedures demonstrate ceil counting techniques, co-agulation studies, antigen-antibody reactions and compatability testing of various blood groups. (SBIB-306 or permission of instructor)

Class 3, Lab 3, Credit 4 (S)

SCLM-405 Diagnostic Bacteriology and Mycology
Registration #1024-405

Study of bacteria and fungi that cause human disease. Lecture and laboratory subjects include microorganisms growth, isolation, identification, antibiotic sensitivity, and related human immunological and serological responses. (SBIB-404)

Class 3, Lab 3, Credit 4 (W)

SCLM-406 Virology
Registration #1024-406

Molecular biology, chemistry, epidemiology and clinical aspects of viruses; morphology, genetics, immunology, environmental effects; methods of isolation, cultivation, identification; assays. Human virus diseases. (One year of general biology)

Class 4, Credit 4 (offered upon sufficient request)

SCLM-412 [v] Parasitology
Registration #1024-412

Ecology, structure, life cycle metabolism, pathology and control of human parasites. Insects, protozoa, nematodes, flukes and tapeworms of medical importance,, fhemotherapy and immunology of human parasites. Emphasis on recognizing human parasites. t

Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SCLM-432 **Clinical Laboratory**
Registration #1024-432 **Instrumentation**
Principles of clinical laboratory instruments in the analysis of body fluids. This quarter stresses the principles of instrumental methods of analysis including visible and ultraviolet spectrophotometry, nephelometry, fluorometry, flame photometry, refractometry, chromatography, electrophoresis, osmometry, radiation counters, and automated chemical analyzers. (SCHG-217 or equivalent, SBIB-306)

Class 2, Lab 6, Credit 4 (F, W)

SCLM-433 **Basic Clinical Chemistry**
Registration #1024-433
Principles of clinical chemistry in the analysis of the chemical component of body fluids. This quarter stresses the basic chemistries underlying the classical methodologies and relates them to the disease state. Topics include: liver function tests, renal function tests, carbohydrates, electrolytes, acid base balance, enzymes, lipids, endocrine function tests, drug analysis and statistical quality control. (SCHG-217 or equivalent, SBIB-306)

Class 2, Lab 6, Credit 4 (S)

SCLN-401 **Introduction to Clinical**
Registration #1025-401 **Nuclear Medicine**
A combination lecture/laboratory course introducing clinical aspects of nuclear medicine. Hospital organization is presented as well as the relationship of nuclear medicine services to other hospital services. Laboratories in affiliated hospitals are correlated with lectures on nuclear medicine technology, patient care and emergency procedures. (Fourth-year standing in NMT program)

Credit 4(F)

SCLN-402 **Nuclear Medicine Procedures**
Registration #1025-402 **Central Nervous System**
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the central nervous system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)

Credit 1 (F)

SCLN-502 **Nuclear Medicine Procedures**
Registration #1025-502 **Skeletal System**
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the skeletal system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)

Credit 1 (F)

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 the 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 NMT program)

Credit **2** (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 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, techniques, data calculations and test interpretation are covered for each procedure discussed. (Fourth-year standing in NMT program)

Credit 1 (S)

SCLN-516 Instrumentation and
Registration #1025-516 Computers in Nuclear Medicine
A combination lecture/practicum course covering the various nuclear instrumentation found in the clinical setting. The lectures provide knowledge of the function and characteristics of the basic components of any scintillation detection system necessary to understand its applications in nuclear medicine. Lectures are reinforced through clinical practicums in which the student operates the equipment. Collimation, tomography, quality control, computer systems and film processing are covered. (Fourth-year standing in NMT program)

Credit 2 (W)

SSCLN-517 Radiochemistry and
Registration #1025-517 Radiopharmacology
A combination lecture/lab course covering the production and use of radioisotopes in medicine. Radiopharmaceutical compounding, quality control procedures, dose calibration, and licensing regulations regarding the handling and use of radiopharmaceuticals are covered. (Fourth-year standing in NMT program)

Credit 2 (W)

SSCLN-518 Radionuclide Therapy
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)

SSCLN-519 Radiation Health Safety
Registration #1025-518
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)

SSCLN-520 Radioassay
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)

SSCLN-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 2 (S)

SSCLN-522 Clinical Nuclear Medicine I
Registration #1025-522
A clinical practicum which gives the student the opportunity to learn and master nuclear medicine procedures through technical and practical experience.Each student is assigned a particular combination of three hospitals and trains approximately three months in each. Students work with patients under the supervision of physicians and technologists on the hospital staff. Student progress and performance is monitored by the RIT nuclear medicine technology clinical coordinator who makes periodic visits to the hospital department. (Fourth-year standing in NMT program)

Credit 7 (F)

SCLN-523 Clinical Nuclear Medicine II
Registration #1025-523
Continuation of Clinical Nuclear Medicine I. (Fourth-year standing in NMT program)

Credit 7 (W)

SCLN-524 Clinical Nuclear Medicine III
Registration #1025-524
Continuation of Clinical Nuclear Medicine II. (Fourth-year standing in NMT program)

Credit 7 (S)

SCLS-412 Cross-Section Anatomy
Registration #1030-412
Basic cross-sectional anatomy of the head, neck, abdomen, and pelvis. Builds on the basic knowledge of anatomy. Prepares the student to recognize sectional anatomy of major human structures, especially as they relate to medical imaging techniques. Lectures are augmented with exercises using prepared human sections, organ modeling, and diagnostic imaging units. (SBIB-305, 306 or permission of instructor)

Class 4, Credit 4 (W)

SCLS-413 Ultrasound Instrumentation
Registration #1030-413

Principles of ultrasound physics are directly applied to the use of ultrasound instrumentation in medical imaging. Transducers, signal production, data display, manipulation of controls, quality control, biologic effects, and doppler will be discussed. Emphasis will be on the creation of high quality images on laboratory scanners.

Class 4, Credit 4 (S)

SCLS-414 General Vascular Examination
Registration #1030-414
A course designed to give basic knowledge of general vascular evaluation with an emphasis on the sonographic approach. Two-dimensional real-time imaging and Doppler techniques will be presented as well as a discussion of other imaging modalities and their use in vascular evaluation. Performance of examinations on laboratory equipment will be stressed. (Fourth-year standing in Ultrasound Program or permission of faculty)

Class 4, Credit 4 (S)

SCLS-552 Introduction to Obstetrical Ultrasound
Registration #1030-552
Provides the ultrasound candidate with basic knowledge necessary to perform obstetrical examinations. High quality image production, recognition of normal structures and basic pathologic states will be stressed. Examination protocols, review of specific anatomy, film reading, and use of other imaging techniques will be addressed. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)

Class 3, Credit 3 (F)

SCLS-553 Gynecologic Ultrasound
Registration #1030-553
Information necessary to perform basic gynecologic sonographic examinations is presented. Examination strategies for various procedures will be explored, as well as the integration of ultrasound into established clinical practices. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)

Class 3, Credit 3 (F)

SCLS-554 Advanced Obstetrical Ultrasound
Registration #1030-554
Provides information necessary to perform more sophisticated obstetrical procedures utilizing ultrasound. Examination strategies for various procedures will be explored as well as the integration of ultrasound into established clinical practices. (Fourth-year standing in Ultrasound Program or permission of faculty)

Class 4, Credit 4 (W)

SCLS-556 Abdominal Ultrasound I
Registration #1030-556
Laboratory simulation and classroom instruction are used to develop practical skills and clinical knowledge necessary to perform basic abdominal examinations utilizing ultrasound. High quality image production, recognition of normal abdominal structures and basic pathologic states will be stressed. Examination protocols, review of anatomy, film reading, and use of other scanning techniques will be addessed. This is an internship course. (Fourth-year standing in the Ultrasound Program or permission of faculty)

Class 3, Credit 3 (F)

SCLS-557 Abdominal Ultrasound II
Registration #1030-557
A continuation of SCLS-556. Laboratory simulation and classroom instruction are used to develop practical skills and clinical knowledge necessary to perform basic abdominal examinations utilizing ultrasound. High quality image production, recognition of normal abdominal structures and basic pathologic states will be stressed. Examination protocols, review of anatomy, film reading, and use of other scanning techniques will be addressed. This is an internship course. (Fourth-year standing in the Ultrasound Program or permission of faculty)

Class 3, Credit 3 (F)

SCLS-558 Small Parts Ultrasound
Registration #1030-558
This course provides the classroom and clinical knowledge necessary to perform basic sonographic examination of anatomy classified as small parts, usually utilizing specialized equipment and high megahertz frequencies. Examination strategies for various procedures will be discussed, as well as the role of ultrasound in established clinical practices utilizing small parts imaging. This is an internship course. (Fourth-year standing in the Ultrasound Program or permission of faculty)

SCLS-560 Seminar in Ultrasound I
Registration #1030-560
Speaking, writing, and researching skills are explored. This course presents methods for researching a selected topic, developing proper writing strategies, and making oral presentations. Students will research a topic and prepare a written document following common publishing guidelines in addition to making oral presentations. (Fourth-year standing in Ultrasound Program or permission of faculty)

Class 2, Credit 2 (W)

SCLS-561 Seminar in Ultrasound II
Registration #1030-561
Candidates will prepare a complete plan for an ultrasound department as if they had been hired to establish a new department in a hospital setting. The candidates will work together to develop the physical, administrative, and financial aspects of a department. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)

Class 4, Credit 4 (S)

SCLS-570 Clinical Ultrasound
Registration #1030-570
Prepares the student for application of classroom knowledge to the practice of ultrasound by means of a clinical internship. Performing basic, general ultrasound examinations in both the laboratory and clinical settings will be stressed. Nursing procedures and medico-legal considerations will also be discussed as related to the practice of ultrasound examination. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of director)

Credit 7 (F)

SCLS-571 Clinical Ultrasound II
Registration #1030-571
Further prepares the candidate for application of classroom knowledge to the practice of ultrasound by means of a clinical internship. Performing basic, general ultrasound examinations in both the laboratory and clinical settings will be stressed. The candidate will be expected to perform basic examinations with little, if any, assistance by the end of this course. (Fourth-year standing in Ultrasound Program or permission of director; SCLS-570)

Credit 7 (W)

SCLS-572 Clinical Ultrasound III
Registration #1030-572
Final development of ultrasound examination skills by means of clinical internship. The candidate will be expected to perform general ultrasound examinations with no assistance by the end of this course. (Fourth-year standing in Ultrasound Program or permission of director; SCLS-571)

Credit 7 (S)

Clinical Chemistry

SCLC-705 Mechanisms of Disease
Registration #1023-705
Following a brief review of normal physiology, this course will cover such topics as: mechanisms of cellular injury, the healing process, atherosclerotic heart disease, hypertension, infectious disease, and many other important medical topics.

Class 4, Credit 4 (W)

SCLC-712 Statistics and Quality Control
Registration #1023-712
The principles of statistics as applied to biomedical research as well as clinical laboratory analysis will be studied. Using a problem-oriented approach, probability, normal values, analysis of variance and quality control as well as the relationship of these procedures to patient care will be studied.

Class 3, Credit 3 (S)

SCLC-722 Clinical Laboratory
Registration #1023-722 Computer Applications
The basic concepts of data processing, as well as the design evaluation and utilization of computer systems in both hospital and clinical laboratories, will be studied. The legal aspects of biomedical data processing as well as instrument interfacing will also be studied.

Class 3, Credit 3 (offered every other year)

SCLC-820 Advanced Clinical Chemistry I
Registration #1023-820
Quality control, statistics, electrolytes, acid-base physiology, renal function, trace metals, lipids, carbohydrate metabolism, enzymes, and various standard methods are covered. (Permission of instructor)

Class 4, Credit 4 (Offered every other year)

SCLC-821 Advanced Clinical Chemistry II
Registration #1023-821
Proteins, liver function tests, hepatitis, porphyrias, toxicology, therapeutic drug monitoring, inherited disorders of metabolism, vitamins, gastrin, VIP, pediatric clinical chemistry, geriatric clinical chemistry, tumor markers and genetic probes. (Permission of instructor)

Class 4, Credit 4 (offered every other year)

SCLC-822 Advanced Clinical Chemistry III
Registration #1023-822
Radioimmunoassay, hormones, fetal-placement unit, integration of laboratory data. (Permission of instructor)

Class 4, Credit 4 (offered every other year)

SCLC-870 Clinical Chemistry Seminar
Registration #1023-870

Credit 1 (W)

SCLC-872 Special Topics in Clinical Chemistry
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 examinations.

Class variable, Credit variable (offered upon sufficient request)

SCLC-877 External Clinical
Registration #1023-877 Chemistry Research
Research carried out in a laboratory outside of the College of Science. Prior to the initiation of external research, a proposal from the student as well as a commitment of support and direction from the laboratory are evaluated for determination of credit to be awarded.

Credit variable

SCLC-879 Clinical Chemistry Research
Registration #1023-879
Research carried out in the College of Science laboratories under the direction of RIT faculty members. The amount of credit awarded for such projects is determined after evaluation of a research proposal.

Credit variable 1-16

SCLC-899 Independent Study
Registration #1023-899
Individual projects or studies carried out under the direction of a faculty member. Study objectives and design are developed through faculty-student interaction with evaluation and credit to be awarded determined after review of a study proposal.

Credit variable

Materials Science and Engineering

SESM-701 Introduction to Materials Science
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. (Graduate standing or permission of instructor)

Class 4, Credit 4 (offered every year)

SESM-702 Introduction to Polymer Science
Registration #1028-702
A study of the chemical nature of plastics detailing the relationships between polymerization conditions,Structure and properties in both the solid and fluid states.

Class 4, Credit 4 (offered every year)

SESM-703 Solid State Science
Registration #1028-703
This course will survey topics in the physics of solids. Included in these will be crystal symmetry, structure, and binding; mechanical, thermal, and electrical properties of insulators, semiconductors, and conductors including band theory. (SESM-704 or equivalent)

Class 4, Credit 4 (offered every year)

SESM-704 Introductory Theoretical Methods
Registration #1028-704
Treatment of waves and fields; selected topics of interest in electrodynamics and fluid mechanics; statistical mechanics; Maxwell-Boltzmann, Bose Einstein, and Fermi-Dirac distributions and their applications.

Class 4, Credit 4 (offered every year)

SESM-705 Introductory Experimental Techniques
Registration #1028-705
The course introduces the student to laboratory equipment for hardness testing, impact testing, tensile testing, x-ray diffraction, and thermal treatment of metallic materials. Experiments illustrating the characterization of high molecular weight organic polymers will be conducted. (SESM-701 and 702 or equivalents)

Class variable, Lab variable, Credit 4 (offered every year)

SESM-706 Experimental Techniques:
Registration #1028-706 Thin Films
Production of thin films of metals and dielectrics by physical vapor deposition. Lectures cover vacuum systems, evaporation sputtering, nucleation and growth of thin films, analysis and characterization of thin films, and application of thin films. Laboratories cover use of vacuum systems in evaporation and sputtering and some methods of characterizing the thin films thus produced. (Permission of instructor)

Class variable, Lab variable, Credit 4

SESM-707 Experimental Techniques:
Registration #1028-707 Electron Microscopy & Spectroscopy
The course includes a detailed study of scanning electron microscopy and modern applications in microelectronic engineering. (SESM-701 or equivalent)

Class variable, Lab variable, Credit 4

SESM-708 Experimental Techniques
Registration #1028-708
This course is designed to provide an in-depth integrated approach to the analysis, investigation and development of materials, concentrating on specific types or classes. (SESM-701 or equivalent)

Class variable, Lab variable, Credit 4

SESM-710 Materials Properties and
Registration #1028-710 Selection I
A study of the principles of material behavior as applied to design. Application of materials according to these principles is stressed. Ferrous, nonferrous and nonmetallic materials are considered. (SESM-701 or equivalent)

Class 4, Credit 4

SESM-714 Glass Science
Registration #1028-714
Topics covered will include the structure and properties of glass, applied areas such as glass melting and processing, and various technological applications of glass. (SESM-701 or equivalent; SESM-704)

Class 4, Credit 4

SESM-717 Materials Degradation
Registration #1028-717 Corrosion
This course introduces the student to the basic electrochemical nature of corrosion and considers the various factors which influence the rate of corrosion in a variety of environments. Various means of controlling corrosion are considered. (SESM-701 or equivalent)

Class 4, Credit 4

SESM-720 Organic Polymers
Registration #1028-720
This course is designed to meet the needs of students in the area of organic chemistry related to synthesis, polymerization mechanism, structures, stereochemistry and reactions of organic polymers and their industrial usage. (SESM-702 or equivalent)

Class 4, Credit 4

SESM-721 Physical Chemistry of
Registration #1028-721 Polymers
A study of the theoretical and experimental methods available for designing plastics products and selecting appropriate materials, with special emphasis on the interrelationships between materials, product design, tooling construction and manufacturing producibility. (SESM-702 or equivalent)

Class 4, Credit 4

SESM-722 Polymer Processing
Registration #1028-722
A study of the basic principles and methods involved in the technology of processing polymeric materials, including treatments of heat transfer, mass transfer, mixing and shaping or molding of these materials. (SESM-702 or equivalent)

Class 4, Credit 4

SESM-730 Optical Properties of Materials
Registration #1028-730
Fundamentals of geometrical and physical optics; interaction of radiation with matter; dielectrics and thin films; introduction to electro-optic and acousto-optic effects. (SESM-704 or equivalent)

Class 4, Credit 4

SESM-733 Magnetic Properties of Materials
Registration #1028-733
Band structures of pure and doped solids and solid compounds, transport phenomena, semiconduction, optical properties, galvanomagnetic and magneto-optic effects. (SESM-701 and 704 or equivalents)

Class 4, Credit 4

SESM-734 Advanced Optics
Registration #1028-734
Lasers: theory, types and construction; optics of metals; multilayer dielectrics; electro- and acousto-optic modulators and deflectors; optical detectors. (SESM-730 or equivalent)

Class 4, Credit 4

SESM-736 Amorphous and
Registration #1028-736 Semicrystalline Materials
Electrical, thermal, and optical properties of amorphous materials; model of conduction. (SESM-701, 703, 704 or equivalents)

Class 4, Credit 4

SESM-740 Nuclear Science and Engineering
Registration #1028-740
Systemics of the atomic nuclei, radioactivity, nuclear reactions, fission, nuclear reactor principles, designs, materials and safety. (SESM-701 and 704 or permission of instructor)

Class 4, Credit 4

SESM-760 Plasma Science
Registration #1028-760
An introduction to plasma science; a study of the basic phenomena and application of plasma to etching, deposition, polymerization, plasma production of materials, analytical emission spectroscopy and atmospheric science. (SESM-701 or equivalent)

Class 4, Credit 4

SESM-770 Physics and Chemistry
Registration #1028-770 of I. C. Processing
Study of the various processing steps used in integrated circuit fabrication technology with special emphasis on diffusion, thermal oxidation, ion implantation and plasma assisted deposition and etching processes. Process modelling using SUPREM. (SESM-703 or permission of instructor)

Class 4, Credit 4

SESM-800 Special Topics
Registration #1028-800
In addition to in-depth study of any of the courses listed under Elective Courses, special topics may be selected from such areas as elastomers, organometallics, radiation damage, processing of materials, superconductivity, etc. (Permission of instructor)

Class variable, Credit 4

SESM-879 Research and Thesis Guidance
Registration #1028-879
A project involving research on a topic in materials science and engineering carried out either on campus or off campus under the industrial internship option. An oral examination and written thesis are required.

Credit variable

SESM-890 **Seminar**
Registration #1028-890
This course is required for completion of the program and will involve a one-hour presentation on some topic in materials science in engineering.

Class variable, Credit 1 (F, S)

SESM-899 **Independent Study**
Registration #1028-899
This course number should be used by students wishing to study a topic on an independent study basis. (Permission of instructor)

Credit variable

National Technical Institute for the Deaf

School of Business Careers

Applied Accounting

NBTA-100 Career Exploration: Accounting
Registration #0801-100
This course is designed to help students collect the information necessary to make an appropriate decision regarding a career in accounting. Students learn about the nature of accounting jobs, work environments, career options, and program requirements through a combination of group and individual activities that include presentations by faculty members and related professionals, panel discussions, field trips, class observations, and student interviews.

Class 1, Credit 1 (F, W, S)

NBTA-201 General Accounting I
Registration #0801-201
This course is an introduction to accounting for both accounting and non-accounting students. Topics covered are the basic accounting equation; the recording of transactions using debits and credits; general and subsidiary ledgers; and die accounting cycle, including recording transactions for service and merchandising enterprises, preparing trial balances, adjusting and closing processes, and preparing basic financial statements. Spreadsheet applications are used on microcomputers.

Class 6, Credit 3 (F)

NBTA-202 General Accounting II
Registration #0801-202
This course is a continuation of General Accounting I for both accounting and non-accounting students. Topics covered include the calculation of interest on notes and the discounting of notes, adjustment for uncollectable accounts, merchandise inventory systems and calculations, internal control, and the voucher system. Coursework includes recording transactions in special journals and a practice set that applies accounting concepts in a simulated business situation. Spreadsheet applications are used on microcomputers. (Grade of C or better in NBTA-201)

Class 6, Credit 3 (W)

Fundamentals of Economics I, II
NBTA-231,232
Registration #0801-231,232
This two-course sequence gives an overview of micro- and macroeconomic concepts. Students examine economic problems in a rational manner by learning the fundamental processes of economic analysis and the skills of economic reasoning. These courses include selected knowledge and skills from the economic discipline presented in the form of concepts and understandings deemed most important to economic literacy for students. (Applied accounting associate degree status, NBTA-101)

Class 3, Credit 3 (NBTA-231, W; NBTA-232, S)

NBTA-251 Applied Accounting I
Registration #0801-251
This course for accounting students is a continuation of General Accounting I and II. Topics covered include a computerized review of the accounting cycle and financial reports, the components of a payroll system, the calculation and recording of employee earnings and employer payroll taxes, the recording and adjusting* of deferrals and accruals, partnerships, and depreciation or amortization of assets. Coursework includes a computerized practice set designed to summarize General Accounting I and II and Applied Accounting I in a simulated business situation. (Grade of C or better in NBTA-202)

Class 6, Credit 4 (S)

NBTA-252 Applied Accounting II
Registration #0801-252
This course introduces students to cost accounting with an emphasis on job order costing. Topics covered include manufacturing statements; cost theory; and integration of materials, labor, and overhead to the computerized job cost situation. The course culminates with practical application of course content through a practice set. Computer applications include spreadsheets. (Grade of C or better in NBTA-251)

Class 6, Credit 4 (F)

NBTA-253 Applied Accounting in
Registration #0801-253
This course is a continuation of cost accounting, with particular concentration on process and managerial aspects. Topics covered include average and FIFO process costing methods, equivalent units, multiple products, changes in units, budgeting, cost classification, and computerized applications. Computer applications include spreadsheets, graphics, and data bases. (Grade of C or better in NBTA-252)

Class 6, Credit 4 (W)

NBTA-254 Applied Accounting IV
Registration #0801-254
This course consists of managerial accounting topics and concepts. Topics covered include financial analysis, accounting concepts and principles, statement of cash flow, and corporate accounting. Computer applications include spreadsheets. (Grade of C or better in NBTA-253)

Class 6, Credit 4 (S)

NBTA-260 Applied Accounting Techniques
Registration #0801-260
This course gives students an opportunity to reinforce and apply accounting topics and skills previously studied. Students work in a simulated accounting office as accounting clerks and perform a variety of general and process costing duties. Computer applications include cost accounting, general ledger, spreadsheets, graphics, and data bases. (Grade of C or better in NBTA-253)

Class 6, Credit 2 (S)

Business Occupations/ Business Technology/ Office Technologies

NBTP-100 Career Exploration: Office Technologies
Registration #0804-100
This course is designed to help students collect information necessary to make an appropriate decision regarding a career in office technologies. Students learn about the nature of office practice and procedures, work environments, career options, and program requirements through a combination of group and individual activities that include presentations by faculty members and related professionals, panel discussions, field trips, class observations, and student interviews.

Class 1, Credit 1 (F, W, S)

NBTP-101 Orientation to Business
Registration #0804-101
This course is a broad overview of the form and structure of American business. It provides students with a basic knowledge of the history, organization, and operation of business and its particular vocabulary. Students use a microcomputer in a market simulation.

Class 3, Credit 3 (F, W, S)

NBTP-108 Payroll Records Management
Registration #0804-108
This course provides practical working knowledge and skills necessary to perform the various recordkeeping, calculating, and reporting activities associated with payroll systems. Students perform both manual and automated (using microcomputers) payroll recordkeeping procedures. (Data processing diploma status)

Class 4, Credit 2 (F, S)

NBTP-110 Business English
Registration #0804-110
This self-paced course provides proofreading and editing skills as they relate to typewritten communications. Course content includes rules for word division, capitalization, numbers, abbreviation style, spelling, and business letter writing. This course is designed specifically for students enrolled in courses in the business occupations department.

Class 3, Credit 3 (W, S)

NBTP-111,112,113 Beginning Typing I, II, III
Registration #0804-111,112,113
These courses are for students with limited typing experience and for those who type below 30 net words per minute. The courses focus on keyboard training, skill development, and basic formatting. Business correspondence, reports, and tables are produced on electronic typewriters and microcomputers using WordPerfect software. Students are expected to exit Beginning Typing II with a net speed of 20 words per minute for five minutes and to exit Beginning Typing III with a net speed of 30 words per minute for five minutes. (Grade of C or better in NBTP-111 for NBTP-112; NBTP-112 for NBTP-113)

Class 5, Credit 2 (F, W, S)

NBTP-114 Keyboarding
Registration #0804-114
This course is offered to students who possess 0-20 words per minute keyboarding speed. The focus of the course is to facilitate inputting of alphabetic, numeric, and other character information on a microcomputer and on an electric typewriter using a standard keyboard. Students are expected to exit this course with a keyboarding speed of 25 words per minute for three minutes. This course is open to all NTID students.

Class 4, Credit 2 (F, W, S)

NBTP-115 Word Processing Foundations
Registration #0804-115
In this elective course, students learn to use the microcomputer with a popular software package to complete a variety of wordprocessing projects. The course, offered to students in all NTID programs except business technologies (AOS) and office technologies, teaches students to put words into print efficiently. Prior keyboarding experience is helpful.

Class 2, Lab 2, Credit 2 (F, W, S)

NBTP-124 Introduction to Data Processing
Registration #0804-124
This course gives students a background in data processing. It presents the concepts and techniques in the processing of data and is directed to the needs and requirements of students.

Class 2, Credit 2 (F, W, S)

NBTP-211,212,215 Business Procedures I, II, III
Registration #0804-211,212,215
This sequence of courses develops basic skills in current business procedures related to general office functions. Skills include the use of electronic mail; current records management systems; the correct use of business machines; introduction of the accounting equation; and the manual and automated computerized keeping of payroll records, accounts receivable, and accounts payable records using Lotus 1-2-3 software. Students develop skills applicable to a variety of office settings.

Class 5, Credit 3 (NBTP-211, F; NBTP-212, W; NBTP-213, S)

NBTP-221 Advanced typing I
Registration #0804-221
The emphasis of this course is on the improvement of basic skills and their application to a variety of realistic office projects. Students type correspondence, reports, manuscripts, business forms, and tabulations on a microcomputer using WordPerfect software. Applied accounting and office technologies students are expected to exit with a net speed of 40 words per minute for five minutes. (Grade of C or better in NBTP-113)

Class 5, Credit 3 (F, W, S)

NBTP-222 Advanced Typing II
Registration #0804-222
This course emphasizes advanced typing skills and their application on a microcomputer using WordPerfect software. Students complete several projects related to areas such as sales, government, executive, general, and word processing. Students must exit with a net speed of 50 words per minute for five minutes. (Grade of C or better in NBTP-221)

Class 5, Credit 3 (F, W, S)

NBTP-250 Office Technologies Seminar
Registration #0804-250
This course gives students an opportunity to prepare for employment through field trips, mentoring, and guest lectures. Topics for discussion are identified by students enrolled in the seminar. Topics covered may include time management, career development, and personal/social development skills necessary for job success. Students are expected to participate in planning class sessions. (Office technology diploma status)

Class 4, Credit 2 (S)

NBTP-284 Fundamentals of Management
Registration #0804-284
This course focuses on theory and practice basic to the management process. Students use case studies, lectures, and simulations to study planning, organizing, directing, staffing, and controlling functions. The course also introduces students to motivation and leadership theory as it relates to the role of a manager. (NBTP-101)

Class 3, Credit 1 (F, W)

NBTP-286 Fundamentals of Marketing
Registration #0804-286
This course is an introduction to the field of marketing and its strategies. Topics include consumer behavior and its effect in the marketplace, product research and planning, pricing, distribution channels, marketing institutions, advertising and promotion, and organization. (NBTP-101)

Class 3, Credit 3 (S)

NBTP-290 Small Business Organization
Registration #0804-290 and Management
This is an elective course designed for business students but available to students from another technical program who have completed the prerequisites and have a desire to learn entrepreneurial skills for starting a business. Each student will write a business plan describing a selected business. (NBTP-201, NBTP-284, or NBTP-286)

Class 4, Credit 3 (S)

NBTP-291 Applied Business Techniques
Registration #0804-291
This course gives students an opportunity to review skill-oriented coursework on a microcomputer and electric typewriter prior to graduation and job entry. Skill review includes production and speed typing, business machines, payroll procedures, records management techniques, and word processing operations and applications using various word processing software packages. (NBTP-302)

Class 3, Credit 2 (S)

NBTP-299 Co-op Work Experience
Registration #0804-299

Credit 0 (Su)

NBTP-301 Word Processing I
Registration #0804-301
This self-paced course provides an introduction to basic word processing concepts and a discussion of various types of word processing office systems and procedures. Students learn basic documentation capabilities of the Xerox 6085 Professional Computer system. (NBTP-222)

Class 4, Credit 4 (F, W, S)

NBTP-302 Word Processing II
Registration #0804-302
This self-paced course provides a continuation of the word processing concepts and applications presented in Word Processing I. Using the Xerox 6085 Professional Computer system, students leam applications, including creation of fill-in forms and tables, and are introduced to basic graphics. (NBTP-301)

Class 4, Credit 4 (F, W, S)

NBTP-303 Word Processing III
Registration #0804-303
This self-paced course provides a continuation of the word processing concepts and applications presented in Word Processing II. Using the Xerox 6085 Professional Computer system, students learn procedures for creating basic business and data-driven graphics that are prepared in the office environment. (NBTP-302)

Class 4, Credit 4 (F, W, S)

NBTP-304 Word Processing IV
Registration #0804-304
This self-paced course contains the concepts and applications for creating, maintaining, and printing files. Using the Xerox 6085 Professional Computer system and microcomputers, students use files to create repetitive letters, lists, and reports. Students also are exposed to advanced files. (NBTP-303)

Class 4, Credit 4 (F,W,S)

NBTP-510 Office Typesetting Methods
Registration #0804-510
This elective course for students specializing in office technologies provides an introduction to the field of typesetting and telecommunications, utilizing word processing, phototypesetting, and microcomputer equipment. Students create documents on word processing equipment and electronically transmit them for typeset output on phototypesetting equipment. Current typesetting software programs that provide a working knowledge of microcomputer-based desktop typesetting also are introduced. In addition to required projects, students select and design documents of their choice. (NBTP-303, English Composition)

Class 4, Credit 3 (F, S)

NBTP-599 Independent Study
Registration #0804-599

Credit Variable

Data Processing

Note: Required laboratories may take place during evening hours or on Saturdays.

NBTD-100 Introduction to Data Processing
Registration #0802-100
This course provides an overview of the fields of business data processing and computer science. It is intended for students who need skill development prior to full entry into the in-depth data processing program courses. Logic skill development and the use of microcomputers are emphasized.

Class 3, Credit 2 (F)

NBTD-101 Introduction to Business Programming
Registration #0802-101
This course introduces students to the function of programming the computer. Using microcomputers, students learn to read, analyze, flowchart, and program various business applications. The course is the foundation for future programming courses and has a strong emphasis on developing logic skills. (Michigan Test score higher than 55 or California Reading Test score higher than 7.5, NBTD-122)

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

NBTD-105 Career Exploration—Data Processing
Registration #0802-105
This course is designed to help students collect the information necessary to make appropriate decisions about possible careers in data processing. Students are given opportunities to explore their interest in data processing through a combination of hands-on experiences with computers, presentations by faculty members and outside professionals, field trips, class observations, and student/faculty interviews. The course offers a unique integration of technical instruction and career counseling that enhances students' decision-making and career-planning abilities.

Class 3, Credit 2 (F, W, S)

NBTD-120 On-Line Processing/Programming
Registration #0802-120
In this course, students learn to build, edit, and list fields on computer terminals. Other topics include types of files, compiling linking, and running programs on-line. This course is required for most programming courses that use the RIT computer system. (NBTD-101)

Class 2, Credit 2 (F)

NBTD-125 Data Processing Technical Communications
Registration #0802-125
In this course, students learn to read and write technical manuals, forms, instructions, and other types of communications used in the field of data processing. (California Reading Test score higher than 7.5, NBTD-157)

Class 2, Credit 2 (F, W, S)

NBTD-157 Beginning Computer Operations
Registration #0802-157
This course provides students with an understanding of the operation of modern computers. Peripheral devices, such as the CPU and off-line equipment, are introduced. (Corequisite: NBTD-158)

Class 1, Credit 1 (F, W)

NBTD-158 Beginning Computer Operations Laboratory
Registration #0802-158
Students are given hands-on experience with one or more computer systems. (Corequisite: NBTD-157)

Lab 2, Credit 1 (F, W)

NBTD-161 Business Computer Systems Facilities
Registration #0802-161
In this course, students study business computer systems. Topics covered include terminology used for hardware and software components and an introduction to concepts such as systems control programs, multiple programming, storage management, and library support. Initial discussions also are conducted on spooling and software creation. (NBTD-101 or concurrent, NBTD-157)

Class 2, Lab 1, Credit 2 (S)

NBTD-162 Computer Console Operations
Registration #0802-162
This course is designed to acquaint students with the operator's work area and initial functions. Indicator lights, the console control panel, and the keyboard are discussed. Course content covers start-up of the computer (from power on) to the point where the operating system takes over. (NBTD-161)

Class 1, Lab 1, Credit 1 **(F)**

NBTD-170 Utilities/JCL for Computers
Registration #0802-170
In this course, students learn the use of utilities as applicable to the operations environment. The writing of JCLs for operations and for the production system is presented. Each student writes and submits a variety of JCLs for operation of utilities as well as for some production work. (NBTD-157)

Class 2, Lab 1, Credit 2 (W, S)

NBTD-171 Computer Architecture
Registration #0802-171
In this course, students learn the hardware that makes up computer systems. Topics include channels, buses, transmission over lines, modems, and general hardware. (NBTD-157, NBTD-158)

Class 1, Credit 1 (F, W, S)

NBTD-213 Applications Software
Registration #0802-213
This course is an introduction to the use of computer application software in a variety of work settings. Students work on computers to solve a variety of problems.

Class 3, Credit 3 (F, W, S)

NBTD-230,231 Business Programming in
Registration #0802-230,231 COBOL I, II
This is a two-quarter sequence in COBOL programming. Students learn printing of reports, general processing of files, and updating of random access files. The two-course sequence is intended to give students beginning skills in COBOL programming. (NBTD-120, NBTD-123 for NBTD-230; NBTD-230 for NBTD-231)

Class **4,** Credit 3 (W, S)

NBTD-235,236 Programming for Computer
Registration #0802-235,236 Science Students I, II
This two-quarter sequence in programming teaches the language currently used by RIT's School of Computer Science. Emphasis is placed on the use of tables/arrays and sorting. These courses are intended for students who plan to pursue a baccalaureate degree in computer science. (Michigan Test score higher than 70 California Reading Test score higher than 9.0, NBTD-120, NBTD-123 for NBTD-235; NBTD-235 for NBTD-236)

Class **4,** Credit 3 (W, S)

NBTD-240 Assembler Language Programming
Registration #0802-240
In this course, students learn to use assembler language to program the computer on a low-level basis. The major emphasis of the course is on the actual machine language of the computer and how the CPU works. The language taught (BAL) is not intended for use as a business programming language. (NBTD-101, NBTD-163)

Class 4, Credit 3 (F, W)

NBTD-250 Multiprogramming/Spooling for Operators
Registration #0802-250
This course provides students with an in-depth discussion of computer systems that operate in multiprogramming mode. Queue and general control of a spooling system are the main topics covered. (Corequisite: NBTD-251) (NBTD-101, NBTD-162, NBTD-170)

Class 2, Credit 2 (F, S)

NBTD-251 Multiprogramming/Spooling Laboratory
Registration #0802-251
This laboratory provides hands-on experience related to Multiprogramming/Spooling for Operators. Students develop skills in working with queues and spooling programs.
(Corequisite: NBTD-250)

Lab 2, Credit 1 (F, S)

NBTD-260 System Generation for Operators
Registration #0802-260
Students learn the various parameters as well as the design of a medium-scale operating system from an operator's viewpoint. (Corequisite: NBTD-261) (NBTD-125, NBTD-162)

Class 2, Credit 2 (F, W)

NBTD-261 System Generation Laboratory
Registration #0802-261
Students receive hands-on experience in working with a medium-scale operating system. Exercises support concepts presented in System Generation for Operators. (Corequisite: NBTD-260)

Lab 3, Credit 1 (F, W)

NBTD-262 Advanced Operating Systems
Registration #0802-262
Designed as a continuation of System Generation for Operators, this course focuses on the software that makes up a total computer system. Topics covered are the major operating system software components, compilers, and utilities. (Corequisite: NBTD-263) (NBTD-260)

Class 2, Credit 2 (W, S)

NBTD-263 Advanced Operating Systems Laboratory
Registration #0802-263
Students in this laboratory investigate the software related to operating systems. (Corequisite: NBTD-262)

Lab 1, Credit 1 (W, S)

NBTD-299 Co-op Work Experience
Registration #0802-299

Credit 0 (Su)

All 300-number courses require that students are enrolled in Written Communication I or higher level course.

NBTD-325 Data Base Systems
Registration #0802-325
This course introduces students to the use of data base systems on computers. Students design a data base for an information system of their choice. (Two-quarter sequence in programming [language is not important], English Composition Placement Test)

Class 4, Credit 4 (W, S)

NBTD-330 File Management
Registration #0802-330
In this course, students learn to store and use maintenance information in files. Major topics include the various forms of storage and organization of files, backup and restore, and areas such as security and confidentiality. (NBTD-162, one programming course [200 level], English Composition Placement Test)

Class **4,** Credit 3 (F)

NBTD-335 Data Organization
Registration #0802-335
This course is a continuation of Programming for Computer Science Students II. The sorting process and the concepts of trees and pointers are discussed and programmed. This course is for students interested in pursuing a baccalaureate degree in computer science. (NBTD-236, NTMM-127)

Class **4,** Credit **4** (F)

NBTD-340 Maintenance Programming
Registration #0802-340
In this course, students learn the maintenance process of the programming environment and how to recognize other individuals' styles and logic as well as standards needed to alter existing programs. Students are given language syntax to correct as well as programs to alter, correct, and revise following a set of standards. This course is for students interested in COBOL business programming. (NBTD-231)

Class **4,** Credit 3 (F)

NBTD-350 Large-Scale Systems
Registration #0802-350
In this course, students are introduced to large-scale systems and their operation. The content of this course varies depending on the systems available. The topics are related to the support functions in large computer installations. Corequisite: NBTD-351) (One 200-series programming course, NBTD-201, NBTD-250)

Class 2, Credit 2 (W)

NBTD-351 Large-Scale Systems Laboratory
Registration #0802-351
This laboratory supports the concepts of Large-Scale Systems. Students are assigned to set up and operate a medium- to large-scale system and have the opportunity to work in a large-scale computer installation. Laboratory meetings will be based on availability of systems. (Corequisite: NBTD-350)

Lab 2, Credit 1 (W)

NBTD-360 Small Business Systems
Registration #0802-360
In this course, students learn the use of micro- and minicomputers in the small business environment. Students are assigned to operate a small business computer for a normal business cycle. This course requires extensive laboratory work outside of class. (Corequisite: NBTD-361) (NBTD-201, NBTD-162, one 200-series programming course)

Class 2, Credit 2 (F, S)

NBTD-361 Small Business Systems Laboratory
Registration #0802-361
This is not a structured laboratory. Student projects are done in a combined class and laboratory environment. Students are responsible for successful management of financial work, inventory control, and payroll systems. (Corequisite: NBTD-360)

Lab 3, Credit 1 (F, S)

NBTD-390 Data Processing Seminar
Registration #0802-390
This seminar provides a relevant framework for students' previous data processing courses and, by emphasizing new directions in data processing, also prepares students for continued growth on the job. Students may study independently a topic agreed upon with the instructor.

Class 1-3, Credit Variable (F, W, S)

Independent Study
NBTD-399
Registration #0802-399

Credit Variable (F, W, S)

School of Science and Engineering Careers

Architectural Technology

NETA-100 Career Exploration: Architectural Technology
Registration #0808-100
This course provides students with information regarding careers in architectural technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETA-110 Construction Terminology
Registration #0808-110
This course introduces students to the basic technical vocabulary for the construction industry. Topics include drafting equipment and procedures, materials, structural components, mechanical and electrical systems, site work, construction equipment, and procedures.

Class 4, Credit 4 (F)

NETA-111 Construction Drafting I
Registration #0808-111
This course introduces students to the basic drafting techniques for construction projects. Topics include line quality, lettering, scale measurement, dimensioning, drafting media and equipment, graphic reproduction methods, sheet layout, floor plans, site plans, sections, and isometric views. Students begin to develop a portfolio of their best work. (Corequisite: NETA-110)

Lab 6, Credit 2 (F)

NETA-112 Construction Drafting II
Registration #0808-112
In this course, students continue to learn and practice basic drafting techniques for construction projects. Topics include field measurement and measured drawings, preliminary drawings, basic rendering, base maps, perspectives, and site plans. Students also begin learning basic computer-assisted drafting (CAD) skills. (Corequisite: NETA-201) (NETA-111)

Lab 6, Credit 2 (W)

NETA-113 Construction Drafting III
Registration #0808-113
Students continue to leam and practice basic drafting techniques. They also leam to make three-dimensional models. Topics include building models, topographic models, presentation drawings from sketches, free-hand drawings, measured drawings from field measurements, topographic contour maps from spot elevations, and design development drawings from preliminary drawings. Students also continue CAD-skill development. (Corequisite: NETA-202) (NETA-112)

Lab 6, Credit 2 (S)

NETA-201 Construction Methods and Procedures I
Registration #0808-201
This is the first of two courses that orient students to the processes of building project development in design offices and at construction sites. This course concentrates on the processes of preliminary design, design development, production of contract documents, and bidding. Topics include roles of owners, consultants, and contractors; working drawings; specifications; analysis of total project; and bidding. (Corequisite: NETA-112) (NETA-110)

Class 3, Credit 3 (W)

NETA-202 Construction Methods and Procedures II
Registration #0808-202
This course continues the orientation of students to the total building project development. In this course, students leam about construction processes. Topics include fabrication, placement, support, and fastening of building parts; identification and understanding of construction equipment; and scheduling of construction operations. (Corequisite: NETA-113) (NETA-201)

Class 3, Credit 3 (S)

NETA-211 Architectural Materials I
Registration #0808-211
This course provides information about materials used in construction. Students leam the characteristics, origins, sources, standard shapes, sizes, and units of measure for materials and manufactured products. Students use the standard referencing and indexing system for materials and products. (NETA-202)

Class 3, Credit 3 (F)

NETA-212 Architectural Materials II
Registration #0808-212
In this course, students apply information from the previous course, Architectural Materials I. Topics include building codes, comparison of materials, selection of materials and products for specific applications, and detailing. (NETA-211)

Class 3, Credit 3 (W)

NETA-220 Principles of Structural Systems
Registration #0808-220
Students identify and describe the major structural systems and their components. These systems include steel frame, cast-in-place concrete, precast concrete, masonry, steel joists, trusses, light frame, and heavy timber. Students read structural framing plans, details, and schedules. (NETA-212)

Class 4, Credit 4 (S)

NETA-221,222,223 Architectural Design Drafting I, II, III
Registration #0808-221,222,223
In this sequence of three courses, students leam drafting production techniques, production scheduling, and self-monitoring of progress. Students will produce drawings for one or more building projects during the three courses. The process will include preliminary drawings; design development; architectural working drawings; and working drawings for the mechanical, electrical, and structural elements of the project. Drawings may include cover sheets; site plans; floor plans; interior and exterior elevations; building, wall, and detail sections; interior and exterior perspectives; axonometric views; schedules; and diagrams. Students apply both manual and CAD drafting skills.
(NETA-113 for NETA-221; NETA-221 for NETA-222; NETA-222 for NETA-223)

Lab 12, Credit 4 (NETA-221, F; NETA-222, W; NETA-223, S)

NETA-224 Construction Computations
Registration #0808-224
This course introduces students to the basic techniques for calculating linear area, volume, and angular quantities. Students apply basic math, algebra, geometry, right angle trigonometry, law of sines, and law of cosines. (NTMM-151)

Class 2, Credit 2 (W)

NETA-299 Co-op Work Experience
Registration #0808-299

Credit 0 (Su)

NETA-340 Planning Project
Registration #0808-340
This course introduces students to the basic techniques for planning surveys. These include base map preparation, data collection from field surveys and public records, data base management, data analysis, graphic presentation of data, project organization, and work discipline skills. Students work as a team to perform an original planning survey. The team cooperates with a local planning agency. Students work in the field and in the laboratory. (NETA-223)

Lab 15, Credit 5 (F)

NETA-351,352 Architectural Projects I, n
Registration #0808-351,352
In this sequence of two courses, students complete one or more building design projects. Activities may include field inspection and measurement, measured drawings, preliminary design, presentation design development, models, and working drawings. The courses simulate the environment of an architectural office. (NETA-340 for NETA-351; NETA-351 for NETA-352)

Lab 15, Credit 5 (NETA-351, W; NETA-352, S)

NETA-375 Architectural History
Registration #0808-375
Students leam the major elements of architectural styles and building technologies throughout the history of Western architecture. This provides a background for discussion of current topics in the field of building design and construction.

Class 2, Credit 2 (S)

NETA-376 Building Estimating
Registration #0808-376
Students leam and apply basic concepts and skills for calculating the cost of a building project. Topics include elements of project cost, quantity survey techniques, material costs, installation costs, unit cost information sources, cost analysis, adjustments for locality, historical cost indexes, contingencies, overhead, and profit. (NETA-224 or NETA-128)

Class 2, Credit 2 (S)

NETA-377 Building Equipment
Registration #0808-377
Students leam to identify and understand the basic equipment and operation of mechanical and electrical systems in a building. These systems include water supply, drainage, fire protection, heating, ventilating, air conditioning, power, lighting, and conveying systems. Students become acquainted with the graphic representation for these systems in working drawings. (NETA-**202)**

Class 3, Credit 3 (F)

NETA-390 Architectural Technology Seminar
Registration #0808-390
This course helps students prepare for the job search and for employment. Topics related to job search include applications, resumes, interviews, and use of a portfolio. Topics related to the world of work include taxes, insurance, employee benefits, credit ratings, marriage, and deaf professionals.

Class 1, Lab 3, Credit 2 (W)

NETA-399 Independent Study
Registration #0808-399

Credit Variable

Biology

NTSB-107 MLT Biology I
Registration #0814-107
This course is a preparatory program for students interested in pursuing the medical laboratory technology program. Principles of inorganic and organic chemistry as they relate to biology are studied. The metric system, cell theory, cellular transport mechanisms, mitosis, meiosis, and nucleotides are among the topics treated. Laboratory activities include the microscopic study of plant and animal cells, the performance of experiments related to concepts learned during class sessions, and additional activities that emphasize the application of the scientific method.

Class 4, Lab 4, Credit 4 (F)

NTSB-108 MLT Biology II
Registration #0814-108
This course is a continuation of MLT Biology I. It is designed to introduce students to principles of biochemistry: the synthesis and metabolism of carbohydrates, proteins, and lipids; DNA; and ATP. The laboratory program is designed to reinforce principles and concepts learned during class sessions. (NTSB-107)

Class 4, Lab 4, Credit 4 (W)

NTSB-109 MLT Biology in
Registration #0814-109
This course is a continuation of MLT Biology n. The principles of general genetics, anatomy, physiology, histology, hematology, and microbiology are studied in this segment of the biology program. Laboratory activities provide students with opportunities to apply principles learned in class and to acquire the basic and transitional skills needed for the medical laboratory technology program. (NTSB-108)

Class 4, Lab 4, Credit 4 (S)

Chemistry

NTSC-115 MLT Chemistry I
Registration #0815-115
This course is for students preparing to pursue the medical laboratory technology program. The course includes an introduction to exponential notation, measurement, the fundamental laws and concepts of matter and energy, formula writing, chemical bonding, and the mole concept. Laboratory work includes general techniques of metric measurement, density, physical properties, and evidence of chemical reactions. Introduction to radiochemistry, volume, temperature-pressure relationships of gases, reactivity of metals, and factors that affect reaction rates are measured qualitatively.

Class 4, Lab 4, Credit 4 (F)

NTSC-116 MLT Chemistry II
Registration #0815-116
This is a continuation of MLT Chemistry I. Solubility, concentration of solutions, calculations involving acid-base titrations, and pH are covered. Introduction to organic chemistry begins with hydrocarbon nomenclature. Discussion of the alcohols, phenols, ethers, aldehydes, and ketones as well as organic acids and their derivatives are included. Laboratory experiences related to these topics focus on the various methods of pH measurement and the use of indicators, including control of acidity through use of buffers and analysis of the acid and alkali content of some consumer products. Chemical and physical properties of some organic compounds are examined, including alcohols, phenols, mercaptans, aldehydes, ketones, carboxylic acids, and esters. (NTSC-115)

Class 4, Lab 4, Credit 4 (W)

NTSC-117 MLT Chemistry III
Registration #0815-117
This is a continuation of MLT Chemistry II. This part of the chemistry program lays the foundation for the relationship between chemistry and living organisms. Topics include the amines, carbohydrates, and lipids as well as amino acids and proteins. Description of the structure and function of nucleic acids, vitamins, and hormones bring together the interrelationships of biochemical reactions. Laboratory procedures include preparation, identification, and qualitative tests for the amines, amides, carbohydrates, triglycerides, and amino acids. Preparation and examination of aspirin, nylon, and soaps, and analysis of a peanut conclude this portion of the course. If time permits, students may explore instrumental analysis involving use of spectrophotometers and gas chromatography. (NTSC-116)

Class 4, Lab 4, Credit 4 (S)

NTSC-215 Introduction to College Chemistry I
Registration #0815-215
This course is for students enrolled in programs requiring review or preparation for College of Science chemistry courses. The course includes principles of measurement, composition of matter, energy changes, behavior of gases, atomic structure, and bonding. Laboratory work includes experiments related to topics covered. (Math completion or concurrent registration in NTMM-152)

Class 4, Lab 4, Credit 4 (F)

NTSC-216 Introduction to College Chemistry II
Registration #0815-216
This is a continuation of Introduction to College Chemistry I Solutions and equilibrium principles are studied. Also included are stoichiometric solution calculations involving ionization and solubility, product constants, and acid-base pH calculations. Laboratory work includes qualitative analysis of common cations and anions. (NTMM-152, NTSC-215)

Class 4, Lab 4, Credit 4 (W)

NTSC-217 Introduction to College Chemistry III
Registration #0815-217
This course provides an introduction to quantitative analysis utilizing both gravimetric and volumetric techniques. Topics include evaluation of analytical data, gravimetric analysis, acid-base titrations, redoxtitrations, and principles of colorimetry and spectrophotometry. (NTSC-216)

Class 4, Lab 4, Credit 4 (S)

Civil Technology

NETC-100 Career Exploration: Civil Technology
Registration #0809-100
This course provides students with information regarding a career in civil technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences .help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETC-211 Surveying and Mapping
Registration #0809-211
This course combines the elements of surveying and mapping. Students have the opportunity to use survey equipment in the field to obtain and record angle, distance, and elevation measurements. Using the information gathered in the field, students perform calculations and produce drawings for a term project. Topics include error of closure, bearings, interior angles, distances, coordinates, slope, reducing field notes, and cut and fill volumes. Students draw with lead and ink on a variety of media and also use the CAD system to produce drawings. (NETA-113, NTMM-152)

Class 6, Lab 4, Credit 6 (S)

NETC-250 Statics
Registration #0809-250
This course requires students to apply physical concepts of equilibrium in co-planar force systems to structural members. Topics include vectors, forces, moments, equilibrium, distributed forces, centroids, and centers of gravity. Students calculate reactions, moments, and internal forces in beams, trusses, and frames. (NTMM-152, NTSP-126)

Class 3, Lab 3, Credit 4 (F)

NETC-260 Strength of Materials
Registration #0809-260
Students apply physical concepts of matter to calculate how forces affect structural members. Topics include stress, strain, behavior of common engineering materials, moment of inertia, section modulus, and basic beam theory. Students calculate the maximum tensile, compressive and shear stresses, and deflection in simple members. They also calculate deflection of beams and select simple tension, compression, and bending members and their connections. (NETC-250)

Class 3, Lab 3, Credit 4 (W)

NETC-283 Soil Mechanics
Registration #0809-283
This course introduces students to the characteristics of soils related to construction projects. Topics include visual and laboratory classification of soils, compaction, sub-surface investigation, percolation, and soil nomenclature. Students perform laboratory experiments and tests and write laboratory reports.

Class 3, Lab 3, Credit 4 (W)

NETC-284 Engineering Materials
Registration #0809-284
Students investigate the basic engineering properties of portland cement concrete, portland cement mortar, and asphaltic cement concrete. They learn and practice standard laboratory testing procedures and write laboratory reports. (NETC-283)

Class 2, Lab 6, Credit 4 (S)

NETC-285 Civil Technology Seminar
Registration #0809-285
This course provides an overview of the field of civil technology. Students leam how the field is related to the profession of civil engineering. The course also introduces research and laboratory report writing, r6sum6 writing, and interviewing skills.

Class 1, Lab 3, Credit 2 (F)

NETC-290 Programming for Civil Technicians
Registration #0809-290
This course introduces basic computer skills. Topics include keyboard operation, expressions, variables, programs, branching, input, subscripted variables, and loops. Students have hands-on experience on the computer.

Class 2, Lab 3, Credit 3 (F, W, S)

NETC-299 Co-op Work Experience
Registration #0809-299

Credit 0 (Su)

NETC-311 Surveying Projects
Registration #0809-311
Students continue to leam the basic techniques of land measurement. Topics include electronic distance measurement (EDM), theodolites, modem levels, deed descriptions, deed research, tape locations, horizontal and vertical curves, aerial surveying, and surveying computations. Students have hands-on experience with surveying equipment in the field. (Corequisite: NETC-242) (NETC-231, NETC-241)

Class 1, Lab 6, Credit 3 (F)

NETC-312 Mapping and Site Design
Registration #0809-312
Students apply skills learned in Mapping I to complete a site planning project. Requirements for the project include topographic, traverse, and highway mapping; cut and fill calculations; drafting with pencil and ink on a variety of media; and graphic reproduction. (Corequisite: NETC-232) (NETC-231, NETC-241)

Class 1, Lab 3, Credit 2 (F)

NETC-321,322,323 Structural Design Drafting I, II, III
Registration #0809-321,322,323
In this sequence of courses, students apply the principles of statics and strength of materials and drafting skills. Students leam the basic principles of structural analysis and design, estimating quantities, preparation of structural and shop drawings, and construction. The first course and half of the second course concentrate on steel structures. The rest of the second course and the third course concentrate on concrete structures. (NETC-260 for NETC-321; NETC-321 for NETC-322; NETC-322 for NETC-323)

Class 2, Lab 6, Credit 4 (NETC-321, F; NETC-322, W; NETC-323, S)

NETC-340 Fundamentals of Fluid Mechanics
Registration #0809-340
This course introduces students to the basic principles of fluid statics and fluid flow. Topics include hydrostatic pressure, forces on submerged surfaces, buoyancy, laminar and turbulent flow of incompressible fluids, fluid measurements, and open channel flow. Students perform experiments in the laboratory.

Class 3, Lab 3, Credit 4 (F)

NETC-350 Highway Design and Construction
Registration #0809-350
This course introduces students to the basic practices in the study, design, plan, preparation, and construction of transportation facilities. Topics include horizontal and vertical alignments, typical sections, hydrology, quantity estimating, intersection design, and traffic control devices. (NETC-311)

Class 3, Lab 3, Credit 4 (W)

NETC-385 Principles of Environmental Technology
Registration #0809-385
This course introduces students to the factors affecting the quality of the environment. Topics include testing, regulation, and management of water supplies, waste water, soil erosion, solid wastes, atmospheric pollutants, and noise; energy measurement and conservation; visual resource analysis; and environmental impact analysis. Field observations are an important part of this course. (NETC-340)

Class 3, Lab 3, Credit 4 (S)

NETC-390 Construction Seminar
Registration #0809-390
This course helps students prepare for their job search and employment. Topics related to job search include applications, rdsumds, interviews, and use of a portfolio. Topics related to the world of work include taxes, insurance, employee benefits, credit ratings, marriage, and deaf professionals.

Class 1, Lab 3, Credit 2 (W)

NETC-399 Independent Study
Registration #0809-399

Credit Variable

Electromechanical Technology

NETM-100 Career Exploration:
Registration #0811-100 Electromechanical Technology
This course provides students with information regarding a career in electromechanical technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETM-101 Basic Drafting I
Registration #0811-101
This course provides instruction in the principles and techniques of basic drafting. The emphasis is on understanding how drawings are made and used in industry. (NTMM-141)

Lab 6, Credit 2(F)

NETM-171 Digital Systems
Registration #0811-171
This course is an introduction to logic components and how they are used in machines. Students will study gates, switches, counters, flip-flops, multiplexers, demultiplexers, truth tables. Boolean algebra, logic families, and the difference between analog and digital systems. (NETM-368)

Class 3, Lab 4, Credit 4 (W)

NETM-209 Technical Graphics
Registration #0811-209
This course is an introduction to electronic and mechanical drawings. Students leam how to draw using drafting standards. They also learn about electronic symbols, component outlines, block diagrams, schematic diagrams, cable drawings, military standards, and integrated circuits. (NETI-101, NETM-368)

Lab 6, Credit 2 (S)

NETM-210 Computer Techniques
Registration #0811-210
This course emphasizes how the computer can be used to solve problems. Students leam a programming language and develop programming skills. Students are required to solve engineering problems through hands-on computer experience. (NTSP-100)

Class 3, Lab 3, Credit 4 (F)

NETM-211 Mechanical Components
Registration #0811-211
This course introduces mechanical devices used in electro-mechanical equipment. The basic topics covered include torque, work, power, gears, cams, and drive systems. Students develop basic breadboarding skills. (NTMM-150, NTSP-100)

Class 3, Lab 4, Credit 4 (S)

NETM-213 DC Circuits
Registration #0811-213
This course introduces students to the theory and use of direct current circuits. Students learn about direct current units and measurements, basic circuit laws, networks, Thevinin's Theorem, and superposition theorem. (NTMM-150, NTSP-135)

Class 3, Lab 6, Credit 5 (S)

NETM-234 Optical Systems
Registration #0811-234
This course introduces students to the use of optics in engineering applications. Students learn about refraction, reflection, imaging, fiber optics, light emitting diodes, lasers, and optically controlled solid-state electronic devices. (NETM-369, NTMM-151)

Class 3, Lab 2, Credit 4 (S)

NETM-241 Tool Skills
Registration #0811-241
This course introduces students to the use of basic hand tools used by electromechanical technicians. Students learn about safety, measuring, layout techniques, cutting, finishing metal, fasteners, drilling, counterboring, countersinking, tapping, soldering, and wiring. The course requires the completion of several projects. (NTMM-141)

Lab 6, Credit 2 (W)

NETM-299 Co-op Work Experience
Registration #0811-299
(NETM-321, NETM-368)

Credit 0(F,W,S, Su)

NETM-304 AC Circuits
Registration #0811-304
This course emphasizes the theory and use of alternating current circuits. Students learn about inductance, capacitance, alternating current circuits, series, and parallel resonant circuits. (NETM-210, NETM-213)

Class 3, Lab 6, Credit 5 (F)

NETM-317 Kinematics
Registration #0811-317
This course emphasizes the motion of machine parts. Students leam about linkages and levers, and the relation of these parts to velocities, accelerations, and distances. (NETM-211, NTMM-152)

Class 3, Lab 4, Credit 4 (F)

NETM-321 Fluid Power
Registration #0811-321
In this course, students leam how power is transmitted by using fluids (liquids and gases). Topics covered include the character of fluids, pumps, valves, cylinders, motors, and the piping used. Students also leam how digital logic is used to control fluid power valves and, equipment. (NETM-317)

Class 3, Lab 4, Credit 4 (W)

NETM-322 Electrical Power Systems
Registration #0811-322
In this course, students learn how power is transmitted by electricity. Basic topics covered include generators, motors, transformers, and distribution lines. Both alternating and direct current machines are covered. (NETM-304, NETM-317)

Class 3, Lab 4, Credit 4 (F)

NETM-324 Transducers
Registration #0811-324
This course introduces students to automatic controls. Students learn about electrical, thermal, hydraulic, and mechanical transducers. Emphasis is on the similar operating characteristics of all kinds of transducers. Students express results using mathematics and graphics. (NETM-321, NETM-368)

Class 3, Lab 4, Credit 4 (S)

NETM-325 Control Systems
Registration #0811-325
This is the second course in a sequence on the topic of automatic controls. Students leam about the effects on a controlled process when different ways are used to connect the input transducer to the output transducer. The course covers open and closed loop systems. Graphic techniques are used to help students understand systems. (NETM-324)

Class 3, Lab 4, Credit 4 (F)

NETM-327 Microprocessor Control Systems I
Registration #0811-327
This is the first course in a two-quarter sequence. The course introduces students to the theory of microprocessor-based control systems. Students leam about software techniques applied to electromechanical systems. This laboratory course emphasizes systems analysis and troubleshooting. (NETM-171, NETM-370)

Lab 6, Credit 2 (W)

NETM-328 Microprocessor Control Systems II
Registration #0811-328
This course emphasizes the construction, testing, and trouble-shooting of microprocessor-based systems. Students identify and solve problems and report solutions independently. This course is project-based and ties together many of the concepts learned in the electromechanical technology program. (Corequisite: NETM-334) (NETM-327)

Lab 6, Credit 2 (W)

NETM-330 Circuit Analysis
Registration #0811-330
This course emphasizes the analysis of complex circuits. Students learn about Kirchoff's Laws, independent and dependent sources, power, equivalent sources and resistances, Thevinin's Theorem, Norton's Theorem, superposition theorem, mesh analysis, and nodal analysis. (NETM-370)

Class 4, Credit 4 (W)

NETM-332 Statics
Registration #0811-332
This elective course covers characteristics of forces and force systems. Emphasis is placed on vectors, levers, moments, free body diagrams, couples, friction, and structure analysis. Problem-solving techniques are stressed throughout the course. (NETM-321)

Class 4, Credit 4 (W)

NETM-333 Strength of Materials
Registration #0811-333
This course introduces students to the reactions of engineering materials to different types of loading. The course emphasizes the use of standard handbooks, stress and strain relationships, Poisson's Ratio, safe loading, and expected deflection of beam- and column-shaped machine parts. (NETM-332)

Class 3, Lab 3, Credit 4 (S)

NETM-334 Electromechanical Systems
Registration #0811-334
This course emphasizes the interface between microprocessors and electromechanical devices. Students work on projects that include circuit design, software design, breadboarding skills, and troubleshooting techniques. (Corequisite: NETM-328) (NETM-325, NETM-327)

Class 3, Lab 3, Credit 4 (S)

NETM-368 Electronics I
Registration #0811-368
This course introduces students to basic diode and transistor circuits. Students learn about semiconductor theory, diode circuits, bipolar transistors, transistor biasing circuits, and AC signal amplifiers. Students develop basic measurement and breadboarding skills. (NETM-304)

Class 3, Lab 6, Credit 4 (W)

NETM-369 Electronics II
Registration #0811-369
This course introduces students to AC amplifiers and their characteristics. Topics of study include transistor AC equivalent circuits, small signal amplifiers, power amplifiers, push-pull amplifiers, and field effect devices. Students develop basic measurement and breadboarding skills. (NETM-368)

Class 3, Lab 6, Credit 5 (S)

NETM-370 Electronics in
Registration #0811-370
This course introduces students to the theory and application of linear integrated circuits. Students learn about operational amplifier characteristics and applications, regulators and control circuits, and a variety of linear integrated circuits. Students are required to use manufacturers' data sheets and to develop proper breadboarding skills. (NETM-369)

Class 3, Lab 4, Credit 4 (F)

NETM-399 Independent Study
Registration #0811-399

Credit Variable

Industrial Drafting Technology

NETI-100 Career Exploration: Industrial Drafting
Registration #0810-100
This course provides students with information regarding a career in industrial drafting. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETI-103 Introduction to Computer-Aided
Registration #0810-103 Drafting (CAD)
In this introductory course, students acquire basic competency in computer-aided drafting (CAD) that may include using the B & L Producer system software and Auto CAD and Plan CAD programs on the IBM PC or DEC Rainbow computers. Students create basic computer drawings, add dimensions and lettering, and leam some useful functions of these systems. They also have the opportunity to work on selected special applications.

Class 1, Lab 3, Credit 2 (F, W, S)

NETI-131,132 Manufacturing Processes I, II
Registration #0810-131,132
Students are exposed to various traditional and non-traditional manufacturing operations. Students develop an appreciation for tolerancing of manufactured parts. (NTMM-152 for NETI-131; NETI-131 forNETT-132)

Lab 3, Credit 1 (NETI-131, F; NETI-132, W)

NETI-141 Basic Technical Drafting I
Registration #0810-141
Students learn basic skills of engineering drawing through instruction and drafting projects. Students are introduced to the use of tools and equipment, constructions, orthographic projection, lettering, and basic dimensioning practices. (NTMM-142)

Class 1, Lab 6, Credit 3 (F)

NETI-142 Basic Technical Drafting n
Registration #0810-142
The major topics of this course are orthographic projection and dimensioning systems. Auxiliary views, sections, and developments are introduced through the use of instruction and projects. Students produce industrial-quality drawings. (NETI-141)

Class 1, Lab 6, Credit 3 (W)

NETI-143 Basic Technical Drafting III
Registration #0810-143
Students develop the skills necessary to produce industrial-quality working drawings, including assembly and detail drawings. Students solve problems related to tolerances, mating parts, fasteners, and standard engineering fits. (NETI-142)

Class 1, Lab 6, Credit 3 (S)

NETI-151 Materials and Processes I
Registration #0810-151
Studenfc develop a working knowledge of the various materials and related manufacturing processes used in industry. (NTSP-156)

Class 3, Credit 3 (F)

NETI-152 Materials and Processes II
Registration #0810-152
Students investigate the properties of metals and plastics and their characteristics and methods of fabrication. (NETI-151)

Class 3, Credit 3 (W)

NETI-201 Technical Drafting I
Registration #0810-201
Students measure and draw parts for machines. In this laboratory course, students produce toleranced working drawings for simple assembly drawings. (NETI-143, NTSP-100)

Lab 15, Credit 5 (F)

NETI-202 Technical Drafting II
Registration #0810-202
Students prepare sub-assembly and final assembly drawings and check layouts of selected mechanical equipment based on detail drawings. This laboratory simulates group participation in an industrial setting. (NETI-201)

Lab 13, Credit 4 (W)

NETI-203 Technical Drafting III
Registration #0810-203
Students draw schematics, wiring diagrams, and harnesses found in industrial, electrical, and electronic drafting. (Corequisite: NETI-211) (NETI-202)

Class 1, Lab 10, Credit 4 (S)

NETI-204 Technical Drafting IV
Registration #0810-204
Students design welded structures from realistic engineering requirements. They work in the laboratory to produce a team-based welding assembly and supporting detail drawings. (NETI-203)

Lab 8, Credit 3 (F)

NETI-205 Technical Drafting V
Registration #0810-205
Students solve a complex design problem from realistic engineering data, applying knowledge of power transmission components and mechanisms. This laboratory course creates a concept layout supported by engineering data. (NETI-204)

Lab 9, Credit 3 (W)

NETI-206 Technical Drafting VI: Seminar Project
Registration #0810-206
Students design a working layout of a complex power transmission problem based on an engineering concept layout. This laboratory course provides a fully documented layout suitable for drafters to draw all individual parts. (NETI-205)

Lab 15, Credit 5 (S)

NETI-211 Supervised Study in Drafting
Registration #0810-211
Students learn about electrical and electronic component selection and application. They design printed circuit boards from simulated industrial specifications with the help of individualized instruction. (Corequisite: NETI-203) (NETI-202)

Lab 2, Credit 1 (S)

NETI-213 Statics
Registration #0810-213
Students learn the basic principles of statics, including reactants and equilibrium of force systems, trusses containing two-force members, structures containing three-force members, centroids, moments of inertia, and dry friction. (NTMM-202, NTSP-135)

Class 6, Credit 5 (F)

NETI-214 . Strength of Materials
Registration #0810-214
Students learn the basic concepts of strength of materials, including stress and strain analysis, both elastic and plastic, with emphasis on elastic analysis of axially loaded members, connectors, beams, and columns. The laboratory experience includes testing of materials utilizing appropriate machines. Field trips to see test demonstrations also occur. (Corequisite: NETI-221) (NETI-213)

Class 3, Lab 3, Credit 5 (W)

NETI-215 Mechanisms
Registration #0810-215
Students learn about basic mechanical components such as linkages and levers, and combinations of these devices as they are applied in machines. Analysis of force, deflection, velocity, and acceleration is stressed. The laboratory experience includes mathematical and graphical solutions of problems. (NTMM-202)

Class 3, Lab 4, Credit 4 (F)

NETI-221 Machine Design I
Registration #0810-221
This is a study of the analytical design of bearings, clutches, couplings, brakes, springs, gearing systems, and power shafting. (Corequisite: NETI-214) (NETI-213)

Class 3, Lab 3, Credit 4 (W)

NETI-222 Machine Design II
Registration #0810-222
Students learn methods of constructing machine parts as well as specifications of materials and manufacturing processes. (NETI-221)

Class 3, Lab 3, Credit 4 (S)

NETI-299 Co-op Work Experience
Registration #0810-299

Credit 0 (Su)

NETI-399 Independent Study
Registration #0810-399

Credit Variable

Manufacturing Processes

NETN-150 Introduction to Numerical Control
Registration #0812-150
This course provides students with information regarding caree in computer-assisted machining. Activities include field tri career information, and instructional demonstrations. Hands- experiences include the fundamentals of cutting too programming for part making, and demonstrations of machi tools. (NETT-135)

Class 1, Lab 2, Credit 2 (S)

NETN-151 Numerical Control I
Registration #0812-151
This course introduces students to computer-controlled machin tools. Students develop the skills required to program a machin using several canned cycles, and to write programs that includ point-to-point, linear, and circular interpolation operati (NETT-134, NTMM-152)

Class 4, Lab 3, Credit 4 (W)

NETN-152 Numerical Control II
Registration #0812-152
Students use on-line computers to prepare and verify program Students are introduced to advanced concepts through compute numerical control programming of a CNC milling machin (NETN-151)

Class 4, Lab 3, Credit 4 (S)

NETN-153 Numerical Control III
Registration #0812-153
This course introduces students to computer numerical contro Topics covered include programming, set-up, and operation machining and turning centers with industrial applicatio Programming with manual data input, basic graphics, and m- chine language is emphasized. Safety is stressed throughout t course. (NETN-152)

Class 4, Lab 3, Credit 4 (S)

NETT-100 Career Exploration: Manufacturing Processes
Registration #0813-100
This course provides students with information regarding a care in manufacturing processes. Activities may include field trip hands-on experiences, career information presentations, interaction with graduates of the program and professionals in field. These experiences help students understand work activitie conditions, and settings

Lab 3, Credit 1 (F, W, S)

NETT-101 Basic Drafting I
Registration #0813-101
This course provides instruction in the principles and techniqu of basic drafting for students in other technical programs. T emphasis is on understanding how drawings are made and used i industry. (NTMM-142)

Lab 6, Credit 2 (F)

NETT-102 Basic Drafting II
Registration #0813-102
This course is a continuation of Basic Drafting I and is designed for students who desire or need greater depth of knowledge of drafting in industry. Topics include auxiliary views, sections, applied mathematics, and isometric and pictorial drawings with greater attention to drawing quality. (NETT-101, NTMM-150)

Lab 6, Credit 2 (W)

NETT-131,132,133 Manufacturing Processes I, II, III
Registration #0813-131,132,133
Students develop the basic skills necessary to use traditional machine tools. Laboratory instruction simulates an industrial environment. Emphasis on safety in the operation of machines is an integral part of the courses. (NTMM-140 for NETT-131; NETT-131 for NETT-132; NETT-132 for NETT-133)

Class 1, Lab 8, Credit 4 (NETT-131, F; NETT-132, W; NETT-133, S)

NETT-134,135,136 Manufacturing Processes IV, V, VI
Registration #0813-134,135,136
Students apply the theory associated with the set-up and operation of lathes, milling machines, drill presses, grinders, and bench operations. Students also are introduced to non-traditional machining. Greater emphasis is placed on accuracy and tolerance of machine parts. Safety is stressed throughout all courses. (NETT-133 for NETT-134; NETT-134 for NETT-135; NETT-135 for NETT-136)

Class 1, Lab 8, Credit 4 (NETT-134, F; NETT-135, W; NETT-136, S)

NETT-137 Advanced Machining and Processes
Registration #0813-137
This course introduces students to advanced-level machining and non-traditional processes. Students develop additional skills in tool-room grinding and are introduced to electrocharge machining and heat treatment of steels. Safety is stressed throughout the course. (NETT-136)

Class 1, Lab 8, Credit 4 (F)

NETT-139,140 Blueprint Reading I, II
Registration #0813-139,140
Students develop the skills necessary to read and interpret prints of engineering drawings of details and assemblies. (NTMM-141 for NETT-139; NETT-139 for NETT-140)

Class 1, Lab 3, Credit 2 (NETT-139, F; NETT-140, W)

NETT-151 Industrial Materials
Registration #0813-151
This course introduces students to the many materials used in industry and the reasons why the final cost of producing a part is influenced by material selection. Metals, plastics, and ceramics are covered from the perspective of physical, mechanical, and dimensional properties. (NETT-134)

Class 3, Credit 3 (W)

NETT-152 Manufacturing Analysis
Registration #0813-152
This course introduces students to manufacturing concepts. Students leam about production, management, and sales. The text and class discussions focus on problem solving and industrial operations. (NETT-134)

Class 3, Credit 3 (S)

NETT-153 Welding I
Registration #0813-153
Students learn about basic oxyacetylene and shielded metal arc welding processes as well as how to set up and operate equipment properly. Safety rules pertaining to welding are emphasized. (NETT-134)

Lab 4, Credit 2 (W)

NETT-154 Precision Measurement
Registration #0813-154
Students develop the skills necessary to measure to the highest tolerances commonly used in industry. They measure parts or groups of parts using industrial methods and equipment. Analysis of measurements and problem solving are stressed. (NETT-132)

Class 1, Lab 3, Credit 2 (S)

NETT-155 Welding II
Registration #0813-155
Students develop skills in gas tungsten arc welding, gas metal arc welding, and resistance welding. The course emphasizes proper operation of equipment and related safety measures. (NETT-153)

Lab 4, Credit 2 (S)

NETT-156 Advanced Precision Measurement
Registration #0813-156
This course introduces students to advanced-level precision measuring equipment and methods of operation. Students develop additional skills in the use of optical and computer-programmed measuring equipment. (NETT-136)

Class 2, Lab 2, Credit 3 (W)

NETT-160 Senior Seminar
Registration #0813-160
This course provides exiting manufacturing processes students with a structured forum for discussions with program faculty members about employee relations and ethics, industrial employment trends, apprentice programs, and continued technical skills development. (NETT-136)

Class 2, Credit 1 (S)

NETT-299 Co-op Work Experience
Registration #0813-299

Credit 0 (Su)

NETT-399 Independent Study
Registration #0813-399

Credit Variable

Medical Laboratory Technology

NTSL-101,102 Anatomy/Physiology and Disease I, II
Registration #0816-101,102
These courses provide students with the fundamentals of human anatomy with emphasis on physiology and related diseases. Students perform a variety of experiments and dissections in the laboratory portion of the courses.

Class 2, Lab 2, Credit 4 (NTSL-101, F; NTSL-102, W)

NTSL-105 Introduction to Medical Parasitology
Registration #0816-105
This course introduces students to the host/parasite relationship, life cycle, and identification procedures for intestinal and atrial protozoa, nematodes, cestodes, and trematodes. Classes include discussion of diseases and use of preserved microscopic slides, 35mm captioned slides, and laboratory preparation.

Class 1, Lab 2, Credit 2 (S)

NTSL-111 Basic Histology
Registration #0816-111
Theory and practice in tissue preparation for paraffin techniques are presented. Laboratory techniques include preparation of solutions, stains, sectioning, slide mounting, and staining of various tissues. Students develop skills in the operation, use, and care of histologic instruments.

Class 12, Credit 6 (S)

NTSL-115 Electrocardiography
Registration #0816-115
This course emphasizes use of machine techniques for selecting and monitoring tracings of simple heart maladies.

Class 4, Credit 2 (W)

NTSL-121 Urinalysis
Registration #0816-121
This course provides theory and practice in the estimation of urinary constituents, microscopic examination, and additional tests of clinical significance.

Class 4, Credit 2 (F)

NTSL-122 Hematology
Registration #0816-122
This course is a study of routine blood tests, including white count, red count, hematocrit, hemoglobin, sedimentation rate, differential count, and the calculations of the hemacytometer. Emphasis also is placed on recognition of normal and abnormal cellular elements of blood.

Class 8, Credit 4 (F)

NTSL-123 Advanced Hematology
Registration #0816-123
This course provides instruction and practice in automated methods of cell counting quality control, red cell description, reticylocyte counts, and test procedures in coagulation. The course emphasizes the correlation between laboratory work and diseases, such as anemia and leukemia, as well as bleeding and coagulation disorders. (NTSL-122)

Class 9, Credit 5 (W)

NTSL-131 Microbiology I
Registration #0816-131
This course is an introduction to the study of microscopic organisms such as viruses, bacteria, yeast, protozoa, fungi, and algae. The course also includes clinical procedures for the study of common disease-causing organisms with concentration in bacteriology. Techniques in the laboratory include media preparation, sterilization, culturing, mounting, staining, agglutination, antimicrobial susceptibility testing, and biochemical reactions.

Class 9, Credit 5 **(S)**

NTSL-132 Immunology/Serology
Registration #0816-132
The nature of immunity, the basic principles of the immune system, immunoassay, immunopathology, histocompatability, and oncoimmunology are among the topics considered in this course. A variety of routine and special immunological procedures are learned during laboratory sessions.

Class 2, Lab 3, Credit 3 (W)

NTSL-133 **Blood Banking**
Registration #0816-133
The theory of blood banking and routine procedures is presented in this course. Emphasis is placed on quality control, ABO grouping, sub-grouping, Rh testing, antiglobulin testing, antibody screening, antibody detection and identification, transfusion reactions, compatibility testing, erythroblastosis fetalis, preparation and storage of blood components, and recordkeeping.

Class 2, Lab 3, Credit 3 (S)

NTSL-140 **Electron Microscopy**
Registration #0816-140
Electron optics and the mechanics of the electron microscope are studied prior to any work on the electron microscope. The principles of specimen preparation, fixation, embedding, microtomy, staining, and photographic processing are studied in depth. The course grade is based on the quality of final products. (NTSB-109, NTSL-111)

Class 2, Lab 5, Credit 3 (F, W, S)

NTSL-200 MLT **Co-op Seminar**
Registration #0816-200
This course provides students with knowledge and skills to prepare them for a successful co-op experience, including guidelines on professional ethics, employee-employer responsibilities, communication skills, and interpersonal relationship development. Class activities include discussion groups, panel presentations, hospital visitations, lectures, and the preparation of co-op materials. (Completed pre-technical year)

Class 2, Credit 1 (W)

NTSL-201,202,203 **Clinical Chemistry I, II, ID**
Registration #0816-201,202,203
This three-quarter sequence provides theory and practice in the quantitative and qualitative analyses of physiochemical parameters. The sequence includes fundamental concepts of clinical analysis, theory and practical application of clinical instrumentation, and the relationship of clinical analysis to methodology and the diagnostic process. The winter and spring quarters include a hospital affiliation in clinical instrumentation twice weekly. (NTSL-201 for NTSL-202; NTSL-202 for NTSL-203)

Class 12, Credit 6 (NTSL-201, F)
Class 9, Credit 5 (NTSL-202, W; NTSL-203, S)

NTSL-211 **Histology II**
Registration #0816-211
This course is a continuation of Basic Histology with emphasis on histochemistry, special stains, and tissue preparation techniques. (NTSL-111)

Class 12, Credit 6 (W, S)

NTSL-224 **Laboratory Simulation**
Registration #0816-224
This course is a review and summary of all specialties included in the total medical laboratory technology program. Students rotate into all departments in the clinical laboratory environment. Students meet one hour per week with medical laboratory technology faculty members on campus. The remaining six hours each week are spent on rotation in an affiliated hospital or clinical laboratory under supervised conditions.

Class 1, Lab 6, Credit 3 (S)

NTSL-232 **Microbiology II**
Registration #0816-232
This course is an in-depth study of medical bacteriology and the related diseases. Theory and practice are provided in specimen collection, culturing, staining, media preparation and selection, normal flora, identification procedures for disease-producing organisms, susceptibility testing, agglutinization reactions, and reporting results. This occurs on campus and in affiliated hospital laboratories. (NTSL-131)

Class 12, Credit 6 (F)

NTSL-233 **Microbiology III**
Registration #0816-233
This course is a continuation of Microbiology II, with an emphasis on special techniques for anaerobic organisms, mycobacteriology mycology, and virology. The theory portion of the course includes the study of diseases and their symptoms. (NTSL-232)

Class **9,** Credit 5 (W)

NTSL-299 **Co-op Clinical Experience**
Registration #0816-299

Credit 0 (Su)

NTSL-399 **Independent Study**
Registration #0816-399

Credit Variable

Medical Record Technology

NTSR-100 Career Exploration: Medical Record Technology
Registration #0819-100
This course provides a general overview of experiences related to the medical record profession. It is offered to students who want to explore their interest in selecting medical record technology as a career. Students enrolled in the course typically have not attended the Summer Vestibule Program (SVP) or attended SVP but did not sample medical record technology at that time.

Class 2, Credit 1 (S)

NTSR-106 **Biology I**
Registration #0819-106
This is the first in a three-quarter series of courses. Topics covered in this course are basic atomic structure, molecular biology, cellular structure and function, cellular respiration, DNA structure, protein synthesis, mitosis, and the relationship of bacteria and viruses to disease. Laboratory activities involving microscopic and macroscopic observations of prepared and live specimens are performed to supplement classroom lectures and discussion. Study skills development and refinement are emphasized.

Class 4, Lab 2, Credit 4 (F)

NTSR-107 **Biology II**
Registration #0819-107
This course concentrates on human biology. Topics covered include hematology and the digestive, excretory, cardiovascular, respiratory, immune, and nervous systems. Laboratory activities, including the use of prepared specimens, supplement classroom lectures and discussion. Medical terminology is introduced through discussion of exemplary pathological conditions. (NTSR-106)

Class 4, Lab 2, Credit 4 (W)

NTSR-108 Biology in
Registration #0819-108
The final course in this sequence continues to focus on human biology. Topics covered are the endocrine system, reproduction, embryology, meiosis, and cellular and human genetics. Basic medical terminology related to each topic is discussed. Laboratory activities include dissecting a pig embryo as well as reviewing the anatomy of all body systems studied in this course and Biology II. (NTSR-107)

Class 4, Lab 2, Credit 4 (S)

NTSR-111,112 Anatomy/Physiology and Disease I, II
Registration #0819-111,112
This is a two-quarter, in-depth study of human anatomy and physiology using a systematic approach to basic disease processes. Emphasis is placed on related medical terminology and clinical procedures. (NTSR-111 forNTSR-112)

Class 6, Credit 4 (NTSR-111, F; NTSR-112, W)

NTSR-141 Medical Record Science I
Registration #0819-141
The career in medical record technology is introduced through discussion and laboratory practice. Topics covered are the medical record content, record numbering and filing systems, and the medical record profession. Procedures in the laboratory include filing, admissions, chart assembly and analysis, and chart deficiencies.

Class 9, Credit 5 (F)

NTSR-142 Medical Record Science II
Registration #0819-142
This course includes coding rules and laboratory experience in practical application of coding diseases and operations. (NTSR-141)

Class 9, Credit 5 (W)

NTSR-143 Medical Record Science III
Registration #0819-143
This unit uses the content of patient records to continue the practical experience in manual and automated coding. Students leam manual and computerized abstracting of statistical data to compute health statistics; they also learn to interpret computerized statistical reports. (NTSR-142)

Class 9, Credit 5 (S)

NTSR-145 Health Care Organization and Structure
Registration #0819-145
This course gives an overall introduction to health care delivery systems. It includes the composition, responsibilities, and functions of the administrative staff, health care providers, and allied health departments and professionals. Students discuss the purposes of and responsibility for the health record.

Class 5, Credit 4 (S)

NTSR-161,162,163 Medical Terminology I, II, III
Registration #0819-161,162,163
These are the first three courses in a five-quarter sequence. Etymology, definition, pronunciation, spelling, and correct utilization of medical terms are stressed. Common medical terms are discussed in relation to disorders and diseases of each body system. (NTSR-161 for NTSR-162; NTSR-162 for NTSR-163)

Class 3, Credit 3 (NTSR-161, F; NTSR-162, W; NTSR-163, S)

NTSR-244 Medical Record Science IV
Registration #0819-244
Students study data regulations and activities associated with health information control and quality as well as legal aspects of medical records. (NTSR-243)

Class 9, Credit 5 (F)

NTSR-245 Medical Record Science V
Registration #0819-245
This course includes the medical staff organization and its responsibilities; management and supervision of health information departments; and health facilities/records in long term care, ambulatory care, home care, hospice, and mental health care. (NTSR-244)

Class 9, Credit 5 **(W)**

NTSR-246 Medical Record Science VI
Registration #0819-246
This final course includes clinical affiliations in long-term, ambulatory, and mental health care at local facilities; cancer registry with abstracting of cases; trends in health care delivery systems; and review/evaluation of medical record technology knowledge and skills. (NTSR-245)

Class 9, Credit 5 (S)

NTSR-251,252 Pathophysiology I, II
Registration #0819-251,252
This two-quarter sequence combines knowledge of human physiology with disease processes. The etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, and diagnostic and therapeutic procedures of common diseases are presented. (NTSR-112 or equivalent for NTSR-251; NTSR-251 for NTSR-252)

Class 3, Credit 3 (NTSR-251, **W;** NTSR-252, S)

NTSR-264 Medical Terminology IV
Registration #0819-264
This is a review of terms encountered in Medical Terminology I, II, and III supplemented by secondary vocabulary selected from the same topics. Etymology, definition, spelling, pronunciation, and correct utilization of medical terms are reinforced. (NTSR-163)

Class 3, Credit 3 (F)

NTSR-267 Medical Terminology V
Registration #0819-267
In this course, terms related to disorders, diagnosis, treatment, and surgical procedures are selected from a variety of specialty topics. These topics include anesthesiology, microbiology, oncology, ontology, pharmacology, psychiatry, radiology, nuclear medicine, and radiation therapy. Etymology, definition, spelling, pronunciation, and correct utilization of medical terms are reinforced. (NTSR-264)

Class 3, Credit 3 (S)

NTSR-299 Co-op Work Experience
Registration #0819-299

Credit 0 (Su)

Ophthalmic Optical Finishing Technology

NTSF-105 Introduction to Optical Finishing Technology I
Registration #0827-105
This course emphasizes a continuation of sampling in optical finishing technology, including an overview of the career, admissions and graduate requirements, sources of employment, and expectations of students in the program. Students learn the titles, roles, and responsibilities of vision care personnel, including the M.D., O.D., dispensing optician, and optical finishing technologist. Laws and regulations governing the ophthalmic laboratory industry are introduced.

Class 2, Credit 2 (F)

NTSF-106 Introduction to Optical Finishing Technology II
Registration #0827-106
This course teaches the function and use of optical laboratory equipment necessary to the production of single-vision eyewear. Students learn the basic concepts of sphere, cylinder, axis, and geometric center as well as how to fabricate single-vision uncut lenses into finished eyewear.

Class 2, Credit 2 (W)

NTSF-107 Introduction to Optical Finishing Technology III
Registration #0827-107
This course introduces the concept of writing functions of given vertometer parts. Students learn the process of writing step-by-step sequential procedures for equipment operation. They practice determining lens powers from vertometer readings and calculating decentration from given prescription information. They also learn the meanings of various optical terms found on prescription forms. (NTSF-106)

Class 2, Credit 2 (S)

NTSF-111 Optical Finishing Technology Math I
Registration #0827-111
This course focuses on the rules of transposition, including transposition of lens powers. Students learn to apply mathematic functions, solving for binocular and monocular P.D.s, near-vision prescriptions, and bifocal segment height and inset. The concepts of plus and minus cylinder prescription powers are discussed, and definitions and determinations of lens powers from given base curves, cross curves, and inside curves are taught. (NTMM-140)

Class 4, Credit 3 (F)

NTSF-112 Optical Finishing Technology Math II
Registration #0827-112
This course teaches students how to select and determine appropriate base curves, cross curves, and inside curves of given lens powers. Students leam mathematic formulas used in determining effective diameter, smallest lens blank, and prism. They also leam to apply mathematic functions related to vertometer power readings, heat treat times, and lens measurer readings. (NTMM-140, NTMM-141, NTSF-111)

Class 4, Credit 3 (W)

NTSF-115 Prescription Analysis I
Registration #0827-115
This course teaches students the meaning of various optical terms found on prescription forms. Students learn what information should be on a complete prescription and how to analyze single-vision and multifocal prescriptions for laboratory processing.

Class 4, Credit 3 (F)

NTSF-116 Prescription Analysis II
Registration #0827-116
Students continue to analyze and write ophthalmic prescriptions in various forms with an emphasis on ortholite plastic, cataract, and trifocal prescriptions. (NTSF-115)

Class 4, Credit 3 (W)

NTSF-117 Lens Design
Registration #0827-117
This course teaches students how to design lens systems based on specific optical factors such as frame selection, lens material, lens thickness, index of refraction, size of lens, lens power, blank manufacturer, and cosmetic appeal. Students learn trade names of lenses, percentages of lens transmission, multifocal segment placement, and occupational and recreational lens forms. (NTSF-111, NTSF-112)

Class 5, Credit 3 (S)

NTSF-121 Optical Finishing Techniques I
Registration #0827-121
This course teaches students the techniques of using the vertometer, layout marker, heat treat units, and pattern maker, automatic edging machines, and development of hand-beveling skills. (NTSF-112, NTSF-116, NTSF-162)

Class 6, Credit 5 (W)

NTSF-122 Optical Finishing Techniques II
Registration #0827-122
This course teaches students how to block and edge lenses using a variety of automatic edging machines. Students learn how to edge given lenses with a Vee bevel, rimless bevel, and hide-a-bevel. Edging concepts and operational techniques are emphasized. (NTSF-121)

Class 6, Credit 5 (S)

NTSF-123 Optical Finishing Techniques III
Registration #0827-123
This course teaches students the use of the vertometer and various layout markers to prepare lenses for edging. Students learn to process uncut ophthalmic lenses according to ANSI standards. (NTSF-122)

Class 12, Credit 6 (S)

NTSF-161 Optical Finishing Terminology I
Registration #0827-161
This course emphasizes comprehension, spelling, and application of terminology related to the optical profession, including the laboratory environment, function and disorders of the eye, and optics/lens characteristics.

Class 5, Credit 3 (F, W, S)

NTSF-162 Optical Finishing Terminology II
Registration #0827-162
This course emphasizes the comprehension, spelling, and application of terminology related to the vertometer, lensometer, pattern maker, heat treat units, and ceramic and diamond head beveling wheels. (NTSF-161)

Class 5, Credit 3 (F, W, S)

NTSF-163 Optical Finishing Terminology III
Registration #0827-163
This course emphasizes the comprehension, spelling, and application of terminology related to lens tolerances, functions, procedures, operation and troubleshooting of selected auto edge machines, layout markers, and blocking systems. Students complete a paper describing the procedures used in making prescription eyeglasses. (NTSF-162)

Class 5, Credit 3 (F, W, S)

NTSF-224 Optical Finishing Techniques IV
Registration #0827-224
Concepts taught in Optical Finishing Techniques III are further developed, with an emphasis on layout techniques, including multifocal and specialized vocational lens systems. Students learn to identify metal frame types by generic names. Procedures for lens insertion, frame alignment, and proper use of assembly-alignment tools are emphasized. (NTSF-123)

Class 9, Credit 5 (F)

NTSF-225 Optical Finishing Laboratory Simulation I
Registration #0827-225
This course provides practice in the total processing of actual eyeglass prescriptions from uncut stage through completion and final inspection. Students practice various methods of assembling lenses into plastic (Zylonite) frames, symmetrical alignment of the finished product, and repair and restoration techniques for damaged or distorted plastic frames. Students rotate positions to demonstrate competence in all phases of operation.

Class 9, Credit 5 (W)

NTSF-226 Optical Finishing Laboratory Simulation II
Registration #0827-226
This course teaches the techniques of rimless mounting, notching, drilling, grooving, frame repair (soldering), lens dying, use of Shave computer, and operation of Kirk Chemical Unit. Students select frame and lens for layout and processing to finished product. (NTSF-225)

Class 9, Credit 5 (S)

NTSF-241 Management of Optical Stockroom Procedures
Registration #0827-241
In this course, students leam to identify the function and job responsibilities of stockroom personnel, suppliers of laboratory products, consumers (customers) of laboratory products, and flow of operations. Emphasis is on basic ophthalmic frames, receipt of orders, picking stock, stock check-in, and related administrative procedures.

Class 6, Credit 4 (F)

NTSF-243 Optical Finishing Inspection and Correction
Registration #0827-243
Students evaluate finished prescription orders as final inspectors, comparing all optical and mechanical details with written specifications. Emphasis is placed on accuracy, quality of workmanship, and the inspector's ability to recommend and produce any changes that may be necessary. Study will include acceptable tolerance levels and prism beveling.

Class 5, Credit 3 (S)

NTSF-251 Professional Optic Seminar
Registration #0827-251
In this seminar, professionals from Rochester's ophthalmic community discuss their roles in the complex field of visual care. They offer valuable background information on the many kinds of services, instrumentation techniques, and technologies that comprise the unending efforts to maintain and improve the quality of visual acuity.

Class 2, Credit 2 (W)

NTSF-299 Co-op Work Experience
Registration #0827-299
(NTSF-101)

Credit 0(Su)

NTSF-399 Independent Study
Registration #0827-399

Credit Variable

Technical Mathematics

NTMM-120 Introduction to College Mathematics
Registration #0817-120
This course improves students' fundamental skills in mathematics. Topics covered emphasize the use of language as it relates to basic mathematical computations. The use of calculators is stressed.

Class 3, Credit 3 (F)

NTMM-140 Fundamentals of College Mathematics I
Registration #0817-140
This course is an introduction to the application of mathematics as a problem-solving tool. Emphasis is placed on measurement, use of proportion, approach to verbally expressed problems, and computation with and without a calculator. Elementary topics from geometry and statistics are included. (NTMM-120 or approval of the offering department)

Class 5, Credit 3 (F, W)

NTMM-141 Fundamentals of College Mathematics II
Registration #0817-141
This course deals with the application of the basic tools of algebra, geometry, and trigonometry as solutions to problems. The course deals with the concepts of an algebraic variable as well as techniques for solving simple equations and inequalities. Simple applications of geometric principles are taught as well as elementary applications of right-angle trigonometry. Attention also is paid to graphic display of data. (NTMM-140 or approval of the offering department)

Class 5, Credit 3 (W, S)

NTMM-142 Fundamentals of College Mathematics III
Registration #0817-142
This course deals with the application of a variety of algebraic and geometric techniques to problem solving. Emphasis is placed on the concepts of function and relation and on graphing linear relations. Concepts of area and volume, powers and radicals, and geometry on the coordinate plane are included as well as an introduction to the use of vectors. (NTMM-141 or approval of the offering department)

Class 5, Credit 3 (F, S)

NTMM-150 Integrated College Mathematics I
Registration #0817-150
Topics from algebra, geometry, trigonometry, and other areas of mathematics are explored. Relations, functions, geometric loci, loci on the coordinate plane, algebraic functions, graphing, and right-angle trigonometry are studied. Calculators are used extensively as aids in problem solving. (NTMM-142 or approval of the offering department)

Class 5, Credit 4 (F, W)

NTMM-151 Integrated College Mathematics II
Registration #0817-151
Additional topics from algebra, geometry, trigonometry, and other areas of mathematics, including statistical concepts, are explored. Inequalities, graphing, polynomial and rational functions, geometry of the circle, trigonometric identities, measurement error, fractional exponents, and exponential functions are studied. Calculators are used extensively as aids in problem solving. (NTMM-150 or approval of the offering department)

Class 5, Credit 4 (W, S)

NTMM-152 Integrated College Mathematics III
Registration #0817-152
Additional topics from algebra, geometry, trigonometry, and other areas of mathematics, including concepts from formal logic, are explored. Inverse relations, logarithms, truth statements, constructions, congruence, introduction to formal mathematical proofs, areas of geometric figures, law of sines, law of cosines, vectors, and complex numbers are studied. Calculators are used extensively as aids in problem solving. (NTMM-151 or approval of the offering department)

Class 5, Credit 4 (F, S)

NTMM-163 Mathematics for Data Processing
Registration #0817-163
This course provides basic mathematical skills relevant to the field of data processing. The course emphasizes arithmetic operations in various number systems and logical formulation of problems.

Class 3, Credit 3 (F, W, S)

NTMM-170 Medical Laboratory Mathematics
Registration #0817-170
This course provides mathematical skills supporting medical laboratory procedures. Topics taught include use of electronic calculators, use of logarithms for computation, conversion between English and metric unit systems, temperature conversions, and calculations with molar and percentage solutions.

Class 3, Credit 3 (S)

NTMM-201,202,203 College Algebra, Trigonometry, and
Registration #0817-201,202,203 Analytic Geometry I, II, III
This is a three-course sequence in college algebra and trigonometry. Topics covered are similar to those studied in Integrated College Mathematics I, II, III, but in some cases are more detailed. Additional topics covered are natural logarithms, solutions of systems of non-linear equations, series and sequences, limits, theory of equations, and selected topics in analytic geometry.

Class 3, Credit 3 (F, W, S)

NTMM-204 Pre-Calculus
Registration #0817-204
Pre-Calculus is offered to students who intend to take a calculus course in the future. Topics include functions and graphing and provide exposure to the variety of functions encountered in calculus. Limits also are introduced. (NTMM-201, NTMM-202 or permission of instructor)

Class 4, Credit 3 (F, S)

Registration #0817-399

Credit Variable **Independent Study**

Technical Physics

NTSP-100 Technical Physics I
Registration #0818-100
This course is required for all engineering technologies students as well as for students preparing for study in the colleges of Engineering and Science. The course provides background in measurement techniques and use of metrics, vector problem solutions, rectilinear motion, dynamic and static forces, Newton's Laws of Motion, work, energy power, energy conservation laws, torque, and Law of Moments. (NTMM-141)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-125 Construction Technology Physics II
Registration #0818-125
The following concepts are taught in this career-integrated course: heat, temperature, heat transfer, linear and volumetric expansion and contraction, insulation materials, specific heat capacities, calorimetry, fusion and vaporization, energy costs, electrical resistance, DC circuits, fuses and circuit breakers, Ohm's Law, electrical metering, electrical power and cost of electricity, transformers, properties of light, reflection and refraction, Snell's Law, photometry and lighting, properties of sound, and acoustical principles. (NTSP-100)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-126 Construction Technology Physics HI
Registration #0818-126
A variety of topics are covered in this final course: work; friction; machines; physical properties of matter, stress, and strain; Young's Modulus; Hooke's Law; concurrent forces; vector analysis; linear equilibrium; density and specific gravity; fluid pressure; Pascal's Principle; fluid dynamics; Bernoulli's Equation; Torricelli's Law; viscous drag; and pressure and velocity in parallel and series pipe systems. (NTSP-125)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-135 Technical Physics II
Registration #0818-135
This is the second course required for industrial drafting, electromechanical technology, and College of Science students. Course topics include magnetism, electrostatics, magnetic and electrostatic forces, static and current electricity, electromagnetic induction, AC and DC motors, electrical meters, photoelectric effect, potential difference and voltage drop, electrical resistance **and** resistivity, resistor code, electrical circuits, fuses and circuit breakers, Ohm's Law, use of electrical meters, Gauss' Law, principles of capacitors and circuitry, dielectrics, electrical power, **and** cost of electricity. (NTSP-100)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-136 Technical Physics HI
Registration #0818-136
This course includes the following topics: Kirchoff's Voltage and Current Laws, mesh circuit problem solutions using the determinant and superposition methods, current division and voltage division rules for circuits, Wheatstone Bridge, mutual and self inductance, Oersted Fields, Lenz's Law, inductance in circuits, electrical transformers, alternating current, rms current and voltage in AC circuits, inductive and capacitive circuits, electrical resonance, and power factor. (NTSP-135)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-137 **Technical Physics IV**
Registration #0818-137
This elective course includes topics on characteristics and transmission of sound waves, acoustics and applications of sound, radio communication principles, wave theory and transmission principles, Fourier's Theorem, standing waves, resonance and harmonics, principles of reflection and refraction, Snell's Law, lenses and prisms, geometrical and wave optics, Gaussian Formula, lens power, optical instruments, use of oscilloscope, and formation of Lissajous Figures. (NTSP-136)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-168 **Optical Finishing Physics**
Registration #0818-168
This course involves the study of light, reflection, and refraction. These principles are applied to the study of the behavior of spherical and piano mirrors, prisms, and lenses. The usefulness and application of dioptric power, the lensmaker's equation, image and object dimensions, and focal length measurements are addressed. Also included are basic optical instruments and a study of the electromagnetic spectrum. Emphasis is placed on geometrical (ray) optics. The course includes a comprehensive laboratory experience that supplements and closely follows classroom instruction. (NTMM-141)

Class 4, Lab 1, Credit 3 (W, S)

NTSP-399 **Independent Study**
Registration #0818-399

Credit Variable

School of Visual Communications

Applied Art

NDAR-100 **Career Exploration: Applied Art**
Registration #0849-100
This course is designed to help students collect the information necessary to make appropriate decisions about a possible career in the art field. Students receive opportunities to explore their interests and skills in art through structured hands-on experiences with art tools and equipment. Emphasis is on increasing students' awareness of their art skills, applied art career options, working conditions, salaries, and job responsibilities.

Studio 2, Credit 1 (F, W, S)

NDAR-111,112,113 **Basic Design I, II, III**
Registration #0849-111,112,113
This course sequence is an introduction to the<concepts and elements of design as they relate to a vocation in applied art. Emphasis is on exploration and analysis of all design principles such as point, line, shape, texture, space, and color as they apply to two- and three-dimensional applications. (NDAR-100 for NDAR-111; NDAR-111 for NDAR-112; NDAR-112 for NDAR-113)

Lab 3, Credit 2 (F, W, S)

NDAR-121,122,123 **Basic Drawing I, II, III**
Registration #0849-121,122,123
This is a fundamental course sequence that introduces students to various freehand drawing concepts, methods, and techniques. Emphasis is placed on eye-hand coordination, rendering techniques, one- and two-point perspective, and various drawing media. A variety of forms are used, including still life objects, architectural forms, and the human figure. (NDAR-100 for NDAR-121; NDAR-121 for NDAR-122; NDAR-122 for NDAR-123)

Lab 6, Credit 3 (F, W, S)

NDAR-141,142,143 **Career Seminar I, II, III**
Registration #0849-141,142,143
These courses provide experience in the development of a personal career plan in art and assists with the development of college survival skills. Students explore personal interests, aptitudes, art program opportunities, and college adjustment issues through presentations, field trips, discussions, and research of art careers. This course sequence emphasizes systematic decision making related to art careers. (NDAR-100 for NDAR-141; NDAR-141 for NDAR-142; NDAR-142 for NDAR-143)

Class 2, Credit 1 (F, W, S)

NDAR-151,152 **Computer Graphic**
Registration #0849-151,152 **Systems I, II**
This course is an introduction to computer graphics systems. Emphasis is placed on learning how to use hardware and software for generating images and type and for file management. Specific computer-related vocabulary also is covered. In this course, students have hands-on experience using various types of hardware and software. (NDAR-100 for NDAR-151; NDAR-151 for NDAR-152)

Lab 3, Credit 2 (F, W, S)

NDAR-161,162,163 **Media and Processes I, II, III**
Registration #0849-161,162,163
The basic tools, materials, and equipment used in the professional applied art studio are introduced to students. Emphasis is placed on identification; vocabulary; maintenance; and correct use of media, mechanical tools, photostat equipment, and a variety of materials. (NDAR-100 for NDAR-161; NDAR-161 for NDAR-162; NDAR-162 for NDAR-163)

Lab 3, Credit 2 (F, W, S)

NDAR-231,232,233 **Introduction to Typography I, II, III**
Registration #0849-231,232,233
This sequence is a study of the use of typography in applied art: the origins of typographic form, type classifications, production processes, measurement systems, and type specification methods. Students gain experience in design, copy marking, planning formats, copy fitting, and using the computer as a composition tool. (NDAR-113, NDAR-150, NDAR-163 for NDAR-231; NDAR-231 for NDAR-232; NDAR-232 for NDAR-233)

Lab 3, Credit 2 (F, W, S)

NDAR-241,242,243 **Art Survey I, II, III**
Registration #0849-241,242,243
These courses offer a survey of major historical developments in the visual arts as they relate to applied art. Students are introduced to research methods used in the field of art as the basis for design concept development. (NDAR-143 for NDAR-241; NDAR-241 for NDAR-242; NDAR-242 for NDAR-243)

Class 2, Credit 2 (F, W, S)

NDAR-258 Applied Art Photography
Registration #0849-258
This is an elective course in the use of photographic processes as they relate to the applied artist. Emphasis is on understanding and using the camera, black-and-white film processing, contact printing, and enlarging. Students practice darkroom procedures and methods for obtaining a basically well-crafted photographic image.

Class 4, Credit 2 (F, W)

NDAR-261, 262,263 Traditional/Electronic
Registration #0849-261,262,263 Layout I, II, III
This course sequence applies design concepts, principles, and methods developed in first-year courses. In this course sequence, students leam how to use both electronic and traditional methods to develop design solutions and produce accurate comprehensive layouts. Students receive hands-on experience using computer hardware and software related to page layout. Marker skills are taught. The development of creative thinking skills is stressed. Emphasis also is placed on practices and procedures evident in a professional art studio. (NDAR-113, NDAR-123, NDAR-163, NDAR-152 for NDAR-261; NDAR-261 for NDAR-262; NDAR-262 for NDAR-263)

Lab 6, Credit 3 (F, W, S)

NDAR-267 Three-Dimensional Applications
Registration #0849-267
This elective course extends basic concepts, principles, and methods as they apply to three-dimensional form. Emphasis is on material characteristics, tool/material processes, construction techniques, and basic model making.

Lab 3, Credit 2 (S)

NDAR-271, 272,273 Production Methods I, II, III
Registration #0849-271,272,273
Emphasis is placed on understanding printing methods used to produce black-and-white and color artwork. The creation and preparation of artwork, including color separation, are taught using both traditional hand skills and computers. Specific vocabulary related to reproducing artwork also is covered. (NDAR-113, NDAR-123, NDAR-163, NDAR-152 for NDAR-271; NDAR-271 for NDAR-272; NDAR-272 for NDAR-273, or departmental permission)

Lab 3, Credit 2 (F, W, S)

NDAR-277 Air Brush/Retouching
Registration #0849-277
This elective course provides basic experience with the air brush as a tool for original art, retouching, and illustration. Emphasis is on care and maintenance, dyes, paints, masks, working surfaces, and a variety of working techniques. (NDAR-112, NDAR-122, NDAR-162)

Class 3, Credit 2 (F, S)

NDAR-280 Computer Illustration Methods
Registration #0849-280
This course provides students with advanced skills in the area of computer illustration. In the course, students leam how to use the advanced functions of black-and-white and color graphic software to create professional-quality renderings for print publication. (NDAR-113, NDAR-123, NDAR-152, NDAR-163, or departmental permission)

Class 2, Credit 2 (F, W, S)

NDAR-284 Mechanical Perspective
Registration #0849-284
Students leam the use of mechanical drawing methods for visualizing three-dimensional form in perspective. Experiences in this elective course include orthographic projection and one- and two-point perspective based on forms ranging from simple geometric solids to complex patterns. Emphasis is on mastery of basic methods for constructing a technically accurate drawing. (NDAR-121)

Class 3, Credit 2 (W)

NDAR-285 Mechanical Drawing Methods
Registration #0849-285
Students are introduced to mechanical processes for depicting three-dimensional forms on a flat surface. This elective course includes drawing methods, such as oblique and isometric, based on simple and complex forms. Emphasis is on translating the three-dimensional form into a technically accurate drawing. (NDAR-284)

Class 3, Credit 2 (S)

NDAR-287 Drawing Applications
Registration #0849-287
This is an advanced elective course refining freehand and technical drawing concepts, methods, and techniques developed in Basic Drawing I, II, and III. Emphasis is on development of advanced drawing skills, using various types of subject matter, media, and processes. (NDAR-123)

Class 3, Credit 2 (F)

NDAR-294 Freehand Lettering
Registration #0849-294
Students are introduced to the basic processes of freehand lettering. The emphasis of this elective course is on identification, care, and use of various lettering tools such as carpenter's pencil, speedball pen, and lettering brush. Use of basic methods of stroking, letterspacing, word spacing, linespacing, and rendering of both serif and sans serif letterforms are taught. (NDAR-161)

Class 3, Credit 2 (W)

NDAR-295 Finished Lettering
Registration #0849-295
This elective course is an introduction to the processes, tools, equipment, and methods for producing finished lettering for reproduction. Included are exercises designed to develop skills in rendering script, serif, sans serif, and decorative letterforms. (NDAR-294)

Class 3, Credit 2 (S)

NDAR-311,312 Graphic Applications I, II
Registration #0849-311,312
This is an advanced course sequence stressing layout, mechanical, and computer skills within the context of a professional studio environment. The courses involve practical work experience, with an emphasis on studio procedures, work habits, professional skills, and dealing with clients as well as refinement of individual portfolios. (NDAR-233, NDAR-243, NDAR-263, NDAR-273 for NDAR-311; NDAR-311 for NDAR-312; NDAR-250)

Lab 3, Credit 2 (F, W, S)

NDAR-321,322,323 Employment Seminar I, II, III
Registration #0849-321,322,323
Students are oriented to the total working/living environment of the professional applied art field, with an emphasis on processes for securing and maintaining employment. Experiences include resume preparation, interviewing techniques, guest lectures, field trips, presentations, discussions, and personally directed job-seeking. (NDAR-233, NDAR-263, NDAR-273 for NDAR-321; NDAR-321 for NDAR-322; NDAR-322 for NDAR-323)

Class 3, Credit 3 (F, W, S)

NDAR-330 Graphic Applications/Portfolio Review
Registration #0849-330
This course is applied art students' final professional preparation course prior to graduation. It includes practical work experience, interaction with clients, and involvement with all phases of studio production, including layout, mechanicals, and computer graphics. As part of this course, students must submit a portfolio of artwork for final review by a jury composed of department faculty members and professional artists. (NDAR-312 or departmental permission)

Lab 10, Credit 5 (F, W, S)

NDAR-399 Independent Study
Registration #0849-399

Credit Variable

Photo/Media Technologies

NVPP-100 Career Exploration:
Registration #0851-100 Photo/Media Technologies
This course explores the photo/media field to help students make well-informed decisions regarding their college area of specialization. Students have opportunities to explore their interest in the field through hands-on experiences with photo/media equipment and tools. Opportunities are provided for students to increase their awareness of necessary photo/media skills, industries, program, and expectations of the photo/media technologies department. Technical areas of study include color negative printing, computer graphics, special effects slides, storyboards from 35mm slides, and video equipment.

Lab 2, Credit 1 (F, W, S)

NVPP-101 Introduction to Photographic Printing
Registration #0851-101
Students learn proper use of equipment and how to process, enlarge, and evaluate black-and-white prints. (Corequisites: NVPP-111, NVPP-121)

Lab 8, Credit 4 (F, W, S)

NVPP-102 Black-and-White Printing
Registration #0851-102
This course builds on previously learned basic printing skills. Students use a variety of negative sizes to develop more advanced skills in controlling print contrast and exposure. The making of a quality photographic print is emphasized. (Grade of C or better in NVPP-101, NVPP-111, NVPP-121)

Lab 4, Credit 2 (F, W, S)

NVPP-111 Introduction to Film Processing
Registration #0851-111
This course introduces and gives students practice techniques for processing and process control of black-and-white roll film. Emphasis is on consistency and high quality film processing through control of processing variables. (Corequisites: NVPP-101, NVPP-121)

Lab 3, Credit 2 (F, W, S)

NVPP-112 Film Processing
Registration #0851-112
This course extends the skills learned in Introduction to Film Processing. Various types and sizes of black-and-white films are used. Emphasis is placed on control and repeatability. (Grade of C or better in NVPP-101, NVPP- 111, NVPP-121)

Lab 4, Credit 2 (F, W, S)

NVPP-121 Introduction to Cameras
Registration #0851-121
This course introduces students to the proper operation of the camera and the control and manipulation of exposure through use of a light meter. Students have the opportunity to demonstrate their abilities by photographing assigned subjects.
(Corequisites: NVPP-101, NVPP-111)

Lab 3, Credit 2 (F, W, S)

NVPP-122 Introduction to Copy Work
Registration #0851-122
Students use and extend basic camera skills to meet the special needs of copy work. They use 35mm and 4 x 5 copy cameras with a variety of black-and-white and color film types and are introduced to special lighting and exposure techniques. (Grade of C or better in NVPP-101, NVPP- 111, NVPP-121)

Lab 4, Credit 2 (F, W, S)

NVPP-132 Orientation to Photo/Media Careers
Registration #0851-132
This course teaches students about careers in custom photographic laboratory services and media production through field trips, class discussions, and hands-on experiences. After completing this course, students are expected to choose their major area of study (custom photographic laboratory services or media production options). (Grade of C or better in NVPP-101, NVPP-111, NVPP-121)

Class 1, Lab 3, Credit 2 (F, W, S)

NVPP-142 Introduction to Advanced Photographic Studies
Registration #0851-142
This course teaches students about programs and career areas offered by RIT's School of Photographic Arts and Sciences. Students develop both creative and technical skills in still photography and have an opportunity to evaluate their interest and readiness for advanced program areas. Class time is spent reviewing services offered by the visual communications support department.

Class 2, Credit 2 (W)

NVPP-151 Introduction to Materials and
Registration #0851-151 Processes of Photography
This course is designed for, and its enrollment is limited to, students who plan to apply to RIT's School of Photographic Arts and Sciences. Students are introduced to the technical and theoretical aspects of photography, including variability, tone reproduction, photo chemistry, color, and light. These skills prepare them to meet the challenges of a similar course in the School of Photographic Arts and Sciences.

Class 2, Credit 2 (S)

NVPP-161 Preparation for the School of
Registration #0851-161 Photographic Arts and Sciences
This course is designed for, and its enrollment is limited to, students who plan to apply to RIT's School of Photographic Arts and Sciences. Through a variety of photographic assignments, students learn creative and technical photographic skills. They also practice academic skills such as test taking, time management, classroom participation, understanding instructions, and use of support services that are essential to effective learning in a mainstream educational setting.

Class 2, Lab 5, Studio 5, Credit 7 (S)

NVPP-171 Machine Printing I
Registration #0851-171
Students develop basic skills for operating machine color printers and color paper processors as well as operation of a roll paper printer and miniprinter. They also learn how to set up printers, classify and print color negatives, process paper, cut prints and negatives, and inspect orders.

Lab 16, Credit 8 (F, W, S)

NVPP-172 Machine Printing II
Registration #0851-172
Students learn additional skills using the roll paper printer and miniprinter as well as how to organize work flow, sort film, set up and check printers, and monitor paper processing. (NVPP-171)

Lab 16, Credit 8 (F, W, S)

NVPP-200 Basic Color Printing
Registration #0851-200
This course introduces techniques for printing color negatives and evaluating color prints. Students learn principles of color theory and materials and relate these to making prints from color negatives. (Corequisites: NVPP-210, NVPP-220)

Lab 8, Credit 4 (F, W, S)

NVPP-201 Custom Lab Services I
Registration #0851-201
This course builds on skills learned in Basic Color Printing and Mechanized Processing. It introduces additional concepts in color negative printing, mechanized processing, and custom lab practices. (Corequisites: NVPP-211, NVPP-221) (Grade of C or better in NVPP-200, NVPP-210, NVPP-220)

Lab 8, Credit 4 (F, W, S)

NVPP-202 Custom Lab Services II
Registration #0851-202
This course, a continuation of Custom Lab Services I, introduces additional skills related to color: negative printing, mechanized processing, internegative calibration and production, quality control, and negative evaluation techniques. (Corequisites: NVPP-212, NVPP-222) (Grade of C or better in NVPP-201, NVPP-211, NVPP-221)

Lab 8, Credit 4 (F, W, S)

NVPP-203 Custom Lab Services III
Registration #0851-203
This course continues to build on concepts and skills learned in Custom Lab Services II. Topics include color analyzers, related translators, and other printing systems. In addition, students learn techniques to produce large color prints and transparencies for display use and prepare a portfolio of finished work. (Corequisites: NVPP-213, NVPP-223) (NVPP-202, NVPP-212, NVPP-222)

Class 2, Credit 2 (F, W, S)

NVPP-210 Mechanized Processing
Registration #0851-210
This course teaches students how to operate automatic processing equipment for color print, color negative, and color transparency materials. Basic process monitoring and chemical mixing are included. (Corequisites: NVPP-200, NVPP-220)

Lab 4, Credit 2 (F, W, S)

NVPP-211,212,213 Integrated Custom Lab I, II, III
Registration #0851-211,212,213
These courses offer students real and simulated custom production opportunities to prepare them for work in the photographic laboratory industry. Students practice and maintain skills learned in Custom Lab Services I, II, and III. (Corequisites: NVPP-201, NVPP-221 for NVPP-211; NVPP-202, NVPP-222 for NVPP-212; NVPP-203, NVPP-223 for NVPP-213)

Lab 4, Credit 2 (F, W, S)

NVPP-220 Print Finishing
Registration #0851-220
This course teaches students how to retouch color prints, including spatting, adjusting selected print areas, and the correction of other defects. Students practice and further develop dry mounting and other print finishing methods. (Corequisites: NVPP-200, NVPP-210)

Lab 4, Credit 2 (F, W, S)

NVPP-221 Advanced Black-and-White Printing
Registration #0851-221
This course continues the development of skills taught in Black-and-White Printing and extends skills to cover a variety of paper types and processes. Students learn the relationship between black-and-white and color printing. (Corequisites: NVPP-201, NVPP-211) (Grade of C or better in NVPP-200, NVPP-210, NVPP-220)

Lab 4, Credit 2 (F, W, S)

NVPP-222 Introduction to Slide Duplicating
Registration #0851-222
Students learn slide duplicating techniques and how to use the related equipment and sensitized materials. Evaluation methods related to slide duplication techniques also are presented. (Corequisites: NVPP-202, NVPP-212)

Lab 4, Credit 2 **(F,** W, S)

NVPP-223 Introduction to Color Copy Work
Registration #0851-223
Students learn and practice camera and calibration skills necessary for color copy work. Students use 35mm and 4 x 5 copy cameras with a variety of color film types and sizes. (Corequisites: NVPP-203, NVPP-213)

Lab 4, Credit 2 (F, W, S)

NVPP-241 Presentation Graphics I
Registration #0851-241
Students learn to use electronic tools to produce charts, graphs, and work for slide or video reproduction. Methods used to produce typography are taught and practiced and the basics of graphic composition are introduced. Good work habits are emphasized.

Lab 3, Credit 2 (F, W, S)

NVPP-242 Presentation Graphics II
Registration #0851-242
This course teaches students advanced techniques for preparing graphics as well as design principles that can be used to focus attention and convey concepts in presentation graphics. Students gain practice in the use of photostat machines, digital image typesetters, computers, and other production equipment. (NVPP-241)

Lab 6, Credit 3 (F, W, S)

NVPP-251 Presentation Graphics III
Registration #0851-251
This course prepares students to use computer applications in producing graphic displays. The use of advanced graphics packages is taught. (NVPP-242)

Lab 6, Credit 3 (F, W, S)

NVPP-261 Media Photography I
Registration #0851-261
This course provides students in the media production option with an opportunity to increase their skills with cameras, exposure, and light meters. Students are expected to use these skills to meet the needs of specific media-related assignments. Supporting skills in film processing and printing also are practiced.

Lab 6, Credit 3 (F, W, S)

NVPP-262 Media Photography II
Registration #0851-262
This course teaches advanced methods of studio and location photography for creating product, portrait, titling, and scenic images. It also teaches multi-image photography techniques. (NVPP-261)

Lab 6, Credit 3 (F, W, S)

NVPP-271 Videography I
Registration #0851-271
This course introduces students to videography, cameras, videocassette recording, editing, and lighting. Emphasis is on proper operation of video equipment for single-camera productions. Students gain hands-on experience in making a single-camera production. (NVPP-262)

Lab 6, Credit 3 (F, W, S)

NVPP-281 Slide Production I
Registration #0851-281
This course introduces students to the production of duplicate, captioned, and basic special effect slides as well as the production of slides from flat art. Emphasis is on the correct use of equipment and appropriate choice of materials. (NVPP-122, NVPP-241)

Lab 6, Credit 3 (F, W, S)

NVPP-282 Slide Production II
Registration #0851-282
This course presents advanced slide duplication techniques, filmstrip production, special effects slide variations, digital film recorders, and color correction techniques. (NVPP-281)

Lab 6 Credit 3 (F, W, S)

NVPP-283 Slide Production III
Registration #0851-283
Students calibrate and use 35mm slide duplicating film and produce intermediate special effects slides requiring computer generated mattes and countermattes. This course, which introduces the operation of basic slide programming equipment and dissolver, emphasizes quality control and testing of film and materials. (NVPP-262, NVPP-282)

Lab 6, Credit 3 (F, W, S)

NVPP-290 Audiovisual Equipment Applications
Registration #0851-290
Students learn to set up, operate, and maintain the various types of recorders, optical cameras, projectors, computers, and electronic accessories commonly used in media and media production. Identification and application of various projection and audio formats also are covered.

Lab 4, Credit 2 (F, W, S)

NVPP-296 Media Production Workshop I
Registration #0851-296
Students apply previously learned skills to user-oriented media projects in a simulated work environment where the emphasis is on good work habits, material use, working with others, and professionally produced media products. Students use job tickets and interact with clients. (NVPP-251, NVPP-271, NVPP-282)

Lab 12, Credit 6 (F, W, S)

NVPP-299 ' Co-op Work Experience
Registration #0851-299

Credit 0(F,W,S, Su)

NVPP-301 Advanced Lab Services Printing I
Registration #0851-301
Students begin working with advanced color printing techniques and calibrate representative equipment and sensitized materials. They also learn color slide, negative, and print monitoring systems as well as corrective/prescriptive actions for these processes. (Corequisite: NVPP-314) (Grade of C or better in NVPP-203, NVPP-213, NVPP-223)

Lab 8, Credit 4 (F, W, S)

NVPP-302 Advanced Lab Services Printing II
Registration #0851-302
Students continue to build advanced color printing skills. Specialized techniques such as masking, multiple printing, replenishment and processor utilization calculations, and advanced theories related to these topics are covered. (Corequisite: NVPP-315) (Grade of C or better in NVPP-301, NVPP-314)

Lab 8, Credit 4 (F, W, S)

NVPP-303 Advanced Custom Lab Services III
Registration #0851-303
This course emphasizes critical color printing skills and techniques and presents additional color theory. Students work to develop portfolios that reflect their technical skills. (Corequisite: NVPP-316) (Grade of C or better in NVPP-302, NVPP-315)

Lab 8, Credit 4 (F, W, S)

NVPP-314,315,316 Integrated Custom Lab IV, V, VI
Registration #0851-314,315,316
These courses provide students with real and simulated custom production work. Students practice and maintain skills learned in Advanced Custom Lab Services I, II, and III. (Corequisite: NVPP-301 for NVPP-314; NVPP-302 for NVPP-315; NVPP-303 forNVPP-316)

Lab 4, Credit 2 (F, W, S)

NVPP-343 Presentation Graphics IV
Registration #0851-343
In this course, students produce graphics for slide and computer applications and prepare multicell graphics for optical effect slides. A series of graphs is designed for computer application. (NVPP-251)

Lab 6, Credit 3 (F, W, S)

NVPP-352 Presentation Graphics V
Registration #0851-352
In this course, students continue to solve graphic problems and use computer graphic systems as tools to create presentation graphics. (NVPP-343)

Lab 6, Credit 3 (F, W, S)

NVPP-372 Videography II
Registration #0851-372
This course teaches operation of television studio cameras, lighting, switching, and digital titling. Students gain experience working in a television studio and control room. Post-production techniques are taught, and productions are made. (NVPP-271)

Lab 6, Credit 3 (F, W, S)

NVPP-373 Videography III
Registration #0851-373
This course combines single-camera remotes with studio productions and teaches advanced post-production techniques. Students produce their own television programs and are encouraged to try new video techniques. (NVPP-372)

Lab 6, Credit 3 (F, W, S)

NVPP-384 Slide Production IV
Registration #0851-384
This course emphasizes the production of advanced special effects slides and introduces the production of in-camera matte techniques and the creation of animation sequences. Optical and digital cameras are used for slide production. (NVPP-283)

Lab 6, Credit 3 (F, W, S)

NVPP-385 Slide Production V
Registration #0851-385
In this course, students produce a catalog of special effects slides and document slide production procedures, materials, and equipment. (NVPP-384)

Lab 6, Credit 3 (F, W, S)

NVPP-396 Media Production Workshop II
Registration #0851-396
This course, taken in the last quarter of the program, requires practical solutions to problems in presentation graphics, still photography, computers, television, and slide production. Students must produce appropriate media materials when given projects in a typical work environment. Portfolios are expanded. (NVPP-352, NVPP-373, NVPP-385)

Lab 12, Credit 6 (F, W, S)

NVPP-397 Media Seminar
Registration #0851-397
This course, taken during the last quarter of the associate degree option in media production, provides a relevant framework for students' previous media production courses. It also prepares students for continued growth on the job by emphasizing new directions in media production. Students may study independently a topic agreed upon with their instructor. Portfolios are expanded. (NVPP-352, NVPP-373, NVPP-385)

Class 1, Lab 5, Credit 2-6 (F, W, S)

NVPP-399 Independent Study
Registration #0851-399

Credit Variable

Printing Production Technology

NVCR-100 Printing Production Career Exploration
Registration #0822-100
This course explores printing as a career choice to help students make well-informed decisions regarding the area in which they will concentrate their studies. Students receive opportunities to explore their interest in printing through hands-on experiences with printing equipment and tools. Although non-technical in nature, this course does provide opportunities for students to increase their awareness of necessary printing skills, the industry as a whole, the program, and expectations of the printing production technology department. Technical areas of study include composition and paste-up, reproduction photography, stripping and platemaking, and press and finishing.

Lab 2, Credit 1 (F, W, S)

NVCR-141 Page Creation Methods—Level I
Registration #0822-141
This course prepares students to be paste-up artists and photolettering machine operators. Students learn the use of layout grids, adhesives, and mechanical drawing tools. State-of-the-art headline and special effect typographic equipment is used and maintained. The course includes an introduction to direct input phototypesetters.

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-142 Fundamentals of Reproduction
Registration #0822-142 Photography—Level I
This course prepares students to be entry-level camera operators. Workers with this job title make films and paper prints used in the preparation of printed products. Students learn chemical mixing, lith and rapid access tray processing, machine processing, basic contact printing, basic halftone negative and print production, camera maintenance, and how to determine basic exposures and change copy size.

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-143 Basic Film Assembly and
Registration #0822-143 Platemaking—Level I
This course prepares students to be single-color strippers and platemakers in the offset printing industry. Students learn single-color stripping, including halftones, tints, reverse and surprint type, manual step, and various signature impositions. Students learn to use contact and duplicating film and proofing methods to calibrate, expose, and process subtractive and direct photo plates.

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-144 Basic Lithographic Duplicator Operation—Level I
Registration #0822-144
This course prepares students to be duplicator operators. Included is instruction on various duplicators that are widely used by in-plant and commercial printers. A systematic method of preparation, operation, and maintenance is emphasized. The operation of small power stitchers, paper drills, paper cutters, and commercial type folders is taught.

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-170,269,270,271,272 Production Printing I, II, III, IV, V
Registration #0822-170,269,270,271,272
The production printing laboratory sequence is a simulated work experience in which each student is expected to work from a job ticket. Job procedures, good skills, production rates, and work habits are emphasized. Previously learned skills are reinforced. The complexity of jobs increases in each production course. (NVCR-170 for NVCR-269; NVCR-269 for NVCR-270; NVCR-270 for NVCR-271; NVCR-271 for NVCR-272)

Lab 4, Credit 2 (F, W, S)

NVCR-251 Computerized Typesetting—Level II
Registration #0822-251
This course prepares students to be keyboard and phototypesetter operators. Special keyboard functions of various machines are presented and practiced for familiarity. Special function codes are used to drive different phototypesetters. Complete operation of several phototypesetters is taught. (Touch-typing skills, NVCR-141)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-252 Electronic Publishing—Level III
Registration #0822-252
This course teaches students with advanced keyboarding procedures for complex typographic formats, including skills in telecommunication with computers and word processors. The layout and paste-up skills learned in Page Creation Methods are used in new, more complex applications. (Touch-typing skills, NVCR-251)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-254 Computer Publishing Methods—Level IV
Registration #0822-254
This advanced course in electronic publishing methods and techniques emphasizes paint/draw programs, interactive and format-based page makeup, image scanning, special effects typography, and elementary PostScript programming. (NVCR-252)

Class 2, Lab 6, Credit 5 (F, W, S)

NVCR-255 Advanced Halftone and Line Technique—Level II
Registration #0822-255
This course prepares students to be camera operators. Graduates with this job title can do advanced line photography, halftones, 50 percent dot placement for tone reproduction, related contacting, proofing, and film processing as required by in-plant printing departments, newspapers, and commercial printing companies. (NVCR-142)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-2S6 Color Separation Methods—Level III
Registration #0822-256
This course prepares students to be color separators, color scanner operators, and dry-dot etchers. Graduates with these job titles can make duotones, direct color separations, color corrections by dry-dot etching, required color proofs, and with limited on-the-job training, operate a color scanner. (NVCR-255)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-257 Color Scanning Methods—Level IV
Registration #0822-257
This course prepares students to enter the printing industry as color scanner operators. Areas of study include copy evaluation, color separation of transparencies and reflection copy, scanner linerization, scanning problem copy, color proofing and correction, gray component replacement, and color separation for different reproduction methods. (NVCR-256)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-261 Flat Color Film Assembly—Level II
Registration #0822-261
This course continues students' preparation for the offset printing industry. Students leam skills necessary for stripping, proofing, and platemaking flat color. Skills learned include multitone and multicolor work using tints, duotones, special effects, and spot color. Students use a precision pin register system throughout the stripping, proofing, and platemaking operations for all jobs. Additional skills include determining imposition planning and quality control systems for film, proof, and plate exposures and processing. (NVCR-143)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-262 Process Color Film Assembly—Level III
Registration #0822-262
This course teaches students process color stripping procedures and considerations. Included are various methods of aligning negatives, stripping multiple sets on the same form, matching color using process color tints, stripping reverse and surprint type in process color areas, split-page/form stripping, making spread and choked negatives and positives, and making composite negatives and positives. (NVCR-161)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-263 Film Assembly Systems and Quality Control—Level IV
Registration #0822-263
This course continues the study of process color film assembly techniques and related applications. Areas of study include computer-aided masking methods, use of a precision line-up table, web offset film assembly considerations, quality control targets, and auto stripping/register systems. (NVCR-262)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-265 Lithographic Press Operator—Level II
Registration #0822-265
This course is an introduction to the small press. Systematic methods of small press preparation and operation are taught. Students learn how to read and use a micrometer. Adequate practice time is provided for students to reach a level of competence required for placement as beginning press operators. (NVCR-144)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-266 Advanced Lithographic Press—Level III
Registration #0822-266
This course emphasizes the use of close registration systems. Four-color process printing is done, but not at normal production rates. Students learn how to use a packing gauge and are instructed in the use of a densitometer for measuring ink densities. Opportunity to gain sufficient skills to do routine troubleshooting is provided. (NVCR-265)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-267 Production Presswork—Level IV
Registration #0822-267
This course continues the study of lithographic press operation in a production-related setting. Areas of study include blanket squeeze and its effect on image length, systematic methods of solving press-related problems, and development of production skills. It reinforces skills developed in prerequisite press courses. The course simulates on-the-job training, using sheet-fed single- and multicolor offset presses. (NVCR-266)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-299 Co-op Work Experience
Registration #0822-299

Credit 0 (Su)

NVCR-399 Independent Study
Registration #0822-399

Credit Variable

Division of Communication Programs

English

Entry Courses

NCPN-100 Ideas in English/A
Registration #0862-100
This course includes work on basic English sentence structure for reading, writing, speaking, and speechreading; practice with vocabulary and comprehension skills needed to read about contemporary topics; and the use of writing to report events. English Learning Center assignments are required. "Die course is for students with basic English skills. (Corequisite: NCPH-136)

Class 5, Lab 2, Credit 4 (F)

NCPN-103 English in American Life
Registration #0862-103
This is a summary course that integrates four communication skills—reading, writing, grammar, and vocabulary. Materials in each area provide reinforcement, follow-up activity, or context for the three other areas. To this end, grammar and vocabulary are contained in the reading assignments; reading provides inspiration for the writing assignments; and writing assignments contain vocabulary and structures taught in the grammar portion. English Learning Center assignments are required. This course is for students with low to intermediate English skills.

Class 4, Lab 2, Credit 4 (F)

NCPN-105 Social Issues
Registration #0862-105
This English course is designed to help students develop better reading and writing skills. Social issues such as child abuse and drug misuse are discussed. Students have opportunities to improve communication skills by completing a variety of vocabulary, grammar, and writing exercises. Summary writing is stressed and is preceded by a variety of writing exercises. English Learning Center assignments are required. This course is for students with intermediate to high English skills.

Class 3, Lab 2, Credit 4 (F)

NCPN-107 Language Structure in Written English
Registration #0862-107
This course provides students with instruction and practice in using appropriate language structures for different writing purposes. The course has three parts: reading and studying the content and meaning of different modes of writing; analyzing and practicing the various grammatical and structural strategies used in different modes; and writing and editing papers in the various modes. Generally, descriptive, narrative, and several forms of expository writing are reviewed. This course is appropriate for students with high-level English skills.

Class 4, Credit 4 (F)

Integrative Courses

NCPN-110 Ideas in English/B
Registration #0862-110
In this course, students study English grammar for compound and beginning complex sentences. Reading materials and vocabulary practice include world knowledge needed for college learning. Students are expected to write paragraphs and longer compositions about reading materials and short films. English Learning Center assignments are required. (NCPN-100)

Class 5, Lab 2, Credit 4 **(W)**

NCPN-111 Ideas in English/C
Registration #0862-111
In this course, students work on English needed for college reading and writing activities. Students study complex sentences and advanced verb patterns, reading for understanding, summarizing information, and communicating ideas clearly in longer writing assignments. English Learning Center assignments are required. (NCPN-110)

Class 5, Lab 2, Credit 4 (S)

NCPN-112 Writing for Different Purposes
Registration #0862-112
In this course, students use English skills to organize ideas and solve problems in situations related to their technical coursework in college and to their employment environments after graduation. Students are expected to work individually and in small groups to read and prepare written descriptions, requests, recommendations, and short reports. (California Reading Test score of 6.5-8.5, 12 credits of NTID English, one year in an area of specialization)

Class 3, Credit 3 **(W, S)**

NCPN-113 Verbs and Complements
Registration #0862-113
This course deals with verb tense, agreement, and active and passive voice. It includes a detailed study of complementation, which involves the writing of several short passages. Students also work on vocabulary development. (NCPN-174, California Reading Test score of 8.0-10.0, Michigan Test score of 55-70)

Class 4, Lab 1, Credit 4 (S)

NCPN-114 Reading English Dialogue
Registration #0862-114
This course is designed to help students improve their skills in writing English and using English words. It provides instruction in two areas: the use of verbs in different kinds of sentences and the independent analysis of vocabulary words. There is heavy emphasis on reading with practice also in writing skills. English Learning Center assignments are required. (California Reading Test score of 7.0-9.0, Michigan Test score lower than 60)

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

NCPN-118 Self-Expression
Registration #0862-118
In this course, students explore communication and self-expression through discussions; viewing films; reading materials; and practicing reading, writing, signing, and speechreading. The course uses vocabulary and structural forms that are common in social, academic, and professional situations. Vocabulary clues, reading skills, and descriptive phrases are important parts of this course. English Learning Center assignments are required. (California Reading Test score higher than 7.5)

Class 4, Lab 2, Credit 4 (W)

NCPN-119 Mass Communication
Registration #0862-119
This course utilizes selections from literature and current newspaper and magazine articles to give students an idea of the power of language and to teach them sentence structure and paragraph organization in popular literature. English Learning Center assignments are required. (California Reading Test score higher than 7.5)

Class 4, Lab 2, Credit 4 (W)

NCPN-120 English and the Arts
Registration #0862-120
This course uses vocabulary and structural forms common in social, academic, and professional situations as well as slides and reading materials that provide an opportunity to practice complex sentence forms. Students learn idioms and verb forms in connection with art history and photojournalism. English Learning Center assignments are required. (California Reading Test score higher than 7.5)

Class 4, Lab 2, Credit 4 (S)

NCPN-121 Improving Vocabulary Through Reading
Registration #0862-121
This course is a continuation of English in American Life. The focus is on integrating the four communication skills—reading, writing, vocabulary, and grammar. Vocabulary, grammar, and writing assignments are based exclusively on the readings and are intended to provide continual follow-up, review, and support for material learned. English Learning Center assignments are required. (NCPN-103)

Class 4, Lab 2, Credit 4 (W)

NCPN-122 Quantitative Concepts
Registration #0862-122
This course teaches students vocabulary and sentence structures that are used in mathematical word problems. Students practice reading, writing, and performing calculations for word problems dealing with subjects that include wages, taxes, working hours, and cost of products. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)

Class 4, Lab 2, Credit 4 (F)

NCPN-123 Famous Scientists
Registration #0862-123
This course teaches students vocabulary and sentence structures that are used in technical reading and writing. Students read a textbook covering the lives of famous scientists, then practice reading and writing biographical information about these people. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)

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

NCPN-124 The Earth and Universe
Registration #0862-124
This course examines vocabulary and sentence structures used in technical reading and writing. Students read textbooks covering various topics in geology and astronomy. Electronic media is used to practice reading and writing compositions on geology and astronomy. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)

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

NCPN-125 Library Research for Writing
Registration #0862-125
This course teaches library techniques for writing research papers and helps students develop vocabulary, sentence structure, and composition skills. Students read textbooks about libraries and writing, visit the library several times, and write one or more college research papers. Classroom lectures cover card, microfiche, and computer catalogs; indexes; organizing and outlining ideas; and word processing as applied to research papers, including h6w to prepare footnotes and bibiliographies. (California Reading Test score of 8.0-10.0)

Class 4, Credit 4 (F,W,S)

NCPN-131 Changing World
Registration #0862-131
This course reviews parts of speech, selected phrases and clauses, and kinds of sentences. It applies this review to the practical task of understanding a variety of texts related to the theme of idealism and reality in American life. Texts have included *Of Mice and Men*, "I Have a Dream," personal accounts of communal living, and a science fiction short story. English Learning Center assignments are required. (NCPN-105)

Class **3,** Lab 2, Credit 4 (F, W, S)

NCPN-132 Medical Issues
Registration #0862-132
This is an advanced technical English course designed to help students develop better reading and writing skills. Students discuss medical issues, including the cause, spread, and prevention of disease, and have opportunities to become familiar with the language of everyday medical science. English Learning Center assignments are required. (NCPN-105)

Class **3,** Lab 2, Credit 4 (S)

NCPN-133 Visual Arts
Registration #0862-133
Students in this course read a variety of texts that develop the human dimensions of issues related to photography. The course stimulates students to improve their English through use of captioned and uncaptioned slides; famous photos, including shots of Iwo Jima and Kent State; song lyrics; and art. English Learning Center assignments are required. (NCPN-105)

Class 3, Lab 2, Credit 4 (W)

NCPN-134 **Beginning Scientific English**
Registration #0862-134
This course introduces students to a broad range of topics related to the technical aspects of society. Emphasis is placed on developing reading skills, acquiring new vocabulary in context, and skimming and scanning procedures. This course is most useful to engineering and science students. English Learning Center assignments are required. (California Reading Test score higher than 8.0, Michigan Test score higher than 60)

Class 3, Lab 2, Credit 4 (F, W)

NCPN-135 **Writing Scientific English**
Registration #0862-135
In this course, designed to improve reading and writing skills, students discuss measurements, dimensions, and properties of objects used in experiments. General technical reading and grammar skills also are used. Homework includes writing short compositions, letters, and laboratory reports. This course is recommended for engineering and science students. English Learning Center assignments are required. (California Reading Test score higher than 8.0, Michigan Test score higher than 60)

Class 3, Lab 2, Credit 4 (W, S)

NCPN-136 **American Experiences**
Registration #0862-136
This integrative course focuses on the theme of alienation in American society. The course requires students to read and discuss articles or a novel, do vocabulary work, complete comprehension exercises, and write compositions related to the articles or novel. English Learning Center assignments are required. (NCPN-105)

Class 3, Lab 2, Credit 4 (W, S)

NCPN-144 **Clear Thinking and Writing**
Registration #0862-144
This critical thought course includes critical reading, using language for personal analysis, writing for persuasive purposes, and studying the vocabulary of inference and implication. (NCPN-107)

Class 4, Credit 4 (W, S)

Emphasis Courses—Reading

NCPN-150 **English in Context**
Registration #0862-150
This course focuses on reading a novel and discussing the structures of English involved in the description of location (setting) and sequence of events (plot) in a narrative. It also touches on the organization and sequencing of facts in a composition. (California Reading Test score of 7.0-9.0)

Class 2, Credit 2 (F, W, S)

NCPN-152 **Reading a Novel**
Registration #0862-152
This course, which emphasizes the reading process, offers instruction in the elements of a novel. It provides experience in discussing and writing about a novel in terms of its setting, characterization, and conflict. To encourage reading for details, drawing conclusions, and making inferences, the course also provides experience with an interactive computer novel. (California Reading Test score lower than 8.5)

Class 3, Credit 3 (F, W, S)

NCPN-153 **Reading for Language Learning**
Registration #0862-153
This course is designed to help students use reading as a means of improving general English skills. The course emphasizes the skills involved in controlling reading processes to improve understanding and in learning new information while reading. Students learn the skills involved in using dictionaries and encyclopedias to increase world knowledge while reading. Some of the reading assignments involve the use of interactive computer materials that require problem solving and use of information during the reading process. (California Reading Test score of 7.0-9.0, Michigan Test score higher than 50)

Class 3, Credit 3 (F, W, S)

NCPN-155 **Reading for Comprehension**
Registration #0862-155 **in the Liberal Arts**
This course allows students to practice college reading skills while they learn vocabulary and develop reading strategies for learning abstract ideas and acquiring information. Materials in this course emphasize important background knowledge and vocabulary useful for a variety of liberal arts courses while sampling from traditional liberal arts disciplines such as anthropology, history, religion, and science. Vocabulary units include key concepts from these disciplines. The course includes practice reading and studying textbooks, outlining, taking lecture notes, and using reference books to provide background knowledge and help in solving reading comprehension problems. (California Reading Test score higher than 9.2 or grade of A or **B** in another reading emphasis course)

Class 3, Credit 3 (F, W, S)

NCPN-156 **Literature Seminar**
Registration #0862-156
This course involves reading novels or short stories based on a specific theme. The course helps students become interactive, reflective, and thoughtful readers. Interaction between students and instructors helps students gain a cultural and historical perspective. (California Reading Test score higher than 9.0)

Class 3, Credit 3 (F, W, S)

Emphasis Courses—Vocabulary

NCPN-160 **Vocabulary Through ASL**
Registration #0862-160
This course is for students whose preferred method of communication is American Sign Language (ASL). The course is designed to develop ability and confidence in translating ASL vocabulary into English equivalents. It includes translation principles, ASL vocabulary items, and English idioms. (ASL knowledge, rating of 4 or 5 on the Sign Instruction Placement Interview)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPN-161 **Business Vocabulary**
Registration #0862-161
In this course, students read nine stories about famous business people/inventors. Each week, more than 60 vocabulary words are chosen for students to use in practice exercises and games, and weekly tests are given on half of these words. Other exercises include weekly reading comprehension, determination of anaphoric references, derivational morphology, and some inductive syntax. All vocabulary, grammatical, morphological, and anaphoric exercises relate to the context of the readings. (California Reading Test score higher than 8.0)

Class 3, Lab 2, Credit 4 (S)

NCPN-162 Vocabulary/Dictionary Skills
Registration #0862-162
This course helps students develop self-reliant methods for improving their vocabulary. To achieve the course's primary goal of developing advanced dictionary skills, students use the *Longman* and *Merriam-Webster* dictionaries. (California Reading Test score of 7.5-9.9, Michigan Test score of 60-80)

Class 2, Credit 2 (F, W, S)

NCPN-163 English Idioms
Registration #0862-163
This course is designed to help students understand and use common English idioms. Students are encouraged to bring to class for discussion idioms that they encounter. Idioms are discussed and practiced in context. Activities include written assignments and student participation. (California Reading Test score higher than 8.5)

Class 2, Credit 2 (F, W, S)

NCPN-164 Popular Film and English
Registration #0862-164
This course is designed to expose students to popular films and readings related to films in order to develop vocabulary skills and general world knowledge. Students then use the vocabulary in essays that express opinions about a variety of film genres. By viewing captioned films, students are introduced to the concept of genre and leam about the connection between film and literature. (California Reading Test score higher than 9.0, Michigan Test score higher than 65, or completion of a writing emphasis course with grade of B or better or permission of instructor)

Class 4, Lab 4, Credit 4 (F, S)

NCPN-171 Introduction to Complex Sentences
Registration #0862-171
This course is designed to improve English skills for constructing sentences and using new vocabulary. It provides instruction in two areas: the structure of sentences with two verbs and a connector and the analysis of independent vocabulary words. The course concentrates on improving written communication and developing reading skills. English Learning Center assignments are required. (NCPN-100)

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

NCPN-173 Basic English Phrase Structure
Registration #0862-173
This course emphasizes grammar and deals with phrase structure, including noun and verb phrases. Gerunds also are introduced. Students are required to read a short novel and work on vocabulary development.

Class 4, Lab 1, Credit 4 (F)

NCPN-174 Adverbials and Basic Clause Structure
Registration #0862-174
This course emphasizes grammar and deals with adverbials, including single-word and adverb phrases; basic clause structure, including adjective and adverb clauses; and noun clause complements. Students also are introduced to coordination. In addition, students are required to read a short novel and work on vocabulary development. (NCPN-173)

Class 5, Lab 1, Credit 4 (W)

NCPN-175 English Phrase Structure
Registration #0862-175
This course, the first in a sequence of two, deals with parts of speech and phrase structure, including noun, verb, adjective, and adverb phrases. In addition, students are required to read a short novel and work on vocabulary development. This course is not for students who have completed Verbs and Complements, Basic English Phrase Structure, or Adverbials and Basic Clause Structure. (California Reading Test score of 7.0-8.5, Michigan Test score of 55-65)

Class 4, Lab 1, Credit 4 (F, W, S)

NCPN-176 English Clause Structure, Tense, and
Registration #0862-176 Passive Voice
This course, which emphasizes grammar, is the second in a sequence of two. It deals with English clause structure, including adjective, adverb, and noun clause complements. Coordination also is introduced, and verb tense, agreement, and active and passive voices are covered. In addition, students are required to read a short novel and work on vocabulary development. (NCPN-175)

Class 4, Lab 1, Credit 4 (F, W, S)

NCPN-178 English Discourse Grammar
Registration #0862-178
This course is designed to help students better express ideas in written English. Two hours a week, formal grammar is studied, including the semantic function of sentence constituents and classical grammar (fragments, run-ons, pronoun reference, subject/verb agreement, consistent tense, etc.). One hour each week is devoted to composition, which then is evaluated for discourse and grammar components. One hour each week is devoted to reading for comprehension through grammatical cues (passive voice, tense, etc.). (NCPN-107)

Class 4, Credit 4 (W, S)

Emphasis Courses—Writing

NCPN-180 Basic Composition
Registration #0862-180
The course provides instruction in composition writing at the basic level. It focuses on the areas of English sentence structures for composition coherence, development of a more flexible vocabulary, and practice with different styles of composition organization. Students write compositions based on nonverbal films and discuss the areas mentioned above. (Michigan Test score lower than 60)

Class 2, Credit 2 (F, W, S)

NCPN-181 Organizing Paragraphs
Registration #0862-181
This course offers instruction and practice in developing short, well-organized compositions. The course focuses on two areas: intensive practice in developing specific writing skills, such as topic sentences, detail (supporting) sentences, outlining, and transition words; and learning to use different composition styles such as description, classification, cause/effect, comparison/contrast, and personal opinion. (California Reading Test score higher than 7.5, Michigan Test score higher than 55, or NCPN-180)

Class 2, Credit 2 (F, W, S)

NCPN-183 Essay Writing
Registration #0862-183
This course focuses on the development of essay writing skills. Essays provide the basis for many types of writing, including proposals, research papers, and memos. Skill in writing essays also is required for the liberal arts curriculum. This course reviews basic paragraph structure, structure of essays, how to express a view or opinion, and how to defend it logically with reason or examples. (California Reading Test score higher than 8.5, Michigan Test score higher than 60, or grade of B or better in NCPN-181)

Class 3, Credit 3 (F, W, S)

NCPN-187 Creative Writing
Registration #0862-187
This course is designed for students who need or want to improve their creative thinking and writing skills. The focus of the course is on stories and poetry. Students learn the mechanics of short stories and poetry and participate in assignments designed to improve their ability to think and write using imagination, imagery, descriptions, and feelings. (Michigan Test score higher than 60)

Class 2, Credit 2 (F, W, S)

NCPN-188 Practical Writing
Registration #0862-188
This course is designed to help students become skilled in practical, everyday writing. Students practice writing directions, forms, letters, notes, memos, ads, and reports that may be encountered in both the workplace and their personal lives. The emphasis is on form, content, and special grammatical structures necessary for professional writing. (Michigan Test score of 50-65)

Class 3, Credit 3 (F, W, S)

NCPN-189 Professional Writing
Registration #0862-189
This course examines various types of letters, memos, and reports that students may encounter in the workplace. The emphasis is on form, content, and special grammatical structures necessary for professional writing. (Michigan Test score higher than 65)

Class 3, Credit 3 (F, W, S)

NCPN-399 Independent Study
Registration #0862-399
This course is designed for students with special needs that cannot be met by another English course. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should talk to their communication advisor.

Credit 1-4 (F, W, S)

Sign Communication

NCPX-101 Sign Communication I
Registration #0863-101
This course is designed to assist students with no previous sign communication skills in developing both receptive and expressive skills in basic American Sign Language (ASL) and natural sign English for both academic and social environments. The course includes conversational vocabulary, fingerspelling, grammatical principles, and cultural aspects of the deaf community. Also, strategies for use of sign language and speech together are discussed and practiced. (Sign Instruction Placement Interview [SIPI] rating of 1 or Language Background Questionnaire [LBQ] rating of 1 or 2)

Class 3, Credit 3 (F, W, S)

NCPX-103 Sign Communication II
Registration #0863-103
This course is designed to assist students in continuing their development of both receptive and expressive skills in ASL and natural sign English for academic and social settings. The course strengthens students' skills and knowledge with additional conversational sign vocabulary, grammatical principles, and cultural aspects of the deaf community. The focus is on developing expressive and receptive skills in dialogues and short presentations. Practice in using sign language and speech together is included. (SIPI 2 or grade of C or better in NCPX-101)

Class 2, Credit 2 (F, W, S)

NCPX-105 Sign Communication III
Registration #0863-105
This course is designed to assist students in continuing their development of receptive, expressive, and conversational skills in advanced ASL and natural sign English for both academic and social settings. The course continues to strengthen students' skills and knowledge with advanced vocabulary, grammatical principles, and cultural aspects of the deaf community. The focus is on the development of receptive skills in dialogues and presentations. Continued practice with use of sign language and speech together is included. (SIPI 3 or grade of C or better in NCPX-103)

Class 2, Credit 2 (F, W, S)

NCPX-111 American Sign Language
Registration #0863-111 for Sign English Users
This course is designed to assist students who use sign English in developing expressive and receptive ASL skills. Study of ASL historical, cultural, and linguistic information is included. (SIPI 3 or 4 or grade of C or better in NCPX-105)

Class 2, Credit 2 (F, W, S)

NCPX-131 Signing Basic English Idioms
Registration #0863-131
This course is designed to assist students in developing their skills in using natural sign English and ASL to receive and express English idioms. Also, strategies for effective use of these sign skills to assist in reading and writing English idioms are discussed and practiced. (SIPI of 4 or 5 or LBQ 4 or 5, English status: Marginally Qualified or Preparatory)

Class 2, Credit 2 (F, W, S)

NCPX-133 Signing Idiomatic English
Registration #0863-133
This course is designed to assist students in developing their skills in using natural sign English and ASL to receive and express English idioms. Also, strategies for effective use of these sign skills to assist in reading and writing English idioms are discussed and practiced. (SIPI of 4 or 5 or LBQ 4 or 5, English status: Proficient (PF) or Provisionally Qualified (PQ))

Class 2, Credit 2 (F, W, S)

NCPX-141 Understanding American Sign Language
Registration #0863-141 as a Language
This course is designed to assist students in developing basic knowledge about the linguistic structure of ASL. Also, basic information about the historical and cultural aspects of ASL is introduced and discussed. (SIPI 5, Michigan Test score higher than 59)

Class 2, Credit 2 (F, W, S)

NCPX-151 How to Use an Interpreter
Registration #0863-151
This course is designed to assist students in becoming better educated consumers of interpreting services. Aspects of interpreting discussed include: history of the Registry of Interpreters for the Deaf (RID); RID code of ethics; roles, rights, and responsibilities of all people involved in interpreting situations; laws relating to interpreters and services; pay scales for interpreters; and types of interpreting (oral, manual, combined, simultaneous, and consecutive). Practicum experience is provided. (SIPI 3,4, or 5 or LBQ 4 or 5)

Class 2, Credit 2 (F, W, S)

NCPX-161 Introduction to Sign Language Teaching
Registration #0863-161
Students are given an overview of how languages traditionally have been taught and the current methods and theories and their applications to sign language. Students practice basic teaching techniques, selecting appropriate materials, designing curriculum and evaluations, teaching cultural information, and including grammatical features in lessons. Students leam about resources to support their efforts to teach sign language. (SIPI 4 or 5, NCPX-141)

Class 2, Credit 2 (F, W, S)

NCPX-399 Independent Study
Registration #0863-399
This course is designed for students with special needs not met by other sign communication courses. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should consult their communication advisor.

Credit 1-4 (F, W, S)

Speech-Language-Hearing Center

Audiology

NCPU-101 Strategies and Speech
Registration #0861-101
This introductory course is recommended for students interested in speech therapy. It is designed to help students improve communication with people who do not know sign language. The course introduces basic speech and speechreading concepts as well as a variety of alternative communication strategies. Particular emphasis is placed on oral strategies to facilitate communication. (Speech score higher than 3.0, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-103 Survival Strategies for the Basic
Registration #0861-103 Speechreader
This course is designed to help students improve their communication with people who do not know sign language. Students are introduced to speechreading and leam a variety of alternative communication strategies. Particular emphasis is placed on writing as a means of facilitating communication. (Speech score lower than 3.0, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-105 Practicing Communication Strategies
Registration #0861-105
This course provides review, practice, and integration of newly acquired listening, speechreading, speech, and strategy skills. It is a follow-up course for students who have completed any basic speechreading or strategy courses. Students role play a variety of everyday and work-related situations with people who do not know sign language. Overall communication success is evaluated by both students and instructor using a videotape format. Students also leam how to use these communication skills to succeed in basic conversations and conflict situations with non-signers. (One of the following: NCPH-177, NCPU-101, NCPU-103, NCPU-155, or NCPU-157; speechreading score [with or without sound] lower than 35 percent)

Class 2, Credit 2, (F, W, **S)**

NCPU-115 Communication for the Job Interview:
Registration #0861-115 Writing
This course focuses on improving the communication aspect of the job interview through a series of practice interviews. It is designed for students who have difficulty communicating during an interview. This course is appropriate for students who prefer to use writing to communicate during the interview. For students with speech scores higher than 3.0, the speech-language department offers Communication for the Job Interview: Speaking. (NGGE-101, speech score lower than 3.0)

Class 2, Lab 1, Credit 2 (W,S)

NCPU-118 Orientation to Hearing Aids and Listening
Registration #0861-118
This course is for students who have not used a hearing aid in a long time. It provides information about hearing aids and an opportunity to use them in supportive and structured situations. It also exposes students to the benefits of amplification through listening practice. This course meets twice for class lecturing and listening practice and once for individual hearing aid evaluation/listening laboratory practice each week. (Recommendation by audiologist, new earmold, $50 fee upon acceptance of new hearing aid)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-120 Auditory Training for Auditory Profile 1
Registration #0861-120 and 2 Students
This auditory training course is designed to help students leam the meaning of sound. Since students in the first two auditory profiles often are part-time hearing aid users, the major goal is to help them become better listeners. Students meet three times each week to participate in both group and individual practice listening for syllables, stress, and duration. Practice with these materials helps students' speechreading skills. Environmental sound training, with special emphasis on warning sounds and music, also is included. (Use of hearing aid, auditory profile of 1 or 2)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-130 Auditory Draining I for Profile 3 Students
Registration #0861-130
The goal of this course is acquisition of listening skills. Listening materials include words, sentences, short stories, and songs. Development of vocabulary skills is integrated into all listening activities. Classes meet twice weekly and a weekly one-hour laboratory is held for additional listening activities and lectures on topics related to audition and amplification. (Auditory profile of 3, use of amplification all or most of the time, speechreading score [with or without sound] higher than 34 percent)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-135 Auditory Training II for Profile 3 Students
Registration #0861-135
This course is a continuation of Auditory Training I for Profile 3 Students in which auditory training is continued for the acquisition of listening fluency and comprehension. (NCPU-130, auditory profile of 3, use of amplification all or most of the time, speechreading score [with or without sound] higher than 34 percent)

Class 2, Lab 2, Credit 2 (F, W, S)

NCPU-140 Auditory Training I for Profile 4 and 5 Students
Registration #0861-140
The focus of this course is to help students acquire listening fluency and auditory comprehension skills. Classes meet twice weekly for group listening activities, group discussions, and lectures on special topics related to audition and amplification. A one-hour listening laboratory is held weekly for individual listening activities. Auditory activities for this course include books and short stories on audiotapes, music listening, and speech perception in noise. Vocabulary skill development also is emphasized. (Auditory profile of 4 or 5, use of amplification all or most of the time)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-145 Auditory lYaining II for Profile 4 and 5 Students
Registration #0861-145
This course is a continuation of Auditory Training I for Profile 4 and 5 Students. The focus of the course is to continue auditory training for the acquisition of listening fluency and auditory comprehension skills. Vocabulary skill development is emphasized, and listening activities include music and books on audiotape. Special emphasis is placed on auditory skills and strategies for successful communication in social and vocational situations. Classes meet twice weekly for group lectures, discussions, and listening activities, and a one-hour laboratory is held weekly for individual listening activities. (NCPU-140, auditory profile of 4 or 5, use of amplification all or most of the time)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-155 Speechreading and Listening
Registration #0861-155
This course develops reception of words, everyday sentences, and on-the-job social sentences by using speechreading and listening. Some auditory-only exercises are done in class and for laboratory assignments. Knowledge of strategies and associational cues is reviewed. (NCPU-101 or NCPU-103, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70, auditory profile higher than 1, use of amplification in class and lab)

Class 2, Lab 2, Credit 2 (F, W, S)

NCPU-157 Speechreading and Strategies
Registration #0861-157
This course is designed to help students use their visual skills to understand speakers. Students practice interpreting verbal and nonverbal information, facial expressions, eye glances, gestures, and body movements as people talk. Practice activities include speech reading and listening to individual words and everyday sentences. Students may be required to speechread hearing people during a practice interview. (Speechreading score [with or without sound] lower than 35 percent, Michigan Test score higher than 69)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-160 Intermediate Speechreading
Registration #0861-160
In this course, speechreading and listening are used to help students understand sentences and short paragraphs. Strategies to assist communication are reviewed and practiced in conversational interviews with hearing staff members. (Speechreading score [with or without sound] of 35-60 percent, Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-167 Receptive Technical Communication
Registration #0861-167
This course uses an experiential learning approach to help students improve their ability to understand other people in technical on-the-job situations. Deaf faculty and staff members share their own communication strategies and discuss the importance of attitude for effective communication. Students gain experience in various communication settings and develop personal goals/ strategies through discussions with peers. Practice materials include vocabulary sentences and paragraphs from students' areas of specialization. Primary emphasis is on the use of communication strategies for spoken language, with secondary emphasis on written language. (Speechreading score [with or without sound] of 35-60 percent, completion of at least three quarters in program of study)

Class 2, Lab 1, Credit 2 (W, S)

NCPU-168 Receptive Social/Academic Communication
Registration #0861-168
This course uses an experiential learning approach to help students improve their ability to understand other people in social and academic settings. Deaf faculty and staff members share their own communication strategies and discuss the importance of attitude for effective communication. Students develop personal goals/strategies through discussions with peers. Practice materials include vocabulary, sentences, and paragraphs commonly found in social and academic environments. Primary emphasis is on the use of communication strategies for spoken language, with secondary emphasis on written language. (Speechreading score [with or without sound] of 35-60 percent, Michigan Test score higher than 69)

Class 2, Lab 1, Credit 2 (F, W)

NCPU-170 Advanced Speechreading: Non-Technical
Registration #0861-170
The intent of this course is threefold: to improve students' ability to speechread in noisy environments and to speechread difficult speakers, to develop factual knowledge to optimize receptive communication skills, and to develop useful strategies for communicating with hearing people. Students are challenged by a variety of speechreading exercises with and without sound. They learn pronunciation techniques, practical strategies for communicating in social and job environments, and skills for speechreading sentences and paragraphs. Class participation is strongly emphasized. (Speechreading score [with or without sound] higher than 60 percent, use of amplification in class and lab)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-177 Technical Speechreading and Speech
Registration #0861-177
This course is designed to help students improve their speech and speechreading of technical vocabulary associated with their areas of specialization. This is a small-group class, with one discussion hour, one individual practice hour, and one homework laboratory hour weekly. Group discussions are provided on work communication, strategies, associational cues, and interviews. Individual practice includes speechreading key vocabulary as well as sentences and short paragraphs from technical areas of specialization. Students also practice pronouncing technical vocabulary with a speech instructor during individual practice hours. (Speech score higher than 3.0, speechreading score [with or without sound] higher than 60 percent, pass vocabulary test on first day of class, completion of at least three quarters in program of study)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-178 Technical Speechreading and Strategies
Registration #0861-178
This course helps students improve their speechreading of technical vocabulary in their areas of specialization. It focuses on the use of writing strategies for communicating at work. The class consists of a small group with one discussion hour, one individual practice hour, one homework hour, and up to two laboratory hours weekly. Group discussions are provided on work communication strategies, associational cues, and job interviews. Individual practice includes speechreading key vocabulary, sentences, and short paragraphs from technical areas of specialization. Students also practice writing strategies with the instructor during individual practice hours. (Speech score higher than 3.0, speechreading score [with or without sound] higher than 60 percent, pass vocabulary test on first day of class, completion of at least three quarters in program of study)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-180 Telecommunication Aids
Registration #0861-180
This course teaches students about regular telephones and different kinds of telecommunication devices for the deaf (TDDs). Students use TDDs to make long-distance and emergency calls and appointments. They leam what to do if they have a bad connection or are disconnected. Each student makes calls using amplifiers and pay telephones. They are taught special codes for listening and speaking on the telephone. (Auditory reception score below 40 percent)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-186 Telephone Communication
Registration #0861-186
This course is offered to help students improve their ability and confidence in using the telephone with strangers. Students leam a variety of techniques, including the best way to use their hearing aids with the telephone, how to make long-distance calls, get information, make appointments over the telephone, and what to do if they have problems or an emergency. Students practice using special strategies to improve their talking and listening over the telephone. They also practice with pay phones. Students are required to practice making telephone calls every week. The instructor works with each student individually during four special appointments. (Speech score higher than 3.4, auditory reception score higher than 40 percent, telephone in room or apartment, use of amplification all or most of the time, completion of at least two quarters in program of study)

Class 2, Lab 1, Credit 2 (F, W, S)

NPCU-399 Independent Study
Registration #0861-399
This course is designed for students with special needs that cannot be met by another communication course. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in taking an independent study must talk to their communication advisor.

Credit 1-3 (F, W, S)

Speech-Language

NCPH-101 Speech Therapy I
Registration #0860-101
This course helps students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours per week and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. Students practice words, phrases, sentences, and conversations. (Speech priority rating of C)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-102 Speech Therapy II
Registration #0860-102
This course is designed to help students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours per week and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. (Therapist's recommendation, NCPH-101)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-103 Speech Therapy III
Registration #0860-103
This course is designed to help students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. (Therapist's recommendation, NCPH-102)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-115 Pronunciation A
Registration #0860-115
Students practice pronunciation of vocabulary through the use of *Merriam-Webster Dictionary* **and knowledge of pronunciation rules. (Speech score of 2.0-3.5)**

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-116 Pronunciation B
Registration #0860-116
Students practice independent pronunciation of vocabulary through the use of *Merriam-Webster Dictionary* **and knowledge of pronunciation rules. (Speech score higher than 3.5)**

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-120 Speech and Listening Lab I
Registration #0860-120
This course is appropriate for students who wish to improve articulation, listening, and self-monitoring skills. Students meet with a speech instructor to establish goals. Students work individually at their own pace using a variety of prerecorded audiotapes. The speech instructor monitors students and provides feedback. (Speech scores higher than 3.S, auditory reception score higher than 16 percent)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-121 Speech and Listening Lab II
Registration #0860-121
This course is a continuation of Speech and Listening Lab I. Students continue to work on speaking and listening skills. (Recommendation from instructor of NCPH-120)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-124 Speech Improvement Using Songs and Poems
Registration #0860-124
In this class, students use singing and poetry readings to improve their speech. Exercises in pitch control, loudness control, and breath support are used to improve voice, vocal quality, and listening skills. (Speech score higher than 3.0 and auditory reception score higher than 16 percent)

Class 2, Lab 1, Credit 2 (S)

NCPH-130 Strategies for Organizing Word Knowledge/A
Registration #0860-130
The purpose of this course is to introduce strategies for organizing word knowledge. The course helps students better understand the relationships among words, including similarities, differences, classification, association, analogies, and different ways to order words in rank and degree. (California Reading Test score lower than **8.5)**

Class 2, Credit 2 (F, W, S)

NCPH-132 Vocabulary Development
Registration #0860-132
In this course, students use a workbook, textbook, and computer laboratory practice to develop vocabulary. Students develop strategies to determine vocabulary meaning through use of contextual clues and knowledge of prefixes and suffixes. (Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-133 Understanding Vocabulary in Context
Registration #0860-133
This course focuses on and develops students' ability to determine the meaning of unfamiliar words encountered in everyday reading. Students identify specific types of vocabulary difficulties in their reading. Using newspaper and magazine articles in class, students practice word attack skills based on context. Implications; connotations; and a knowledge of prefixes, suffixes, and roots are used to determine meaning in reading passages. (Michigan Test score higher than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-136 Spoken Language Learning I/A
Registration #0860-136
This course focuses on the use of spoken English to express information effectively. Students who have some intelligible speech will practice basic patterns of English structures, including asking and answering questions, conveying basic information, and brief descriptions. This course uses a text and workbook for grammar development and the self-instruction laboratory for speech and speechreading practice. (Corequisite: NCPN-100) (Speech score higher than 3.0, California Reading Test score lower than 7.0)

Class 2, Lab 1, Credit 2 (F)

NCPH-137 Spoken Language Learning II/A
Registration #0860-137
This course focuses on using spoken English correctly in the organization and expression of personal experiences. Practice is provided in some common complex sentence forms. Students who have grammatical errors that interfere with the intelligibility of their spoken message should take English for Speech **I** prior to this course. This course uses the self-instruction laboratory for speech and speechreading practice. (NCPH-136)

Class 2, Lab 1, Credit 2 (W)

NCPH-138 Spoken Language Learning I/B
Registration #0860-138
This course focuses on the use of spoken English to express information effectively. Students who have some intelligible speech practice basic patterns of English structures, including asking and answering questions and conveying basic information and brief descriptions. (Speech score higher than 3.0, California Reading Test score of 7.1-8.5)

Class 2, Lab 1, Credit 2 (F)

NCPH-139 Spoken Language Learning II/B
Registration #0860-139
This course focuses on using English correctly in the organization and expression of personal experiences. Practice is provided in some common complex sentence forms. Students who have grammatical errors that interfere with the intelligibility of their spoken message should take Spoken Language Learning **IB** prior to this course.

Class 2, Labi, Credit 2 (W)

NCPH-140 Spoken Language Learning I/C
Registration #0860-140
This course focuses on the use of spoken English to express information effectively. Students who have some intelligible speech practice basic patterns of English structures, including acting and answering questions and conveying basic information and brief descriptions. (Speech score higher than 3.0, California Reading Test score higher than 8.5)

Class 2, Lab 1, Credit 2 (S)

NCPH-160 Interpersonal Communication
Registration #0860-160
This course helps students become aware of the communication process and their role in it. Students examine their communication skills and evaluate how successfully they communicate expressively and receptively. Students develop strategies to help them take control and communicate effectively in social and employment situations. Some traditional interpersonal communication concepts are discussed, including first impressions, opinions, points of view, clarification of information, problem solving, anger, assertiveness, and consideration. Classes include lectures, discussions, laboratories, films and videos, and role playing. (Recommendation of speech pathologist)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-162 Building Relationships Through
Registration #0860-162 Communication/A
This course helps students develop effective interpersonal communication skills and confidence. Students come to understand related concepts and develop skills in the following areas: first impressions, perception, self-disclosure, provision and use of feedback, listening, sharing opinions, conflict resolution, and assertiveness. An experiential approach is used, including structured experiences, role playing, and journal writing. (Speech score lower than 3.0)

Class 2, Credit 2 (F, W, S)

NCPH-163 Building Relationships Through
Registration #0860-163 Communication/B
This course helps students develop effective interpersonal communication skills and confidence. Students come to understand related concepts and develop skills in the following areas: first impressions, perception, self-disclosure, provision and use of feedback, listening, sharing opinions, conflict resolution, and assertiveness. An experiential approach is used, including structured experiences, role playing, and journal writing. (Speech score higher than 3.0)

Class 2, Credit 2 (F, W, S)

NCPH-170 Group Presentation
Registration #0860-170
This course helps students improve their ability to search for, organize, and present information to groups. It includes topic selection, library research, organizing, outlining written reports, and making presentations to an audience. Activities include a library tour, discussions, evaluations of speeches, and information regarding interpreting. (Speech score higher than 3.S, California Reading Test score higher than 7.0)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-171 Public Speaking
Registration #0860-171
This course is designed to refine and increase presentation ability by giving further experience in researching and organizing information for presentation to different audiences. Presentations focus on topics related to hearing impairment and its effect on communication, psychosocial development, and habilitation. Students can serve as presenters representing NTID. The course is highly recommended for students enrolled in social work and those preparing for managerial positions. Students should have some experience in public speaking before taking this course. (Speech score higher than 4.0, California Reading Test score higher than 10.0)

Class 2, Lab 1, Credit 2 (W, S)

NCPH-172 Group Discussion Techniques
Registration #0860-172
This course develops an awareness of group process and interaction. It introduces the principles and techniques necessary for successful communication in group discussions and other complex situations (e.g., interviewing). Group dynamics and leading and participating in groups are taught. Topics for group discussions include social and job-related situations. (Speech score higher than 4.0, speechreading score [with or without sound] higher than 65 percent, California Reading Test score higher than 9.0)

Class 2, Credit 2 (F, W, S)

NCPH-175 Conversational Speech
Registration #0860-175
Students develop skill and confidence functioning as both speakers and listeners in oral/aural conversations using appropriate discourse rules. Students develop an awareness of the characteristics of an effective conversationalist, improve their self-knowledge, and set goals toward becoming effective conversationalists. Students also develop vocabulary and pronunciation skills and refine speech skills. Current issues are used as conversational topics. The course is structured to promote learning and reliance on individual and peer feedback. (Speech score higher than 3.0, sp'eechreading score [with or without sound] higher than 36 percent, Michigan Test score higher than **60)**

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-177 Strategies to Aid Functional Communication
Registration #0860-177
This course is suitable for students who want to develop and practice receptive and expressive strategies to aid in oral/aural communication with a non-signing person. Students develop strategies for communicating in specific dialogue situations, such as renting an apartment and ordering food in a restaurant. Class activities focus on speaking, speechreading, and using strategies in specific functional situations. Laboratory work includes viewing videotapes and practicing speech. Students produce and critique videotapes of simulated situations. Journals are used to describe out-of-class conversational practice. (Speech score of 1.9-3.1, speechreading score [with or without sound] higher than 34 percent, Michigan Test score higher than 50. This course is not appropriate for students with severe voice disorders as noted by a speech-language pathologist)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-178 Communication for the Job Interview: Speaking
Registration #0860-178
This course focuses on improving the communication aspect of the job interview through a series of practice interviews. It is for students who have difficulty communicating during an interview. The focus of this course is on using speech effectively. Students with some speech skills and who prefer to use them during an interview are appropriate for this course. Communication for the Job Interview: Writing, offered through the audiology department, is available for students who prefer to use writing durihg an interview. (Completed one year in program, speech score higher than 3.0, NGGE-101)

Class 2, Lab 1, Credit 2 (W, S)

NCPH-399 Independent Study
Registration #0860-399
This course is designed for students with special needs that cannot be met by another communication course. Students are required to write a contract describing what the course will cover and their responsibilities. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should talk to their communication advisor.

Credit 1-4 (F, W, S)

NCPT-118 Seminar in Adventitious Deafness
Registration #0864-118
This course is intended to provide students who have an acquired hearing loss with an understanding of their deafness, educationally, socially, culturally, and communicatively. Communication strategies for social and classroom settings are discussed and discussion of feelings, attitudes, and issues related to the psychosocial and cultural implications of deafness are stressed. (NCPX-101 or interview with instructor)

Class 2, Discussion Group 1, Credit 3 (F, W, S)

Division of General Education Programs

Educational Interpreting

NITP-200 Sign Vocabulary Development
Registration #0850-200
This course allows students to develop, expand, and refine sign vocabulary skills that prepare them for future courses in interpreting. Vocabulary introduced includes at least 300 signs.

Class 1, Lab 1, Credit 1

NITP-203 American Sign Language I
Registration #0850-203
This required course concentrates on development of basic knowledge of and beginning skills in conversational use of American Sign Language (ASL). Students describe ASL as it fits into a general language model. Students learn to recognize and accurately produce ASL sentence types with appropriate non-manual behaviors and grammatical features.

Class 2, Lab 2, Credit 3

NITP-204 American Sign Language Interpreting I
Registration #0850-204
This required course uses skills and principles learned in American Sign Language I and II. Students practice interpreting from English to ASL using consecutive interpreting. Using the body of knowledge available from foreign language interpreting, students examine the theoretical aspects of the interpreting process. (NITP-206)

Class 1, Lab 4, Credit 3

NITP-205 American Sign Language Interpreting II
Registration #0850-205
This skills-development elective course provides experience in simultaneous and consecutive interpretation. Activities include simulated interpreting experiences, interpreting practice with the use of audio- and videotapes, and critiques. (NITP-204)

Class 1, Lab 4, Credit 3

NITP-206 American Sign Language II
Registration #0850-206
This required course develops conversational fluency in ASL. Students incorporate appropriate use of ASL classifiers, non-manual grammatical markers, and grammatical features of ASL in a conversational setting. (NITP-203)

Class 2, Lab 2, Credit 3

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.

Lab **6,** Credit 3 **(F)**

NITP-211 Voice Interpreting I
Registration #0850-211
This course increases students' ability to receive the spoken and signed messages of hearing-impaired people and refines students' ability to use vocal modulation to prepare for the voice interpreting task. This is a self-paced laboratory course. Students learn by viewing videotapes and completing a series of exercises. The videotapes contain hearing-impaired people communicating orally, in signed English, and in ASL. (NITP-210)

Class 2, Lab 2, Credit 3

NITP-212 Voice Interpreting II
Registration #0850-212
This course develops students' ability to generate a spoken English equivalent while viewing/listening to a hearing-impaired person's signed/spoken message. This is a self-paced laboratory course. (NITP-211, NITP-331)

Class 1, Lab 4, Credit 3

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 people are delivered at a faster rate than those in Voice Interpreting I and II. This is a self-paced laboratory course. (NITP-212)

Class 1, Credit 3

NITP-251,252 Aspects and Issues of Deafness I, II
Registration #0850-251,252
Students learn the communication and psychosocial/cultural aspects of deafness through panel and class discussions, readings, and field trips. (NITP-251 for NITP-252)

Class 3, Credit 3

NITP-261 Theory and Practice of Interpreting I
Registration #0850-261
This course addresses the current theory and practices of the profession of interpreting. Topic areas include: general communication principles and their application to the interpreting task; the history of the profession of interpreting; different types of interpreting and related terminology; general skills required in interpreting and current applications by professional interpreters; overview of the professional code of ethics and its rationale; population serviced by interpreters, (e.g., hearing-impaired speechreaders, deaf-blind individuals, and multiply disabled individuals); resources related to interpreting and mainstreaming available to students; and current issues facing the professional (e.g., multiple roles and mainstreaming specialists).

Class 3, Credit 3

NITP-262 Theory and Practice of Interpreting II
Registration #0850-262
Students use a communication process model to acquire a theoretical base for the interpreting task. Topics addressed are linguistic principles associated with sign language and the interpreting task as well as skills in positioning and lighting. This course includes lectures and student participation in small and large group activities. (NITP-261)

Class 3, Credit 3

NITP-271 The Professional Interpreter I
Registration #0850-271
Students develop a broad understanding of interpreting as a profession, national standards for certification, and the concepts contained in the Registry of Interpreters for the Deaf code of ethics. Other areas of concentration are interpersonal skills, self-critique, professional development, and r6sum6 writing. Coursework includes panels, role playing, discussions, readings, and lectures.

Class 3, Credit 3 (S)

NITP-281 Interpreting Practicum I
Registration #0850-281
This course provides an opportunity to acquire knowledge about the profession of interpreting through observation of and discussion with professional interpreters. The practicum student is assigned a mentor who will supervise the practicum experience. (Corequisite: NITP-283) (NITP-211, NITP-251, NITP-262, NITP-271, NITP-331)

Class 10, Credit 5 (F, W, S)

NITP-283 Interpreting Seminar I
Registration #0850-283
This course is designed as part of the practicum experience. Students come together and share observations and experiences gained from the practicum placement. Class discussion focuses on analyzing ethical or situational problems, behavioral alternatives, and outcomes. (Corequisite: NITP-281)

Class 2, Credit 1 (F, W, S)

NITP-311,332 Expressive Transliterating I, II
Registration #0850-331,332
These two courses concentrate on expressive transliteration as it relates to conceptually accurate English. Students develop skills required to present a spoken message in a signed English mode. Emphasis is placed on conceptual accuracy, accuracy of fingerspelling, vocabulary development, facial expression and body movement, and self-critiquing skills. (NITP-205 for NITP-331; NITP-331 for NITP-332)

Class 2, Lab 2, Credit 3 (F, S)

NITP-342 Deaf-Blind Interpreting
Registration #0850-342
Students are prepared to interpret for deaf-blind consumers. Topics concerning deaf-blindness include causes and effects, aspects and issues of deaf-blindness, information and resources, and interpreting modes and methods of communication. (NITP-212, NITP-271, NITP-331)

Class 3, Credit 3

NITP-343 Expressive Oral Interpreting/ Transliterating
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 is placed on speech production principles, natural gestures, body language, facial expressions, and speed of transmission. (NITP-252)

Class 3, Credit 3

NITP-372 The Professional Interpreter II
Registration #0850-372
Students develop a broad understanding of interpreting as a profession, national standards for certification, and the concepts contained in the Registry of Interpreters for the Deaf code of ethics. Other areas of concentration are interpersonal skills, self-critique, professional development, and rdsumd writing. Coursework includes panels, role playing, discussions, readings, and lectures. (NITP-271)

Class 3, Credit 3

NITP-382 Interpreting Practicum II
Registration #0850-382
This course provides the opportunity to integrate skills and knowledge through practicum situations. Experiences are gained by observation and actual interpreting in a variety of settings. Practicum students are assigned mentors who supervise the practicum experience. (Corequisite: NITP-384) (NITP-212, NITP-252, NITP-332, NITP-372, NITP-395)

Class 12, Credit 5 (F, W, S)

NITP-384 Interpreting Seminar II
Registration #0850-384
This course is designed as part of the practicum experience. Students come together and share observations and experiences gained from the practicum placement. Class discussion focuses on analyzing ethical or situational problems, behavioral alternatives, and outcomes. (Corequisite: NITP-382) (NITP-212, NITP-252, NITP-372, NITP-395)

Class 2, Credit 1 (F, W, S)

NITP-391 Principles of l\itoring/Notetaking
Registration #0850-391
This course prepares students to provide tutoring and notetaking support for hearing-impaired people in mainstream educational settings. The methodology is appropriate for elementary, secondary, and postsecondary education levels. (NITP-251)

Class 3, Credit 3

NITP-392 Tlitoring/Notetaking Practicum
Registration #0850-392
Students provide tutoring and notetaking services to hearing-impaired students. A minimum of 10 hours per week is devoted to taking notes in class and tutoring outside of class. Practicum sites include the Rochester City School District, 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 (F, W, S)

NITP-395 Mainstreaming: Educational Programs and Alternatives
Registration #0850-395
This course explores the goals and processes of education of hearing-impaired people and covers current demographic, legal, economic, and social trends affecting education of hearing-impaired people. Students identify criteria and processes for the establishment of quality support services for hearing-impaired students. (NITP-251)

Class 3, Credit 3

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 non-educational settings where the support service provider has more than one major responsibility. Presentations by people with practical experience in the field enhance students' awareness of what it means to be a support service professional. (NITP-281, NITP-283, NITP-391, or permission of instructor)

Class 3, Credit 3

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 occur in the field, this course addresses "state-of-the-art" issues. Some examples are court decisions, state and federal legislation, research findings, development of new techniques or technology, in-service training programs for faculty members and service providers, and management of support services. The course is offered as new topics arise or if a lecturer with specific expertise in support services is available to conduct the course. (NITP-281, NITP-392, or permission of instructor)

Class 1-3, Credit 1-3 (S)

NITP-399 Independent Study
Registration #0850-399
NITP-205, NITP-252, NITP-262, NITP-331, NITP-391, or permission of instructor)

Credit 1-3

Other courses offered within NTID and RIT may be taken as electives if students have interests outside the educational interpreting program and time .available to take them. For information on these courses and the process for registering for them, students should see their educational interpreting academic advisor.

General Education

Required Courses

NGGE-100 or NAPS-100 Freshman Seminar
Registration #0847-100 or #0853-100
This course is designed to provide entering students with opportunities to enhance intellectual, academic, personal, social, and ethical decision-making skills in order to maximize their college experience. Students have opportunities to explore and negotiate the college environment, expand critical thinking skills, learn and use academic skills, confront questions of identity and social roles, and deal with ethical issues with faculty members and senior-level students who serve as mentors.

Class 3, Credit 2 (F, W)

NGGE-101 Job Search Process
Registration #0847-101
This course is designed for students who are preparing for their first co-op experience or permanent job. Students learn about r£sum£ writing, employment letters, sources of employment information, job applications, interviews, and ways to find a job. Learning activities include lectures and written assignments.

Class 2, Credit 1 (F, W)

NGGE-102 Life After College
Registration #0847-102
This course, designed for students in their last year, provides information that will help them after they graduate. Topics include budgeting, housing, birth control, and keeping a job. Learning activities include lectures, videotapes, and individual conferences with the instructor.

Class 2, Credit 1 (F, W, S)

Elective Courses

Career/Job Development

NGGE-160 SIGI Decision Making
Registration #0847-160
This course helps students learn about themselves and about potential careers by using the career computer SIGI. Topics are decision making, value clarification, and self-assessment. Activities include lectures, discussions, small-group activities, and presentations.

Class 2, Credit 2 (F, W, S)

NGGE-161 Career Decision Making
Registration #0847-161
This course, designed for students who are not sure about their educational and career goals, teaches them how to plan careers and lives. Work is on an individual or small-group basis. Activities include independent study, field trips, role playing, lectures, and discussions.

Class 2, Credit 2 (F, W, S)

NGGE-163 Interpersonal Relationships on the Job
Registration #0847-163
This course teaches students the importance of good work relationships to careers. Topics include employer-employee relationships, co-worker relationships, and how work relationships affect job satisfaction. Activities include role playing, discussions, and presentations

Class 2, Credit 2 (F, W, S)

Fine Arts and Humanities

History

NGGE-148 Deaf Heritage
Registration #0847-148
This course examines many topics related to deafness. Students survey "the deaf experience" from ancient times to the present by tracing the social and cultural heritage of deaf people and by examining important events and developments. Deaf individuals who have made important and remarkable contributions and achievements also are studied.

Class 3, Credit 3 (F, W, S)

NGGE-149 **American Past**
Registration #0847-149
This course gives students an understanding of American history, beginning in 1607 and continuing through the 20th century. It introduces students to a history of the country's past (heritage) and helps prepare them for the personal responsibilities of good citizenship in contemporary society.

Class 2, Credit 2 (F, W, S)

NGGE-201 **European History**
Registration #0847-201
This course is an introduction to political, social, and cultural history from 1600 through the 20th century and serves as a bridge to Modern European History offered in the College of Liberal Arts. Emphasis is placed on the major historical developments that have influenced the development of modern Europe.

Class 3, Credit 3 (W)

NGGE-202 **Current Events Seminar**
Registration #0847-202
This course examines the major news events as they occur through identification of underlying issues and their historical foundations.

Class 3, Credit 3(F)

Language and Literature

NGGE-215 **Introduction to Dramatic Literature**
Registration #0847-215
This course provides a basic introduction to dramatic literature as well as a bridge to the study of dramatic literature in the College of Liberal Arts. It introduces students to the play script as literature and to play script analysis, focusing on vocabulary and basic skills.

Class 3, Credit 3 (F, W)

NGGE-216 **Introduction to Prose Literature**
Registration #0847-216
This course serves as a survey course for students desiring a basic knowledge of prose fiction and nonfiction and as a bridge to the study of prose in the College of Liberal Arts. It introduces students to the genres of the short story, novel, autobiography, and essay.

Class 3, Credit 3 (W)

NGGE-218 **Written Communication I**
Registration #0847-218
This course is designed for students who need to improve their reading and writing skills before entering Written Communication II. Using a variety of readings and topics, students develop the language and thinking skills needed to write effectively. Specifically, students learn the conventional structures of paragraphs and essays; generate ideas through a variety of invention strategies; use basic development techniques and order choices in writing; use a variety of analytic strategies for both reading and writing; and write paragraphs and essays using narration, exposition, and summary forms. (Appropriate score on NTID Liberal Arts Placement Test)

Class 3, Credit 4 (F, W, S, Su)

NGGE-219 **Written Communication II**
Registration #0847-219
This course is designed for students planning to take English Composition and who need an introduction to the basic concepts of good writing. Using a variety of readings and topics, students develop the language and thinking skills needed to write effectively. Specifically, students learn the conventional structures of documented reports; generate ideas through a variety of invention strategies; review basic development techniques and order choices and learn more complex forms; use a variety of analytic strategies for both reading and writing; enhance critical thinking skills by recognizing assumptions, overgeneralizations, oversimplifications, etc.; and write essays using exposition, summary, critique, persuasion, and argumentation forms. (NGGE-218 or appropriate score on the NTID Liberal Arts Placement Test)

Class 3, Credit **4** (F, W, S, Su)

Religion

NGGE-145 **The Bible as Literature: A Cultural**
Registration #0847-145 **and Historical Perspective**
This course provides a basic understanding of the contents of the Bible. It presents some of the major events and themes, and focuses on the cultural and historical circumstances in which the biblical literature grew. Students with a variety of religious interests may take this course. The course does not approach the literature from any particular belief or lack thereof.

Class 2, Credit 2 (F)

NGGE-150 **Our Judeo-Christian Heritage**
Registration #0847-150
This course gives students an understanding of the historical and literary roots of two major religions of the world, Judaism and Christianity. The foundations of Western culture also are explored. A study of these roots begins with a geographical and sociological view of the Ancient Near East 6,000 years ago and continues with a study of factors that encouraged the later development of Jewish/Christian religious thought and understanding. Students have an opportunity to become more familiar with their own heritage so that they can better form values, opinions, and answers to religious questions in their own lives.

Class 2, Credit 2 (F, W, S)

Interdisciplinary

NGGE-166 **The Human Experience:**
Registration #0847-166 **An Individual Life**
This course introduces the major challenges faced by human beings throughout the life cycle. It explores the factors that affect healthy and unhealthy adjustments to the circumstances of an individual's life, including biological inheritance, thoughts, feelings, and environment. Students examine contemporary issues related to the challenges of adolescence, adulthood, and old age in order to understand how unconscious adjustment and conscious decision making help in attaining and maintaining psychological health. Selected contemporary issues are explored through self-reflection; group discussions; writing; examination of scientific, literary, and periodical materials; guest speakers; and campus and community activities. Alternative solutions to life's challenges are generated, shared, and evaluated by students. Through these experiences, students are introduced to the knowledge, communication skills, and critical-thinking skills important for making responsible decisions throughout their adult lives. (Permission of department chairperson or instructor)

Class 4, Credit 4 (F,W,S)

NGGE-167 **The Human Experience:**
Registration #0847-167 **The Individual and Society**
This course focuses on the individual's relationships with others, starting from a study of primary groups and moving through a study of secondary groups (peers, school, work, and citizenship groups) to a study of world awareness and responsibility. The course involves the perception and evaluation of values, morals, ethics, human rights, and responsibilities. The study of selected social issues is accomplished through self-reflection, group and panel discussions, reading of periodicals and teacher-created materials, and participation in campus and community activities. Students are introduced to the knowledge, communication skills, and critical thinking skills important for making responsible decisions throughout their lives. (NGGE-166)

Class 4, Credit 4 (F, W, S)

NGGE-168 **The Human Experience:**
Registration #0847-168 **The Individual and Technology**
This course explores the social, political, economic, and ethical dimensions of the relationship between the individual and technology in modern society. It provides a specific focus for the application of the general understanding of human development, society, and the possibilities for personal self-determination that students acquire in The Human Experience: An Individual Life and The Human Experience: The Individual and Society. Drawing on this knowledge and using the skills in communication and critical thinking that they have developed, students analyze selected current issues that affect their lives, present and future, and develop a course of responsible actions based on their analysis. This activity will be grounded in a consideration of the nature of science and technology, the role of human values in determining the course of scientific inquiry and the social uses of technology, and some major areas of controversy in this field. (NGGE-167)

Class 4, Credit 4 (F, W, S)

Mathematics and Science

NGGE-220 or NAPS-220 **Reading and Thinking in Science**
Registration #0847-220 or #0853-220 **and Technology**
This course is offered to cross-registered science and engineering students who are interested in raising their academic achievement level and to other students who wish to improve their skills and increase their knowledge in these areas. The course helps students evaluate their strengths and weaknesses in areas of thinking such as comparing, analyzing, reasoning, and problem solving. With an emphasis on making thinking overt, strategies are modeled and practiced. Expansion of both background knowledge and scientific vocabulary are additional benefits.

Class 3, Credit 3 (S)

Social Science

Economics and Political Science

NGGE-106 **Personal Finance**
Registration #0847-106
This course introduces students to basic money management. Topics for in-depth discussion are based on student interest and selected from the areas of income tax, banking, credit, budgeting, inflation, and shopping wisely to save money.

Class 2, Credit 2 (F, W, S)

NGGE-203 **Economic Basics**
Registration #0847-203
This course serves as a bridge to Introduction to Economics offered in the College of Liberal Arts. It is designed to introduce students to basic background knowledge in economic concepts and methods of analysis. Emphasis is placed on the application of basic methods of economic analysis, economic theories, and contemporary economic issues of the United States. (NTMM-142 or the equivalent is recommended)

Class **3,** Credit **3** (S)

Psychology

NGGE-105 or NAPS-105 **Learning Strategies**
Registration #0847-105 or #0853-105
This course is designed to help students evaluate their strengths and weaknesses and to improve their learning efficiency and effectiveness through appropriate training. Students have the opportunity to improve their learning skills in areas such as reading, test taking, questioning, and general study habits. Activities include lectures, discussions, and individual conferences.

Class 2, Credit 2 (F, W, S)

NGGE-108 **Drug and Alcohol Usage**
Registration #0847-108
This course is designed to give a general overview of various drugs commonly used among college-age populations. Upon completion of this course, students should be able to identify and describe the effects on the body, both short- and long-term, from using each drug covered; classification; dependence; and tolerance. Students study the following drug-related topics: social impact, peer pressure, economy of drugs, and personal values related to drugs.

Class 2, Credit 2 (F, W, S)

NGGE-109 **Adjusting to Deafness**
Registration #0847-109
This course is designed to assist students who are postlingually deafened, individuals who prefer using an oral method of communication and have had little or no contact with other hearing-impaired people, and prelingually deaf people who have grown up in hearing environments. The course covers topics about deafness, including social issues, how deafness affects individuals and their families, and ways that an individual adjusts to deafness.

Class 2, Credit 2 (F, W, S)

NGGE-111 **Basic Human Sexuality**
Registration #0847-111
This course provides information and helps students understand human sexuality. Topics addressed include feelings and attitudes toward sexuality, values, and sensitivity to the feelings of others. Activities include lectures, discussions, and projects.

Class **3,** Credit 2 (F, W, S)

NGGE-113 **Psychology and Your Life**
Registration #0847-113
This course presents a life-stages model of human development that emphasizes psychological aspects of development, including emotional, self-concept, and interpersonal relationship development. Students use this model to identify important life issues for themselves and others and also to better understand their own behavior as well as that of children, teenagers, parents, and older people.

Class 3, Credit 3 (F, W, S)

NGGE-126 Leadership Development
Registration #0847-126
This course helps students develop managerial/leadership skills. A required project and class activities assist them in improving leadership skills. Course topics include one- and two-way communication, group leadership and followership, styles of leadership, delegating responsibility, planning skills, helping behaviors, establishing goals, and problem-solving techniques.

Class 2, Credit 2 (F, W, S)

NGGE-146 Psychology of Religion
Registration #0847-146
This course is designed to help students understand how religion may relate to their lives and how they can develop a mature, reflective, and critical view of religion as a life influence. Topics for study include religion as a type of human behavior, methods of studying religious experiences, the psychology of conversion, mysticism, and human development in religious understanding and practice.

Class 2, Credit 2 (S)

Sociology and Anthropology

NGGE-112 Love, Marriage, and the Family
Registration #0847-112
This course examines the potentials and problems of married life. Students are introduced to such relevant topics as love, sexuality, singlehood, marital roles, conflict resolution, and parenting. The course challenges students to recognize their rights and responsibilities in relationships and offers them opportunities to clarify their thinking with peers and faculty members.

Class 3, Credit 3 (F, W, S)

NGGE-127 Community Service I
Registration #0847-127
This course is designed to give students an opportunity to learn some basic helping skills and to use these skills in a supervised community service experience. Students explore different volunteer and professional helping roles and use this information to make personal and career choices. Activities include lectures, discussions, volunteer service, and individual conferences.

Class 2, Credit 2 (F, W, S)

NGGE-147 Law and Society
Registration #0847-147
This course is designed to assist students in understanding the basic rules and applications of practical law as it applies to personal rights and responsibilities. Topics covered are how laws affect a society, civil rights, legal rights, torts, marriage, family relations, and criminal law. Activities include lectures and field trips.

Class 2, Credit 2 (F, W, S)

Theater

NGGT-100 Technical Theater I
Registration #0848-100
This course covers the methods and materials used in technical theater. Topics include scenery construction, properties, and the responsibilities of different theater personnel. Activities include lectures, demonstrations, discussions, and involvement in theater productions.

Class 2, Credit 2 (F, W, S)

NGGT-101 -Technical Theater II
Registration #0848-101
This is a course for students who want to learn more about technical theater. Activities include independent projects, supervision of crews, and shopwork. (NGGT-100)

Class 2, Credit 2 (F, W, S)

NGGT-102 Stage Lighting
Registration #0848-102
This course introduces students to theater lighting and teaches them how to use each piece of lighting equipment. Activities include hanging lights for plays, running the light board, and using color in lighting. (NGGT-100)

Class 2, Credit 2 (F, W, S)

NGGT-120 Acting I
Registration #0848-120
This course explores communication by using pantomime, sign mime, body language, facial expression, character study, and role playing. Students leam to perform in front of an audience with confidence and skill.

Class 2, Credit 2 (F, W, S)

NGGT-121 Acting II
Registration #0848-121
This course helps students perfect acting skills. Activities include advanced character development and preparation of scenes with a partner. (NGGT-120, permission of instructor)

Class 2, Credit 2 **(F,** W, S)

NGGT-130 Introduction to Theater
Registration #0848-130
This course, designed to teach students about theater production, encourages them to take part in theatrical experiences while they leam about acting, writing, directing, and designing (lights, scenery, costumes, make-up). Activities include lectures, demonstrations, and discussions.

Class 2, Credit 2

NGGT-131 Creative Translation into
Registration #0848-131 Sign Language
This course covers translation forms used by the department of performing arts. Students leam to translate stories, poems, and plays into American Sign Language. They also leam to present their translated works in sign. Activities include lectures, discussions, drills, and group workouts.

Class 2, Credit 2

NGGT-132 Sign Mime
Registration #0848-132
This course teaches students to translate plays, poems, and stories into sign mime. Topics include how to develop and use sign mime in theater and how to express original ideas in sign mime. Activities include lectures, demonstrations, and a laboratory.

Class 2, Credit 2

NGGT-133 Theater Practicum
Registration #0848-133
This course is for students who are accepted for a role (performance or crew) in a faculty-directed theater production. Acting students analyze a script, develop a character, rehearse, memorize, and perform. Crew students build a specific scene or costume element and serve as members of the running crew. This course may be taken more than once.

Class 3-8, Credit 1-3

NGGT-140 **Dance Performance I**
Registration #0848-140
This course teaches students the basic terminology and techniques of modem dance. Basic body structure and creative movement are studied by the class. Individuals and groups perform in the studio. Activities include lectures, demonstrations, exercises, and performances.

Class 2, Credit 2 (F, W, S)

NGGT-141 **Dance Performance II**
Registration #0848-141
This intermediate-level modem dance course teaches technique, group work, and performance standards. Activities include lectures, discussions, exercises, and performances. (NGGT-140, dance experience, or permission of instructor)

Class 2, Credit 2 (F, W, S)

NGGT-142 **Sign Dance**
Registration #0848-142
In this basic dance class that includes warm-up, barre, center, and cross-the-floor movement, sign language and modem dance become the basis from which students make compositions. Students do not need to know sign language to take the course. Activities include lectures, demonstrations, and performances.

Class 2, Credit 2

NGGT-143 **Special Topics in Dance**
Registration #0848-143
This course teaches different styles of dance. Possible topics include Afro-Caribbean dance," ballet, jazz, and tap. This course may be taken more than once.

Class 2, Credit 2 (F, W, S)

NGGT-150 **Music Introduction/**
Registration #0848-150 **Instruction Practicum**
This course helps students develop musical skills in one or more of the following areas: piano, guitar, electric bass, percussion, brass, woodwinds, strings, organ, and voice. Students may begin with basic instruction and progress to more advanced levels. Lessons are offered on an individual or small-group basis. This course may be taken more than once.

Class 2, Credit 2 (F, W, S)

NGGT-200 **Play Production I**
Registration #0848-200
This course covers the areas of script analysis, acting for the stage, and stage direction. Through lectures, demonstrations, class discussions, projects, and films, students encounter a fundamental concern of all theater artists—how to transform the printed word into living theater. The topics presented not only acquaint students with stage practices, but through contrast and comparison, clarify those areas in which television and motion-picture production require different imaginative techniques than are used for stage production.

Class 4, Credit 4 (W)

NGGT-399 **Independent Study**
Registration #0848-399

Class 3-9, Credit 1-3

Pre-Baccalaureate Studies

College of Liberal Arts Courses

Language, Literature, Communication

GLLC-220 **English Composition**
Registration #0502-220
This course develops the language skills needed to write effectively. It should be taken in the freshman year.

Class 3, Credit 4 (F, W, S, Su)

Social Work

GSWS-210 **The Professional Social Work Role**
Registration #0516-210
This course explores social work as a profession, the various fields in which social workers practice, and the differing job philosophies of human services and social work approaches. Also covered are strategies for developing self-awareness and professional self-assessment.

Class 3, Credit 4 (F)

GSWS-212 **Self-Awareness in the Helping Role**
Registration #0516-212
This course helps to develop students' helping skills in essentially three broad areas: skills in noticing or observing; observing one's professional use of self in the helping relationship and evaluating the appropriateness of such behavior; and observing the client and evaluating the effect one's response has on her/him. Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills.

Class 3, Credit 4 (W)

GSWS-216 **Introduction to Social Welfare**
Registration #0516-216
This course is designed as a beginning social work practice course. Its purpose is to introduce social work students to basic generalist helping skills. Students become more aware of their current skills in attending, responding personalizing, and initiating. They further develop these skills by learning the theory behind the skills, doing worksheets related to these skills, and practicing the skills in class through role playing and direct experience. These skills will be developed later in the course Interviewing and the Helping Relationship.

Class 3, Credit 4 (W)

GSWS-217 **Community Services**
Registration #0516-217
This beginning social work practice course is designed to develop students' basic helping skills and introduce them to service delivery systems and client systems. As volunteers, students have the opportunity to observe professional practice, be exposed to a social work setting, and interact with agency clientele.

Class 3, Credit 4 (S)

College of Science Courses

Biology

SBIB-201 **General Biology**
Registration #1001-201
This course describes the characteristics and origin of life; basic principles of modern cellular biology, including cell organelle structure; chemical basis and functions of life, including enzyme systems, respiration, and photosynthesis; and nutrient procurement in plants and animals. (Corequisite: SBIB-205)

Class 3, Credit 3 (F)

SBIB-202 **General Biology**
Registration #1001-202
This course is a study of the physiological processes of gas exchange, internal transport, osmoregulation, excretion, and hormonal control in plants and animals. The nervous system and behavior in animals also are studied. (Corequisite: SBIB-206)

Class 3, Credit 3 (W)

SBIB-203 **General Biology**
Registration #1001-203
This course includes a study of cellular and organismal reproduction; the principles of genetics and developmental biology; and an introduction to evolution and ecology. (Corequisite: SBIB-207)

Class 3, Credit 3 (S)

SBIB-205,206,207 **General Biology Laboratory**
Registration #1001-205,206,207
Laboratory work complements the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts; develop laboratory skills and techniques; and improve ability to make, record, and interpret observations. (Corequisites: SBIB-201 for SBIB-205; SBIB-202 for SBIB-206; SBIB-203 for SBIB-207)

Lab 3, Credit 1 (SBIB-205, F; SBIB-206, W; SBIB-207, S)

Chemistry

SCHA-261 **Introduction to Chemical Analysis I**
Registration #1008-261
This course offers an introduction to quantitative analysis, solubility of ionic compounds and the equilibria involved, activity concepts, and statistical treatment of data. Laboratory experiments include gravimetric and precipitation methods. (Corequisite: SCHC-251)

Class 2, Lab 5, Credit 3 (F)

SCHA-262 **Introduction to Chemical**
Registration #1008-262 **Analysis II**
This course discusses systematic treatment of acid-based equilibria, titrations, analytical oxidation-reduction processes, and complex metric methods. (Corequisite: SCHC-252) (SCHA-261)

Class 2, Lab 5, Credit 3 (W)

SCHA-263 **Introduction to Chemical**
Registration #1008-263 **Analysis III**
This course introduces electrochemical and spectroscopic methods and potentiometric and spectrometric titrations. Electrodeposition and pH measurements are included in the laboratory. (Corequisite: SCHC-253) (SCHA-262)

Class 2, Lab 5, Credit 3 (S)

SCHC-251 **General Chemistry I**
Registration #1010-251
This course includes a detailed study of fundamental tools of chemistry, atomic theory and nuclear chemistry, stiochiometry (elements, compounds, reactions), and properties of gases and thermochemistry (first law). (Corequisite: SCHA-261)

Class 3, Credit 3 (F)

SCHC-252 **General Chemistry II**
Registration #1010-252
This course describes structure and properties of the atom; periodic relationships; basic concepts of chemical bonding, kinetics, and equilibrium; and thermodynamics (free energy, second and third laws). (Corequisite: SCHA-262) (SCHC-251)

Class 3, Credit 3 (W)

SCHC-253 **General Chemistry III**
Registration #1010-253
This course describes 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; and introduction to the use of chemical literature. (Corequisite: SCHA-263) (SCHC-252)

Class 3, Credit 3 (S)

SCHG-208 **College Chemistry I**
Registration #1011-208
This course is primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stiochiometry, first law of thermodynamics, thermochemistry, electronic theory of composition and structure, and chemical bonding.

Class 4, Credit 4 (F, W)

SCHG-209 **College Chemistry II**
Registration #1011-209
This course is a continuation of College Chemistry I. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry, and the chemistry of metals. (SCHG-208)

Class 4, Credit 4 (S)

Mathematics

SMAM-204 **College Algebra and Trigonometry**
Registration #1016-204
Topics in this course include a review of the fundamentals of algebra; solution of linear, fractional, and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic, and trigonometric functions; and systems of linear equations. (Two years of high school algebra)

Class 4, Credit 4 (F, W, S)

SMAM-214 **Introduction to Calculus I**
Registration #1016-214
This course is 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, and maxima and minima. (SMAM-204 or equivalent)

Class 3, Credit 3 (F, W, S)

SMAM-215 Introduction to Calculus II
Registration #1016-215
This course, a continuation of Introduction to Calculus I, deals 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, and introduction to differential equations. (SMAM-214)

Class 3, Credit 3 (W, S)

SMAM-251 Calculus I
Registration #1016-251
This standard first course in calculus is intended for mathematics, science, and engineering students, with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter includes two-dimensional analytic geometry, functions, limits, continuity, the derivative and its formulas, and applications of the derivative. (Three years of high school mathematics)

Class 4, Credit 4 (F, W, S, Su)

SMAM-252 Calculus II
Registration #1016-252
This standard course in calculus is intended for mathematics, science, and engineering students, with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter includes anti-derivatives by various methods, the definite integral with applications to calculation of area, arc length, volumes of revolution, transcendental functions, and numerical integration. (SMAM-251)

Class 4, Credit 4 (F, W, S, Su)

SMAM-253 Calculus III
Registration #1016-253
This standard course in calculus is intended for mathematics, science, and engineering students, with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter includes improper integrals, formal limits of sequences, infinite series, Taylor series, polar coordinates, and conic sections. (SMAM-252)

Class 4, Credit 4 (F, W, S, Su)

Physics

SPSP-200 Physics Orientation
Registration #1017-200
This course is an introduction to the nature and scope of physics for freshmen interested in physics as a profession. Topics include what is physics, professional opportunities in physics, the physics profession, literature of physics, and communicating in physics. Laboratory includes safety instruction, measurement and recording techniques, graphics analysis, error analysis, and report writing. Each student presents a formal written or oral report on some topic of interest at the end of the course.

Class 1, Lab 2, Credit 2 (F)

SPSP-311 University Physics I
Registration #1017-311
This intensive course in general physics, using calculus, is for students in the sciences and engineering. Mechanics: kinematics and dynamics of a particle and rigid body; work and energy; momentum and impulse; rotational motion; oscillatory motion, and gravitation are studied. (Credit or co-registration in SPSP-251, co-registration in SPSP-371)

Class 4, Credit 4 (F, W, S)

SPSP-312 University Physics II
Registration #1017-312
This course discusses fluids and elastic properties, heat and thermodynamics, wave motion, sound, and geometrical and physical optics. (SPSP-372, credit or co-registration in SPSP-252) (SPSP-311)

Class 4, Credit 4 (F, W, S)

SPSP-313 University Physics III
Registration #1017-313
This course discusses electrostatics. Gauss' Law, electric field and potential, dielectrics, DC circuits, magnetic fields. Ampere's Law, Faraday's Law, inductance and capacitance, magnetism in matter, and AC series circuits. (SPSP-373, credit or co-registration in SPSP-253) (SPSP-312)

Class 4, Credit 4 (F, W, S)

SPSP-371 University Physics Lab I
Registration #1017-371
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-311)

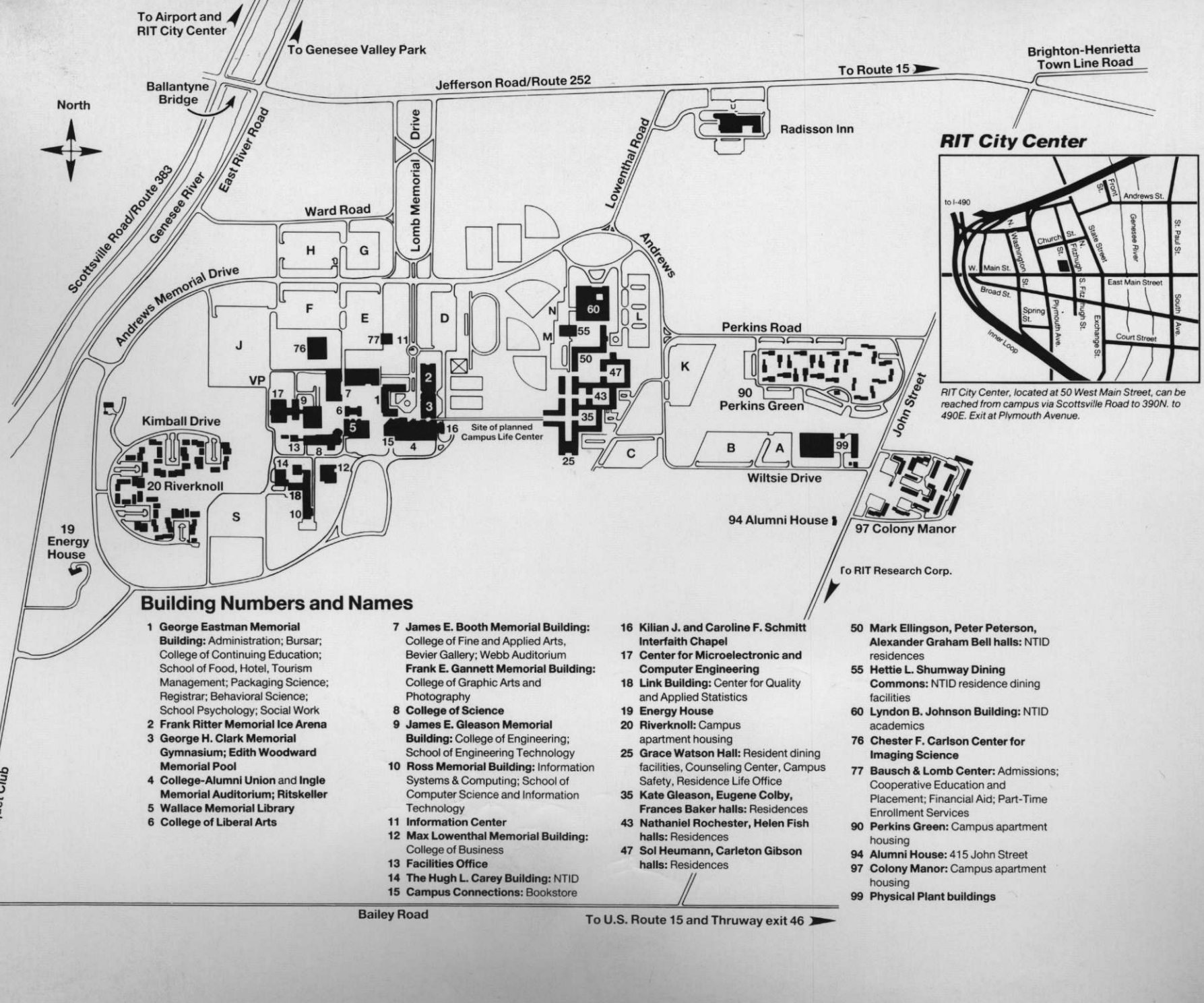
Lab 3, Credit 1 (F, W, S)

SPSP-372 University Physics Lab II
Registration #1017-372
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-312)

Lab 3, Credit 1 (F, W, S)

SPSP-373 University Physics Lab III
Registration #1017-373
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-313)

Lab 3, Credit 1 (F, W, S)



RIT City Center

RIT City Center, located at 50 West Main Street, can be reached from campus via Scottsville Road to 390N. to 490E. Exit at Plymouth Avenue.

Building Numbers and Names

1 **George Eastman Memorial Building:** Administration; Bursar; College of Continuing Education; School of Food, Hotel, Tourism Management; Packaging Science; Registrar; Behavioral Science; School Psychology; Social Work
2 **Frank Ritter Memorial Ice Arena**
3 **George H. Clark Memorial Gymnasium; Edith Woodward Memorial Pool**
4 **College-Alumni Union** and **Ingle Memorial Auditorium; Ritskeller**
5 **Wallace Memorial Library**
6 **College of Liberal Arts**
7 **James E. Booth Memorial Building:** College of Fine and Applied Arts, Bevier Gallery; Webb Auditorium
Frank E. Gannett Memorial Building: College of Graphic Arts and Photography
8 **College of Science**
9 **James E. Gleason Memorial Building:** College of Engineering; School of Engineering Technology
10 **Ross Memorial Building:** Information Systems & Computing; School of Computer Science and Information Technology
11 **Information Center**
12 **Max Lowenthal Memorial Building:** College of Business
13 **Facilities Office**
14 **The Hugh L. Carey Building:** NTID
15 **Campus Connections:** Bookstore
16 **Kilian J. and Caroline F. Schmitt Interfaith Chapel**
17 **Center for Microelectronic and Computer Engineering**
18 **Link Building:** Center for Quality and Applied Statistics
19 **Energy House**
20 **Riverknoll:** Campus apartment housing
25 **Grace Watson Hall:** Resident dining facilities, Counseling Center, Campus Safety, Residence Life Office
35 **Kate Gleason, Eugene Colby, Frances Baker halls:** Residences
43 **Nathaniel Rochester, Helen Fish halls:** Residences
47 **Sol Heumann, Carleton Gibson halls:** Residences
50 **Mark Ellingson, Peter Peterson, Alexander Graham Bell halls:** NTID residences
55 **Hettie L. Shumway Dining Commons:** NTID residence dining facilities
60 **Lyndon B. Johnson Building:** NTID academics
76 **Chester F. Carlson Center for Imaging Science**
77 **Bausch & Lomb Center:** Admissions; Cooperative Education and Placement; Financial Aid; Part-Time Enrollment Services
90 **Perkins Green:** Campus apartment housing
94 **Alumni House:** 415 John Street
97 **Colony Manor:** Campus apartment housing
99 **Physical Plant buildings**