

R · I · T

Undergraduate
Courses 1989-90

Rochester Institute of Technology • Rochester, New York

Course Numbering

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

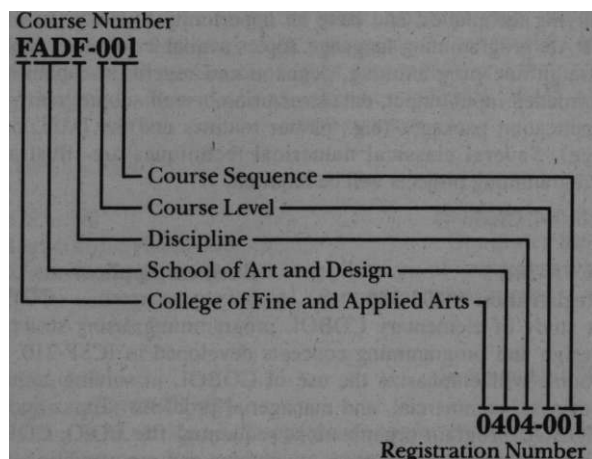
First letter: College offering the course

Second and third letters: School or department of that college

Fourth letter: Discipline

First number: Course level: 0-Non-credit; 1- Diploma; 2 or 3-Lower level degree courses; 4, 5, or 6-Upper level undergraduate degree courses; 7 or 8-Graduate courses that must be taken to satisfy undergraduate requirements.

Second and third numbers: Course differentiation and sequencing



Directly below the 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 1989-1990

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

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Table of Contents

College of Applied Science and Technology	2
School of Computer Science.....	2
Packaging Science.....	6
School of Engineering Technology.....	9
Department of Instructional Technology.....	23
School of Food, Hotel and Tourism Management.....	26
Department of Military and Aerospace Science ROTC.....	31
College of Business	33
College of Continuing Education	40
Business and the Arts.....	40
Science and Technology.....	57
College of Engineering	73
Computer Engineering.....	73
Electrical Engineering.....	75
Industrial Engineering.....	79
Mechanical Engineering.....	81
Microelectronic Engineering.....	86
College of Fine and Applied Arts	88
School of Art and Design.....	88
School for American Craftsmen.....	91
College of Graphic Arts and Photography	95
School of Photographic Arts and Sciences.....	95
Center for Imaging Science.....	107
School of Printing Management and Sciences.....	110
College of Liberal Arts	118
Criminal Justice.....	118
Economics.....	122
Professional and Technical Communication.....	122
Social Work.....	123
Liberal Arts Courses.....	128
Language, Literature and Communication.....	128
Science and Humanities.....	135
Social Science.....	143
Service Courses.....	151
College of Science	153
Biology.....	153
Chemistry.....	156
Mathematics.....	163
Physics.....	168
General Science.....	171
Clinical Sciences.....	171
Materials Science and Engineering.....	176
National Technical Institute for the Deaf	178
Department of Support Service Education.....	178

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

College of Applied Science and Technology

School of Computer Science

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

Applied Computer Studies

Courses are offered by the Department of Applied Computer Studies 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 Science Registration #0602-200

Survey of computers and problem solving by using general-purpose application software and a high-level programming language in several computing environments. 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. Programming projects will emphasize algorithmic problem-solving methodologies. To accommodate students from different majors, each student will pick an area of concentration where further, more advanced and specialized projects will be required.

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

ICSA-208 Introduction to Programming Registration #0602-208

A continuation of the technical topics begun in ICSS-200, with emphasis on advanced features of Pascal and their use in implementing 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 Validation Registration #0602-210

A third 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 Engineers Registration #0602-220

Students will be introduced to computer systems, learn problem solving techniques, and have an opportunity to study the FORTRAN programming language. Topics available for study include 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 COBOL Registration #0602-300

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

Class 4, Credit 4

ICSA-303 Advanced Business Applications Registration #0602-303

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

Class 4, Credit 4

ICSA-410 Computer Concepts and Software Systems Registration #0602-410

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, synchronization 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 #0602-41 **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 organizations supporting data management (sequential, direct access, indexed sequential), logical data models and their physical implementation, database administration, and DBMS selection. (ICSA-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-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. (ICSA-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/O. Programming projects are required. (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**
Registration #0601-307 **Programming**

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

Class 4, Credit 4

ICSP-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**
Registration #0601-319 **Programming**

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

Class 4, Credit 4

ICSP-450 **Programming Language Concepts**
Registration #0601-450

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

Class 4, Credit 4

ICSP-488 **Programming Systems Workshop**
Registration #0601-488

A workshop for the application of 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

ICSA-499 **Cooperative Education**
Registration #0602-499

One quarter of appropriate work experience in industry.

Credit 0

ICSS-202 **Introduction to Computer Science**
Registration #0603-202

An introduction to the field of computer science. Topics include computer representation of information, integer (binary and decimal) and floating point arithmetic, logical operations, character codes, and an introduction to machine language and assembly language. The role of operating systems, compilers, and other software components will be surveyed.

Class 4, Credit 4

ICSS-315 **Digital Computer Organization**
Registration #0603-315

An introduction to computer 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 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. (ICSA-200 or 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)(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 upon use of MSI and LSI circuits and CAD tools, sequential circuit synthesis, both synchronous and asynchronous, and an introduction to interfacing techniques. Additional topics to be covered include testing, CAD tools such as logic simulators and logic reduction programs, 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 communication; media and software protocol 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 and Technology)

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

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-470 Finite State Machines and Automata

Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis and synthesis, sequential iterative systems, and space-time transformations. (ICSS-315, SMAM-265 or equivalent)

Class 4, Credit 4

ICSS-480 Formal Languages**Registration #0603-480**

Formal language theory and principles. Topics include context free and context sensitive grammars, regular expressions, Turing machines, and an introduction to unsolvability and computability. (ICSS-470)

Class 4, Credit 4

ICSS-485 Data Base Concepts**Registration #0603-485**

A 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, database design and modelling techniques, hierarchical and network approaches, and issues such as recovery, concurrency, physical implementation concerns, and performance and management aspects. Optional topics include distributed databases, data base machines, and data base interfaces and languages. A data base programming project is required. (ICSS-325)

Class 4, Credit 4

ICSS-515 Analysis of Algorithms**Registration #0603-515**

A course covering the mathematics and techniques needed to analyze the computational complexity of algorithms. Several classic algorithms will be studied, to determine their space and time efficiency. (ICSS-325, SMAM-265 or equivalent)

Class 4, Credit 4

ICSS-520 Computer Architecture**Registration #0603-520**

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

Class 4, Credit 4

ICSS-521 Introduction to Microprocessor Systems

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

Class 3, Lab 2, Credit 4

ICSS-530 **Fundamentals of Discrete Simulation**
Registration #0603-530

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

Class 4, Credit 4

ICSS-540 **Operating Systems Laboratory**
Registration #0603-540

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

Class 4, Credit 4

ICSS-541 **Introduction to Computer Networks**
Registration #0603-541

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

Class 4, Credit 4

ICSS-542 **Distributed Systems Laboratory**
Registration #0603-542

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

Class 4, Credit 4

ICSS-545 **Computer Architecture Laboratory**
Registration #0603-545

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

Class 3, Lab 2, Credit 4

ICSS-560 **Compiler Construction Laboratory**
Registration #0603-560

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

Class 4, Credit 4

ICSS-565 **Computer Systems Selection**
Registration #0603-565

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

Class 4, Credit 4

ICSS-570 **Introduction to Computer Graphics**
Registration #0603-570

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

Class 4, Credit 4

ICSS-571 **Computer Graphics Laboratory**
Registration #0603-571

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

Class 4, Credit 4

ICSS-580 **Language Processors**
Registration #0603-580

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

Class 4, Credit 4

ICSS-590 **Seminar in Computer Science**
Registration #0603-590

Current advances in computer science. (Prerequisites set by instructor)

Class 2-4, Credit 2-4

ICSS-599 **Independent Study**
Registration #0603-599

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

Class 2-4, Credit 2-4

ICSS-610 **EDP Auditing**
Registration #0603-610

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

Class 4, Credit 4

ICSS-690 Seminar in Computer Science**Registration #0603-690**

Current advanced topics in computer science. Open to graduate students and fourth- and fifth-year undergraduates. (Prerequisites set by instructor)

Class 4, Credit 4

Packaging Science**IPKG-201****Principles of Packaging****Registration #0607-201**

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

Class 4, Credit 4

IPKG-301**Engineering Design Graphics****Registration #0607-301**

A basic course in engineering drawing. Topics include, but are not limited to, lettering, line quality, use of instruments, 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-310**Methods of Evaluation****Registration #0607-310**

Information about recognized standard testing procedures will be presented, and students will gain practical experience in the operation of various commonly used testing instruments which determine physical properties of bre, metal, plastic, and glass packaging materials. (IPKG-201)

Lab 4, Credit 2

IPKG-311**Packaging Materials I****Registration #0607-311**

The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on metals and plastics used in packaging, and adhesives, propellents, and other component materials. (IPKG-201)

Class 3, Credit 3

IPKG-312**Packaging Materials II****Registration #0607-312**

The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on paper, paperboard, wood, and glass used in packaging applications. (IPKG-201)

Class 3, Credit 3

IPKG-321**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 compatabili-

ty 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-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****Registration #0607-431****Systems**

A study of package forming and filling, closing, product/package identification, inspection, and other machinery commonly used in packaging, plus consideration of handling and storage/retrieval systems. The characteristics of such equipment and maintenance programs 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-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-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. (431, ITEF-424, 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-541 Computer Applications
Registration #0607-541**

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. (ICSA-210; professional elective)

Class 2, Lab 4, Credit 4

**IPKG-433 Packaging for Marketing
Registration #0607-433**

The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a scientific marketing tool. The course concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market. Advertising, marketing demographics, and the impact of color upon packaging will be considered. Students will gain practice in the development of a complete package system. (IPKG-431, 432)

Class 2, Lab 4, Credit 4

**IPKG-499 Packaging Co-op
Registration #0607-499**

One quarter of appropriate work experience in industry.

Credit 0

**IPKG-520 Packaging Management
Registration #0607-520**

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

Class 3, Recitation 1, Credit 4

**IPKG-524 Packaging Economics
Registration #0607-524**

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

Class 4, Credit 4

**IPKG-530 Packaging and the Environment
Registration #0607-530**

Consideration of packaging in a social context. Factors which enhance secondary use, recycling, recovery of resources, and proper disposal will be discussed. Package design in relation to solid wastes 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-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-541 Computer Applications
Registration #0607-541**

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. (ICSA-210)

Class 2, Lab 4, Credit 4

**IPKG-555 Military and Export Packaging
Registration #0607-555**

Study of the particular forms and requirements for packaging for the military and export environments. Preservation techniques, military specifications, crates and large export containers, construction techniques, the export handling and transportation environment, and related topics. (IPKG-432; Professional elective)

Class 3, Lab 2, Credit 4

**IPKG-562 Packaging Regulations
Registration #0607-562**

A detailed study of federal, state, and local regulations that affect packaging. History of the development of packaging law; detailed study of recent packaging regulations, including the Fair Packaging and Labeling Act and the Poison Prevention Packaging Act; consideration of Food and Drug Administration regulation of packaging, 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 it applies to packaging. (IPKG-433)

Class 3, Credit 3

**IPKG-568 Food Preservation and Packaging
Registration #0607-568**

Study of food products, common methods of processing and preservation, impact on quality and nutritional value of the product, and the relationships with common packaging methods and distribution practices. (IPKG-432, professional elective)

Class 3, 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, audio-visual technology, retailing and printing.) (IPKG-433, FADK-403, BRER-410, ICIC-450, PPRM-403 or department approval, depending on major. Professional elective)

Class 2, Lab 4, Credit 4

**IPKG-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-585 Principles of Shock and Vibration
Registration #0607-585**

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

Credit variable 3-4

**IPKG-590 Senior Thesis
Registration #0607-590**

An in-depth study of some phase of packaging which will enable the student to make use of the knowledge and skills acquired during the course of the program.

Arranged, Credit 4

**IPKG-598,599 Independent Study
Registration #0607-598,599**

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

Arranged, Credit variable 1-4

School of Engineering Technology

Civil Engineering Technology

**ITES-099 Co-op Preparation
Registration #0606-099**

This course is intended for second- or third-year SET students. It will introduce the concept of cooperative education and the services of the Office of Cooperative Education and Placement, and will provide the student with basic job search skills: research and identification of potential employers; resume writing and correspondence, and interviewing techniques. Ethics of the job search and expectations of employers will also be covered. Except for transfer students who co-op prior to taking courses, 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

**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 2, 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 micro-computers. 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 micro-computers 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 as ASTM and AASHTO 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, plan and profile views, cross sections, volume computations, and mass diagrams. Laboratory exercises include layout of curves in field. (Plane Surveying)

Class 3, Lab 2, Credit 4

ITEC-360 Elementary Soil Mechanics**Registration #0608-360**

Introduction to soil mechanics and its application to problems encountered in civil engineering. Major topics include soil classification, strength and compressibility analysis, and effect of water on soil characteristics. Laboratory tests commonly used to evaluate engineering properties of soils are performed.

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 also will 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 design principles. (Statics and Strength of Materials)

Class 4, Credit 4

ITEC-420 Hydraulics**Registration #0608-420**

Study of principal physical and mechanical properties of liquids, hydrostatic pressure and forces; pressure measuring devices; buoyancy and floatation, 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 bridge techniques.

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 Transport Systems**Registration #0608-432**

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

Class 2, Credit 2

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

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

Class 3, Lab 2, Credit 4

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

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

Class 2, Credit 2

ITEC-460 Construction Equipment**Registration #0608-460**

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

Class 4, Credit 4

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

Discussion of the properties of structural lumber including grades, sizes, and design properties. Design of beams, columns, trusses, plywood diaphragms and shear walls. Other topics include glued-laminated timber, 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 modern 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 safety practices in construction operations. Safety standards, both voluntary and mandatory. Employer responsibilities under the provisions of OSHA and state labor law. A portion of this course is audiovisual.

Class 2, Credit 2

ITEC-509 Cost Estimating**Registration #0608-509**

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

Class 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-220)

Class 2, Credit 2

ITEC-514 Land Planning**Registration #0608-514**

The environmental and social aspects of land planning are covered as well as the engineering and cost considerations. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wet lands, 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 Concrete Structures**
Registration #0608-516

The course is organized to continue with the study of reinforced concrete that was begun in ITEC-495. Topics include 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 Treatment Facilities**
Registration #0608-520

Principles of wastewater treatment plant design, conceptual and hydraulic design of activated sludge and trickling filter plants are studied. Tertiary treatment facilities, such as nitrogen and phosphorous removal will be discussed. Processes, plant design, and construction elements are stressed. (ITEC-438)

Class 3, Lab 2, Credit 4

ITEC-522 **Principles of Treatment of Water and Sewage II**
Registration #0608-522

Principles of microbiology and its application to water and wastewater. Principles and practice of water and wastewater treatment processes with emphasis on settling, chemical precipitation, adsorption, disinfection, granular medium filtration, aerobic suspended and attached growth, and anaerobic suspended growth. (ITEC-438)

Class 3, Lab 3, Credit 4

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 and Practices**
Registration #0608-546

A treatment of legal and ethical aspects of the profession; review of codes of ethics and current professional problems; featuring several guest speakers representing different segments of the civil engineering field.

Class 1, Credit 1

ITEC-550 **Construction Practices**
Registration #0608-550

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

Class 4, Credit 4

ITEC-552 Analysis and Design of Steel Structures
Registration #0608-552

This course is organized to continue with the study of structural steel that was begun in ITEC-495. Topics include 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 Treatment 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 4, Credit 4

ITEC-561 Construction Project Management II
Registration #0608-561

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

Class 4, Credit 4

ITEC-580 Senior Construction Seminar
Registration #0608-580

Special topics are offered in a seminar format. In the past topics have included construction finance, cost engineering, quality and production control, special engineering subjects, and value engineering. (Seniors only; permission of the instructor)

Class 3, Credit 4

ITEC-599 Independent Study
Registration #0608-599

A supervised investigation within a civil 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, Kirchoffs Laws, Thevenin's and Norton's Theorem, Mesh and Nodal Analysis and Superposition. (Corequisite SMAM-204)

Class 3, Lab 3, 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 3, 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 of the telecommunications industry and an introduction to the regulation of the industry are provided. The basics of telephone switching systems and networks are introduced. Telecommunication management, economic issues, and regulation are studied. Current features and applications of switching systems and networks are introduced.

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 for Communication**Registration #0609-363**

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; covers basic electrical circuits, network theorems, power and energy concepts, P.F. correction, and basics of transformers and motors.

Class 3, Lab 2, Credit 4

ITEE-412 Electrical Principles for Design II**Registration #0609-412**

An introductory survey course in the basics of analog and digital electronics; topics include basic semiconductors, transistor circuits, operational amplifiers, fundamental digital logic concepts, and an introduction to microcomputers. (ITEE-411)

Class 3, Lab 2, Credit 4

ITEE-413 Applied Microprocessors**Registration #0609-413**

Applications of microprocessors for manufacturing engineering technology students. 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 learn to write good, well documented programs using PASCAL as the programming language. The emphasis of the program will be to learn modern programming techniques and methods of solving problems using computers.

Class 4, Credit 4

**ITEE-472 Telecommunication Concepts
Registration #0609-472**

This course introduces the student to transmission modes, multiplexing methods, and signal theory of communications systems in the laboratory. These signals are analyzed in the presence of noise. Voice, digital, and data transmission media are examined in terms of technical capabilities and functions. (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**

Basic telephone concepts and the characteristics of public telephone systems are studied in this course. Different types of telephone systems and the components of each are studied and compared. The laboratory teaches the student how to measure various parameters 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**

Digital communication theory is introduced with an emphasis on voice application, voice digitalization, and digital and video transmission. The types of modulation techniques studied are frequency and phase shifting, keying, pulse code modulation, and delta modulation. These techniques are then implanted 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
Registration #0609-520 Magnetic Fields**

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
Registration #0609-534 Systems**

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 ip-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; the kits are available for \$150. (ITEE-538)

Class 3, Lab 2, Credit 4

ITEE-542 Microprocessors**Registration #0609-542**

An introductory course in Microprocessors emphasizing the Motorola 6800 and Intel 8085. The topics covered include the CPU, ROMS, RAMS, programming and interface ICs. Practical applications of microprocessors are also considered. (ITEE-424, ITEE-437)

Class 3, Lab 3, Credit 4

ITEE-543 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 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**

Basic photometry is discussed. Light emitting and light receiving devices are covered with circuits and applications. Optics is introduced with laser theory and fiber optics.

Class 4, 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 also will 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)

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-392)

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-320 Fluid Power Systems**Registration #0610-320**

Introduction to pneumatic and hydraulic components, pneumatic and hydraulic power systems; compressors, pumps efficiency and applications; integrated electromechanical power systems. Lab sessions develop a qualitative feel for characteristics and applications of power systems, machines and their control.

Class 3, Lab 2, Credit 4

ITEM-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 detection 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-429 **Technical Communication**
Registration #0610-429

This course encompasses instruction in both written and oral communication. Emphasis will be placed on the written technical report and the formal oral technical presentation. Topics covered in the course will include report research; report preparation; formulation of the report outline; report organization, format and style; and development of the executive summary. Written reports and oral presentations will be required from each student. Use of visual aids and assistant presenters will be incorporated into the formal oral presentations delivered by the student. Evaluation of the students' written and oral presentations will be based on technical content and to a large extent on the students' command of the English language. Development of vocabulary and spelling skills; improvement of grammar, syntax and punctuation; and improvement of basic English language skills also are objectives of this course.

Class 3, Recitation 2, Credit 4

ITEM-432 **Computers in Mechanical Technology**
Registration #0610-432

The use of computers to solve problems encountered in mechanical engineering technology will be emphasized. This will include an introduction to the RIT academic computing system and introduction to the use of personal computers. Instruction will be provided in word processing, spread sheet programming, plotting and other applications programs. Assignments will be based on problems encountered in mechanics of materials, dynamics, materials testing, energy analysis, etc. A course in a programming language is a prerequisite.

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 gases 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 static 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 Mechanical Design**
Registration #0610-512
 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-521** **Logic Control Systems**
Registration #0610-521
 The analysis and design of logic control systems using Boolean algebra. Emphasis is placed on the control of machines with fluid and relay logic. Introduction to electronic programmable controls. The concepts of ordinary and time sequence control and machine protection are covered. Logic control systems will be demonstrated in the lab.
 Class 3, Lab 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, psychometric, 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 Engineering**
Registration #0610-546
 This course covers the thermodynamic analysis of air conditioning processes, especially with regard to equipment components such as coils, humidification apparatus, fans, and compressors. The methods of modeling the dynamic thermal performance of buildings are studied. Topics related to the influence of solar energy and light on the design of buildings. The thermofluid analysis of pipe flow and air flow in ducts is also covered. (ITEM-542)
 Class 4. Credit 4

ITEM-561 **Computer-Aided Energy Analysis**
Registration #0610-561

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.)

Credit variable (1-4)

Manufacturing Engineering Technology

ITEF-220 **Introduction to Manufacturing Processes**
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-229 **Introduction to Technical Communication**
Registration #0617-229

The student will be introduced to technical communication in both written and verbal form. Emphasis will be placed on style, content, and the contrast between technical and non-technical communications.

Class 4, 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 turn-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 to Tool Design**
Registration #0617-372

This course deals with the design of tools used in the manufacturing processes. The course will employ a CAD system for design purposes. (ITEF-260)

Class 3, Lab 2, Credit 4

ITEF-375 **Introduction to Computer-Aided Manufacturing**
Registration #0617-375

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

Class 3, Lab 2, Credit 4

ITEF-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-420 **Manufacturing Processes**
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-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, nite 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-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 3, Lab 2, Credit 4

ITEF-475 Computer-Aided Manufacturing**Registration #0617-475**

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

Class 3, Lab 2, Credit 4

ITEF-481 Work Simplification and Measurement**Registration #0617-481**

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 Manufacturing Processes**Registration #0617-502**

A course dealing with precision machining using non-traditional processes. Includes such processes as electric discharge machining, electro-chemical machining, chemical milling, laser beam machining, electron beam machining, ultrasonic machining, water jet cutting, abrasive flow machining and plasma arc machining.

Class 3, Lab 2, Credit 4

ITEF-510 Process Design**Registration #0617-510**

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

Class 1, Recitation 4, Credit variable 3-4

ITEF-526 Quality Systems**Registration #0617-526**

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

Class 3, Credit 3

ITEF-530 Special Topics in Computer Integrated Manufacturing

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, Kirchoffs 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-203 Electronic Devices**Registration #0618-203**

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. (ITEP-202, corequisite SMAT-420)

Class 3, Lab 2, 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 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. (Corequisite ITEP-203)

Class 3, Lab 2, Credit 4

ITEP-302 Linear Electronics**Registration #0618-302**

A course in the analysis and design of linear amplifiers for students who have completed an introductory course in electronics. Emphasis will be placed on small signal modeling, depiction of amplifier characteristics, direct and capacitor coupled amplifiers, frequency response, differential amplifiers and feedback. (ITEP-203)

Class 3, Lab 3, 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-203, 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 2, Credit 4

ITEP-320 **Principles of Design Automation**
Registration #0618-320

This is an introductory course in design, capture, and validation of digital and analog circuit designs. The automation process will use Valid's EDA software package operating on a UNIX/SUN platform. (ITEP-301, ITEP-310 [or ITEP-203], 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 Kirchhoffs 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.

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.

Class 3, Lab 2, Credit 4

ITEP-471 **Topics in Computer Engineering Technology**
Registration #0618-471

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 inter-

facing various logic families are discussed. (ITEP-303)

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)

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

Department of Instructional Technology

All courses in the Department of Instructional Technology are offered at least once every three years and/or upon sufficient demand: Audiovisual Communications Service Courses Service courses are offered by the Audiovisual Communications Department for other departments. These courses may not be taken by audiovisual communications majors.

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

Design, creation, and presentation of 35mm slide and 35mm slide 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

ICIC-421 **Producing Audiovisual Presentations I**
Registration #0612-421

Students develop slide v tape presentations in order to communicate an idea or to change the attitudes or behavior of the viewer. The development process includes: analyzing the needs of clients and audiences; preparing communications objectives; preparing treatment, storyboard, and script; producing audio track and visual materials; synchronization and presentation preparation. Project required. (Photographic skills required, for nonmajors)

Credit 4

Upper Division Major Courses

**ICIC-422 Producing Audiovisual
Registration #0612-422 Presentations II**

Basic slide v tape planning and production similar to ICIC-421 but with increased emphasis on scripting and production planning and the unique characteristics of slide v tape as a delivery medium; increased emphasis on synchronization methods and more sophisticated presentation hardware. (ICIC-421, for non-majors)

Credit 4

**ICIC-426 Training and Supervision in
Registration #0612-426 the Hospitality Industry**

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

Credit 4

**ICIC-444 Technical Writing for
Registration #0612-444 Computer Scientists**

An intensive course in the preparation of technical documents in the field of computer science. Topics include analysis of purpose of a document, and writing effectively for the expertise and interests of the intended audience. Writing assignments will cover reports and user documentation. This course is a prerequisite to the third quarter of cooperative education. (For computer science majors only)

Credit 2

**ICIC-445 Technical Writing
Registration #0612-445**

An intensive course in the preparation of documentation and reports to both management and a variety of information users. Topics include analysis of the document's purpose and audience, analysis and structure of content, effective writing, and layout techniques. Writing assignments include preparation of technical information for management and for non-technical staff; progress reports; and common organizational communications. (Course meets computer science technical requirements.)(English Composition from the College of Liberal Arts or from transfer institution)

Credit 4

**ICIC-489 Audio for Audiovisual
Registration #0612-489 Presentations**

Students record, transfer, edit, and mix sound tracks—with music, narration and sound effects—for audiovisual programs. Course stresses practical approach with hands-on experience. Enrollment for 4 credits requires production of the audio portion of a presentation.

Credit variable 3-4

**ICIC-519 Principles and Methods for
Registration #0612-519 Dietetics Education**

Principles of learning; behavioral objectives, motivation, perception, evaluation, guidance, teaching methods and audiovisual techniques; development of a teaching/learning unit for a specific group. (For dietetics majors only)

Credit 4

**ICIC-375 Video Production for
Registration #0612-375 Audiovisual Presentations**

Designed primarily for audiovisual communications transfer students, the course covers the basic elements of non-studio video production as it relates to producing purposive, situation-linked video presentations integrated into an overall meeting or series of meetings. Covers establishing communications objectives, production design and planning, shooting and editing, presentation and client review. (Basic photography and basic audio production skills, previous audiovisual production experience.)(For audiovisual communications majors only.)

Credit 4 (offered only as needed)

**ICIC-401 Message Design
Registration #0612-401**

Reviews media formats as they may be applied to the design of purposive communications. Examines social and psychological principles as they relate to attitude change and motivation in learners. Students use design principles and structure messages for different media forms. (Required for graduation)

Credit 4

**ICIC-424 Visual Production Techniques
Registration #0612-424**

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

Credit 4

**ICIC-430 Audiovisual Presentation
Registration #0612-430**

Design Students review basic production skills and develop slide v tape presentations to communicate ideas or to change the attitudes of the viewer. This development process includes an analysis of the client's needs and setting communications objectives; preparing the treatment, script, and storyboard; producing the audio track and visual materials and synchronization of the presentation. Stresses more design and planning than production. (For audiovisual communications majors only, required for graduation)

Credit 4

**ICIC-441 Audiovisual Program Design I
Registration #0612-441**

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

Credit 4

**ICIC-442 Audiovisual Program Design II
Registration #0612-442**

Students analyze the elements used in design of audiovisual programs and presentations. Emphasis is on the application of the key psychological principles, perception, memory, experience, attitudes underlying successful communications. Students must design a series of presentations incorporating these principles. (Required for graduation)(ICIC-441)

Credit 4

**ICIC-475 Computer Graphics in
Registration #0612-475 Audiovisual Presentations**

Covers the design and production of computer-generated slides and computer graphics for purposive, meeting presentations. Includes characteristics and features of optically produced and computer generated special effects slides and computer-based presentations. Includes problems of production and staging. (ICIC-401,441, 585)(For audiovisual communications majors only)

Credit 4

**ICIC-490 Audio Techniques
Registration #0612-490**

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

Credit 4

**ICIC-499 Cooperative Education
Registration #0612-499 in Audiovisual Communications**

One quarter of approved work experience in appropriate audiovisual field. For audiovisual communications majors only. (Approval of advisor required prior to registration)

Credit 0

**ICIC-501 Practicum in Audiovisual
Registration #0612-501 Program Design**

Allows a student to explore or develop a special competence in audiovisual program design and to work with clients in real or simulated work environments. A proposal must be submitted prior to registration; guidelines available from the department. (For audiovisual communications majors only)

Credit variable 1-2

**ICIC-502 Practicum in Audiovisual
Registration #0612-502 Management**

Allows a student to explore or develop a special competence in audiovisual management and to work with clients in real or simulated work environments. A proposal must be submitted prior to registration; guidelines available from the department. (For audiovisual communications majors only)

Credit variable 1-2

**ICIC-503 Practicum in Audiovisual
Registration #0612-503 Production**

Allows a student to explore or develop a special competence in advanced production and work with "clients" in real or simulated work environments. A proposal must be submitted prior to registration; guidelines available from the department. (For audiovisual communications majors only)

Credit variable 1-2

**ICIC-510 Writing for Audiovisual
Registration #0612-510 Programs**

Emphasizes the principles of scriptwriting for verbal and visual continuity, clarity, and impact. Considers the audience and purpose for which the script is being written, the intended medium and styles of writing. (Required for graduation)

Credit 4

**ICIC-550 Management of Audiovisual
Registration #0612-550 Programs**

Covers organizational strategies, management practices, budgeting and seal control, personnel recruitment, selection, training and supervision, resource center operation and organization.

Credit 4

**ICIC-560 Media Facilities Design
Registration #0612-560**

Examines major variables influencing the design of such media facilities as media production areas, darkrooms, audio and television studios and control rooms, and training and instructional areas. Topics include acoustics, lighting, ventilation, electrical circuits, space requirements and layouts.

Credit 4

**ICIC-571 Staging Audiovisual Presentations
Registration #0612-571**

The student learns to plan and set up equipment for audiovisual presentations. Includes calculation of power requirements, analyzing facilities and developing plans, setting up, connecting and troubleshooting common audiovisual equipment such as sound systems, projectors, multi-image equipment, screens. (ICIC-489, ICIC-422)

Credit 2

**ICIC-580 Producing Multi-Image Presentations I
Registration #0612-580**

Students design, produce, and present multi-image productions (3-6 projectors). Covers both theory and practice of aspects such as synchronization, presentation planning and equipment selection, and the presentation development process. Projects required. (Photography skills, ICIC-489, and ICIC-401 or ICIC-422 or equivalent)

Credit 4

**ICIC-581 Producing Multi-Image Presentations II
Registration #0612-581**

Students design and produce multi-image productions (6-15 projectors) controlled by microprocessor-based programmers using leisure time programming. Basic research and theory of multi-image covered. Projects required. (ICIC-489, ICIC-580, and ICIC-401 or equivalent)

Credit 4

**ICIC-583 Advanced Multi-Image Project
Registration #0612-583**

A special project to develop an advanced, complex multi-image presentation using memory programming and multiple projectors. Projects may focus on a single special effect or a complete presentation. The number of credits allowed depends on the scope and complexity of the project undertaken. (ICIC-580, 58 and approval of project prior to enrollment)

Credit variable 1-2

**ICIC-585 Producing Special Effects Slides
Registration #0612-585**

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

Credit variable 3-4

ICIC-586 **Advanced Special Effects**
Registration #0612-586 **Slides Production**

In this continuation of ICIC-585, the student will analyze, design, and produce special effects slides with a number of elements. The student will also have the opportunity to learn the operation of a computer-controlled special effects camera stand and to incorporate basic techniques like positive, negative, and gradation masks with camera and compound movements and multiple exposures to produce special effects slides like streaks, zooms, neons, step and repeats, spins, posterizations, seamless masks, pans and animation. Emphasis will be on the development of such slides for multiprojector presentations. In addition to camera operation, the student must design and produce any necessary artwork.

Credit variable 2-4

ICIC-587 **Production Seminar: Special**
Registration #0612-587 **Effects Slides**

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

Credit 2

ICIC-595,596 **Senior Project**
Registration #0612-595,596

Focus is on the design and production of an interview presentation package based on each senior's own job aspiration, professional skills, personal qualities and portfolio materials. These courses are to be taken in the senior year. Both are required for graduation. (For audiovisual communications majors only)

Credit 2

ICIC-601 **Audiovisual Seminar**
Registration #0612-601

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

Credit 2

School of Food, Hotel and Tourism Management

Dietetics and Nutritional Care

ISMD-202 **Nutrition Concepts and Controversies**
Registration #0620-202

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 4, Credit 5

ISMD-526 Class 4, Credit 4

ISMD-550 **Community Nutrition**
Registration #0620-550

Study of current nutrition problems in the community. Survey of agencies involved in giving nutrition information or nutritional care. An independent study project involving nutrition care in a clinical facility in the community is required. Assignments are arranged by the instructor.

Class 2, Credit 8, Clinical hours by arrangement

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

Principles of management in organizational structure, supervision and evaluation of employee performance, and use of computers in food management; the functions of an administrative dietitian in planning, organizing, directing, coordinating, and controlling dietetic activities.

Class 1, Credit 8, Practicum in hospital by arrangement

ISMD-554 **Nutrition in Life Cycle**
Registration #0620-554

This is an applied course in nutritional needs throughout the life cycle. Emphasis will be given to nutrition during pregnancy, infancy, early childhood, adolescence, and in later years.

Class 4, Credit 4

ISMD-560, 561 **Clinical Dietetics I & II**
Registration #0620-560,561 **(Coordinated Dietetics Program)**

An intensive integrated study and application of advanced nutrition and diet therapy theories and principles. The course is structured to integrate class lectures 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-210 **Introduction to Food, Hotel**
Registration #0621-210 **and Tourism Management**

An orientation course designed to trace the history, organizational structure, problems, opportunities and the place of the industry in the national and world economy. Trends and developments in the industry today are stressed.

Class 3, Recitation 2, Credit 4 Class 3, Recitation 2, Credit 4

**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 will be aided in developing career objectives. Leading industry executives will participate.

Class 2, Credit 2

**ISMF-222 Introduction to
Registration #0621-222 Food Service Management**

Trends in foods; types of food service. Menu types; relationship of menu to equipment and labor requirements. Elements of food preparation, terminology, sanitation, nutrition, and purchasing.

Class 4, Credit 4

**ISMF-224 Decision-Making in
Registration #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, standard 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 4

**ISMF-330 Quantity Food Production
Registration #0621-330**

Principles of quantity food production including equipment operation, holding techniques, use of standard recipes, conversion of small quantity recipes to large quantity, production techniques, forecasting, temperature control, cafeteria/buffet service, purchasing and inventory systems.

Class 4, Credit 4

**ISMF-351 Restaurant Operations
Registration #0621-351**

Application of standards, preparation, and service of high quality food. Recognizing, analyzing, planning, scheduling, solving and evaluating problems related to all aspects of food production and management based on scientific, technological, economic, and social factors. Students will assume various operational positions found in commercial feeding facilities by operating the department's 80-seat restaurant. Students in the Coordinated Dietetics Program will have hospital practicum arranged.

Class 1, Lab 12, Credit 6

**ISMF-340 Beverage Operations
Registration #0621-340**

Practical course dealing with the management of a commercial beverage operation. Class and laboratory includes objectives, procedures, characteristics, regulations, controls and mixology of alcoholic beverages. Students will utilize computerized dispensing equipment. (Open to juniors only, age 18 or older)

Class 2, Credit 2

**ISMF-424 Food and Labor Cost Control
Registration #0621-424**

A fundamental course to assist the student in costing of food and labor needed to operate a food service system. Included is analysis of standardized recipes, scheduling, application of internal controls, and computations of operating statements. Analysis of sales activity and current inventory data will be done.

Class 4, Credit 4

**ISMF-430 Restaurant Management
Registration #0621-430**

Application of theories and techniques dealing with total restaurant operation including: menu planning, marketing strategies, supervision of purchasing, equipment, production and service operations. Creation and calculation of management reports to evaluate efficiency and effectiveness of restaurant operations.

Class 1, Lab 12, 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.

Credit 0

**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 Management**Registration #0621-511**

Management experience in planning, organizing, supervising preparation and service of foods for special functions. Emphasis is placed on experiences in organizational behavior, the responsibilities of management in marketing, promotion, sales promotion, sales production, personnel and customer relations and attitudes. Evaluation of management experience by preparation of operations reports. Open to seniors only. (ISMF-331, 340, 341, 424, 426)

Class 1, Lab 12, Credit 4

ISMF-512 Design and Layout of Food Operations

Evaluation of different food service facilities with regard to design and layout. Reviewing layouts in operating facilities and suggesting innovative ways to utilize the space to its fullest potential.

Class 2, Credit 2

ISMF-515 Food Service Concept 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 impact of these variables on the theme, atmosphere, style of service, menu prices, and labor costs of the operation.

Class 4, Credit 4

ISMF-516 Product Development

Food experimentation; sensory and objective evaluation of food quality; interaction of food ingredients; recipe development, writing and presentation; problem solving; experimental design; written and oral communication of research.

Class 2, Lab 6, Credit 6

ISMF-520 Food Service Computer Applications

Applications of commonly available spreadsheet and data base software to effective computer-assisted management.

Class 4, Credit 4

ISMF-521 Computerized Models for Decision Making

A survey of available software packages in food service management; comparison of their suitability in the various decision-making situations.

Class 4, Credit 4

ISMF-522 Contract Environment of the 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 food service operator's rights and obligations 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

This class will provide students with 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

Course will allow experience in the actual operation of Henry's beverage center. Students will become familiar with Remanco and Bevcon electronic liquor control system. Open to seniors only, age 18 or older. (ISMF-340)

Lab 4, Credit 2

Hotel and Resort Management**ISMH-200 Hotel Operations**

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 Sales Management

This course introduces the student to the application of the marketing concept in hotel operations. This will be accomplished by defining the marketing function, organization, sales office work and forms flow, customer contact methods and servicing procedures as generally practiced in the hotel industry.

Class 4, Credit 4

ISMH-310 Resort Development 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 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.

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 marketing issues facing 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 Development**
Registration #0622-470

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

Class 4, Credit 4

ISMH-480 **Personnel and 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, computer-aided instruction, 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 #0622-205

This course introduces the student to the principles, practices, and philosophy of tourism economics. Agencies, infrastructures, and cultures of tourism are examined and compared throughout the world.

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 and convention bureaus is discussed. Various economic models are examined in order to analyze the pricing structure associated with the travel suppliers' ability to provide travel service.

Class 4, Credit 4

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

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

lecture and Travel Lab simulations.
 Class 4, Credit 4

ISMT-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, reading travel brochures. Emphasis is on the various forms used in travel documentation.

Class 2, Credit 2

ISMT-314 **Salesmanship Techniques for TVavel**
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 that are used to promote tourism attractions and communities. Emphasis will be on the role that organizations such as tourist promotion agencies, convention and visitor bureaus, and state divisions of tourism play in marketing 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 #0623-515

This course will focus on research issues, problem solving techniques, analysis skills with particular emphasis on the role of information in the decision process and the sources of information that can be useful in management decisions. Computer-assisted data base creation and analysis techniques will be discussed.

Class 4, Credit 4

ISMT-515 **Tourism Research and Analysis**
Registration #0623-515

This course will focus on research issues, problem solving techniques, 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

An 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 costs-to-revenue ratios.

Class 2, Credit 2

ISMT-521 **Tour Operations**
Registration #0623-521

This course focuses on the planning, development, and marketing of packaged or group tours by suppliers and intermediaries. Emphasis 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 TYavel/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 auto risk);workers' compensation; personal and personnel risk; and travel insurance.

Class 2, Credit 2

ISMT-526 **Travel/Tourism Policy & Law**
Registration #0623-526

An examination of the various laws associated with travel and tourism and their resultant policy implications. Four major areas are examined: domestic and international air transportation; car rental, cruise and rail; hotels and resorts; and retail travel agents and wholesale tour operators.

Class 4, Credit 4

ISMT-530 **Intermediate SABRE Applications**
Registration #0623-530

This course enables students to progress to the "total automation" level associated with SABRE. The focus of the course is to provide an overall picture of how the SABRE system 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 food and hotel 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-SSS **Seminar in TVavel/
Registration #0623-555** **Tourism Management**

This course surveys various issues and events that influence the travel and tourism industry and affect the careers of future professionals. This course is intended for students who have completed all of their cooperative education experiences.

Class 4, Credit 4

ISMT-575 **Destination Geography
Registration #0623-575**

Leisure and recreation geography shares the geographer's curiosity of place, its spatial interactions and expanse, and its man-land interdependence. This course focuses on man's leisure proclivities and their 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 taxation relating to concepts of income, deductions and credits. The tax structures of various forms of sole proprietorship, partnership, S corporation, and C corporation will be compared. Tax research will be introduced as a component of the decision process. (BBUA-302, junior status)

Credit 4

BBUA-523 **Tax Accounting II** **Registration #0101-523**

A course in Federal taxation emphasizing specialized topics in individuals and business taxation. Advanced topics will include acquisitions, mergers, liquidations and tax planning. (BBUA-522, junior status)

Credit 4

BBUA-530 **Auditing** **Registration #0101-530**

A study of the legal, ethical, and technical environment in which the auditor works. Current auditing 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

Registration #0102-310,311

Air Force Management and Leadership I, II

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

Credit 5 each

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

BBUB-312

Registration #0102-312

Career Seminar

Career planning for the college student. Aptitudes, interests and course and major selections while in college. Transition from college to the world of work; job search; resumes, interviews, job offers. Getting on board. Importance of career paths to career achievement in organizations.

Credit 2

BBUB-430

Registration #0102-430

Organizational Behavior

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

Registration #0102-432

Comparative Management

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

Registration #0102-438

Business Ethics

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-4S5

Registration #0102-455

Human Resources 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

2

BBUB-460

Registration #0102-460

Management and Leadership

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

Registration #0102-462

Management Development

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

Registration #0102-490

Entrepreneurship I

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

Registration #0102-491

Entrepreneurship II

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

Registration #0102-507

Business Environment

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

Registration #0102-515

Technology Management

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, BBUB-441, BBUB-463 and senior status. For non-College of Business students, consent of instructor)

Credit

2

**BBUB-536 Organizational Design and Performance
Registration #0102-536**

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

Credit 4

**BBUB-547 Entrepreneurial Field Studies
Registration #0102-547**

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

Credit 4

**BBUB-551 Policy and Strategy
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, 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, inflation 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**

An introduction to the functions of Financial Management and Financial Markets and Institutions. Asset Valuation as it applies to capital budgeting, working capital management and long term financing. (BBUQ-330, BBUA-302, GSSE-301, junior status)

Credit 4

BBUF-445 Advanced Corporate Finance**Registration #0104-445**

A broad coverage of business finance with emphasis on the analytical techniques of resource allocation and asset management. Covers securities and securities' markets, capital structures, analysis of financial statements, financing business operations, cost of capital, theories of leverage and dividend policy, and capital budgeting. (BBUF-441, 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 (offered upon demand)

BBUF-507 Security Analysis**Registration #0104-507**

The course is introductory and provides background in the field of securities investment. It is both descriptive and analytical in nature. The course coverage emphasizes the securities markets, type of issues, the historical investment perspective, and the valuation of different types of securities. (BBUF-441, junior status)

Credit 4

BBUF-508 Portfolio Management**Registration #0104-508**

This course deals with the considerations involved in the construction and management of securities portfolios. The emphasis is on the requirements of the institutional investor, the examination of the efficient market hypothesis, modern portfolio theory and the valuation of investment results. (BBUF-507, 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-463 Principles of Marketing****Registration #0105-463**

A basic course in which the student is introduced to the marketing system and specific marketing functions of the business firm. An analytical approach is used to develop an understanding of marketing strategy. (Junior status)

Credit 4

BBUM-505 **Consumer Behavior**
Registration #0105-505

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

Credit 4

BBUM-510 **Consumer Services Analysis**
Registration #0105-510

A course designed to examine the common attributes and problems of consumer service institutions. Topics to be covered: factors of market segmentation, customer needs, models of present and future service organizational concerns, and external environmental variables affecting consumer service industries. (BBUM-463, junior status)

Credit 4

BBUM-550 **Marketing Management Problems**
Registration #0105-550

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

Credit 4

BBUM-551 **Marketing Research**
Registration #0105-551

A study of research methods and procedures used in the marketing process. Topics include problem formulation, sources of market data, research methodology, data collection, data analysis, and the role of marketing research within the firm. (BBUM-463, 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-556 **Marketing Logistics**
Registration #0105-556

A study of physical supply and physical distribution activities. Topics include transportation, inventory control, materials handling, warehousing, order processing, protective packaging, product scheduling, facility location and customer service. (BBUM-463, BBUQ-330, junior status)

Credit

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-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 Research**
Registration #0105-565

This course is a continuation of the groundwork acquired in the marketing research course. Emphasis is on the analytical basis of marketing research in support of management decision-making. Multivariate analytic techniques will be stressed and applied to projects and data base analysis. (BBUM-551, junior status)

Credit 4

BBUM-570 **Industrial Marketing**
Registration #0105-570

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

Credit 4

Retail Management

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 Merchandise Control**
Registration #0105-301

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 and Management**
Registration #0105-401

A detailed examination of the operation of a retail enterprise including fixturing, information systems, operating costs, merchandise flows, and security. Particular attention will be paid to the managerial tasks of selecting, training and motivating store personnel. (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

BBUM-413 **Buying Management and**
Registration #0105-413 **Market Analysis**

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

Credit 4

BBUM-431 **Interior Design**
Registration #0105-431

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

Credit 4

BBUM-452 **Retail Sales Promotion**
Registration #0105-452

The study of the overall sales promotion functions in a retail environment. Includes the planning, analysis, and evaluation of alternative promotional activities in terms of media selection, budgeting, copy writing, layout. The full promotional mix employed by typical retailers including newspapers, broadcast, display, specialty advertising, and in-store promotions is analyzed and evaluated. (BBUM-201, 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-502 **Current Trends in Retailing**
Registration #0105-502

A course that studies and identifies the forces that promote trends in the industry, and the environments in which they exist. Further analysis and attempts to translate the trends into lifestyle merchandising strategies. (BBUM-201, junior status)

Credit 4

BBUM-503 **Textiles**
Registration #0105-503

Analysis of textile fibers, weaves, and fabrics, methods of printing, dyeing and finishing, evaluation of fabrics and materials commonly used in fashion and home furnishings. (BBUM-301, junior status)

Credit

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

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, ICESA-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 and Reliability**
Registration #0106-406

Study of total quality control (TQC), reliability concepts and problem-solving methods and tools; objectives of quality planning and control; and the use of statistical methods for quality control and improvement. The course focus is on the management of quality, reliability, productivity and profit improvement. (BBUQ-330, 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 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 and materials 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 decision support systems 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 will 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 will be 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)(Offered alternate years, see schedule)

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

Credit 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-241,242 Health Institutions
Registration #0206-241,242 Management

Introductory survey of administration in health care facilities including roles, functions, and responsibilities; organization structure; health care focusing on patient care, education and research; supervisory management for hospitals and related care facilities, emphasizing managerial planning, span of supervision, financing and coordination of public and private efforts.

Credit 4/Qtr.

CBCF-340 Legal Aspects of Health
Registration #0206-340 Care Administration

An overview of legislation as it applies to health facilities. All levels of law—federal, state and local—discussed. Social Security, National Labor Relations, New York State Disability and Workmen's Compensation, minimum wage, and Code of the New York State Health Department are examples of regulatory procedures to be analyzed. The role of the state and local governments in licensing and accrediting, and the standard of accreditation by major professional bodies will be reviewed.

Credit 4

CBCF-341,342 Health Administration Functions
Registration #0206-341,342

Course examines contemporary issues in health care management. Emphasis is placed on the daily operational situations and decisions encountered in managing a health care unit, including personnel administration, financial management, and organization planning and administration.

Credit 4/Qtr.

Marketing

CBCG-210 **Effective Selling** **Registration #0207-210**

Investigates the importance of the sales function within the overall marketing organization and the necessary general characteristics of a successful salesperson. The various steps of the sales process and the practical applications of effective sales presentation are discussed.

Credit 4

CBCG-213 **Advertising Principles** **Registration #0207-213**

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

Credit 4

CBCG-214 **Advertising Evaluation and Techniques** **Registration #0207-214**

Course presents basic approaches used in planning, preparation and evaluation of advertising and sales promotional materials. Course incorporates a number of projects involving writing/layout/production for print, broadcast and specialized media advertising.

Credit 4

CBCG-361 **Marketing** **Registration #0207-361**

An introductory course in marketing designed to provide a better awareness of the function of marketing and how marketing relates to other areas of business. Topics include the marketing concept, developing a product strategy, behavioral aspects of consumer marketing, the marketing mix, segmentation and current marketing issues.

Credit 4

CBCG-362 **Marketing Practices for the Service Economy** **Registration #0207-362**

Focuses on applications of traditional marketing concepts and techniques to the service sector (e.g., banking, health care, transportation; and services within organizations), to optimize quality, customer satisfaction, and sales/revenues/profits. Includes a brief review of the increased role of services in the economy.

Credit 4

CBCG-398 **Special Topics** **Registration #0207-398**

Special topics are experimental courses offered quarterly. Watch for titles in the course listing each quarter.

Credit Variable

Mathematics and Statistics for Business

CBCG-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, Training and Supervising Service Industry Personnel** **Registration #0209-225**

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 Engineering** **Registration #0210-305**

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

Credit 4

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

Credit 4

Logistics and Transportation Management

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

Credit 4

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

Credit 4

Real Estate

**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 475-4940.

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 475-4940.

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

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 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 and 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 4

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 Home Interiors**
Registration #0223-218

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 Environmental Design**
Registration #0223-227

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

Credit 2

CHAD-231 **Color Theory in Art**
Registration #0223-231

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

Credit 2

CHAD-235 **Commercial Interior Design**
Registration #0223-235

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

Credit 2

CHAD-251,252,253 **Environmental Design**
Registration #0223-251,252,253

The study of enclosed space, using material and the elements of design, line form, texture, and color to develop living space. (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. (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 2

CHAD-295 **Independent Study: Design**
Registration #0223-295

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

Credit Variable

Drawing

CHAF-201,202,203 **Basic Drawing and Media** **Registration #0224-201, 202,203**

An 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-306 **Drawing** **Registration #0224-306**

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

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

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

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-317 or equivalent)

Credit 2

CHAF-337 **Portrait Painting** **Registration #0224-337**

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

Credit 2

CHAF-341 **Watercolor Painting** **Registration #0224-341**

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

Credit 2

Sculpture

CHAF-247 **Sculpture** **Registration #0224-247**

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

Credit 2

CHAF-357 **Sculpture Workshop** **Registration #0224-357**

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

Credit 2

Illustration

CHAF-361 **Illustration** **Registration #0224-361**

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

Credit 2

CHAF-362 **Airbrush Techniques**
Registration #0224-362

This course is designed to provide an opportunity for beginners to develop the basic skills and techniques of painting with an airbrush and allow experienced users to enhance their skills. Graphic artists, fine artists, illustrators, and photographers can benefit from this exposure to airbrush techniques and applications through demonstration and experiential learning. Class will be limited to 10 students. (0223-201, 202, 203, and 0224-201, 202, 203 or equivalent)

Credit 3

CHAF-263 **Calligraphy**
Registration #0224-263

Students will explore the history of the alphabet through slides, lectures, and projects. Italic handwriting with related variations and techniques will be taught.

Credit 2

CHAF-363 **Calligraphy Workshop**
Registration #0224-363

Further study in the methods and techniques of calligraphy. Students will be able to pursue study in a 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 and Jewelry**
Registration #0225-201

Emphasis will be placed on basic jewelry making techniques involving sawing, filing, soldering, hand and machine finishing techniques, simple stone setting and more. Design will be stressed throughout the course. May be elected more than once for credit.

Credit 2

CHAM-211 **Intermediate Metalcrafts and Jewelry**
Registration #0225-211

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

Credit 2

CHAM-301 **Advanced Metalcrafts and Jewelry**
Registration #0225-301

For advanced students in the arts 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: Metalcrafts/Jewelry**
Registration #0225-295

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 and Jewelry**
Registration #0225-298

Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.

Credit Variable

Weaving/Textiles

CHAT-201 **Introduction to Weaving**
Registration #0226-201

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

Credit 2

CHAT-211 Intermediate Weaving**Registration #0226-211**

A continuation in the development of weaving techniques and design skills through advanced study of color effects, drafting, 4 harness and tapestry techniques. The course will include samples of a particular technique plus home assignments and a final project to satisfy individual needs. May be elected more than once for credit. (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 foundations of Japan's economic and technological success? This course considers the economy, government, and society of modern Japan and traces its emergence from the first contacts with the West in the 1500s to its present position as a leading economic power. This course may serve as a social science elective.

Credit 4

Deaf Studies

CHGD-211 Sign Language & Manual**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 3

CHGD-311 **American Sign Language I
Registration #0234-311**

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

Credit 2

CHGD-312 **American Sign Language II
Registration #0234-312**

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

Credit 2

Humanities

CHGH-201 **Humanities
Registration #0235-201**

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

Credit 4

CHGH-202 **Humanities
Registration #0235-202**

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

Credit 4

CHGH-203 **Humanities
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 Modern). 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 CCHGL-204, or equivalent, may register for Dynamic Communications II, CHGL-205.

CHGL-120 Basic Communications
Registration #0236-120

This course provides an opportunity for students to improve their reading, writing, listening skills. For college-prep students or adults who want to upgrade their communication skills.

Credit 0

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, logic, coherence, logical development of ideas, and effective use of language is emphasized. Basic research techniques and critical reading skills are also 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. Emphasis will be on organizing and supporting ideas in papers of several paragraphs. The major exercise is the writing of an 8-10 page researched position paper and an oral defense of the paper's thesis. A study of critical reading techniques will teach students to evaluate the substance, logic, organization, and clarity of their own writing. (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 will 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 Leadership
Registration #0236-302

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

Credit 4

CHGL-307 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 will 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 learn to prepare reports of the sort required by practicing engineers and managers in industry and business. They will develop the ability to analyze audiences and purposes, state problems, design reports, and write and edit them. Assigned reports will be discussed and critiqued by peers and instructor. (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.

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.

Credit 2

CHGL-327 Practicum: Designing Manuals
Registration #0236-327

With supervision, students will apply general principles of technical communication to the process of planning, researching, writing, editing, formatting, and producing a finished manual.

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 will be discussed and put into practice.

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 2

CHGL-331 Promotional Writing
Registration #0236-331

This course focuses on practical guidelines for preparing marketing materials including brochures, data sheets, trade press articles, press kits, and newsletters.

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 marketing 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 **Audiovisual Presentations**
Registration #0236-333

This course introduces a variety of ways to visualize information for presentation to audiences. Students will learn how to match the media to the message and the audience, how to prepare simple materials quickly, and how to work with production units for more sophisticated visuals. From flip charts to video, visualizing information will be studied and practiced.

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 will be 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 will be on producing clear, correct copy that is appropriate for purpose and audience. (Comm-220 or equivalent; CHGL-365 recommended)

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-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)

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

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 acceptable 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, 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 learn 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 opticals 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 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 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 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 non-silver and unconventional silver halide systems in view of the future requirements in cost, sensitivity, image quality, color rendition, ecology (to compare them to present silver imaging systems), and to consider the reasons for the commercial failure and future prospects of other systems.

The course will 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 principle non-silver systems and today's research and product trends. Topics include: latent-image theory; exposure effects; mechanism of development and spectral sensitization; sensitometry, and image evaluation. (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-111, 112,113** **Color Separation Camerawork**

Fundamentals of light and color as applied to masking and color separation in offset lithography. Densitometric control of photographic operations is emphasized; various masking methods are surveyed. Laboratory projects supplement lecture materials. Credit 2/Qtr.

CHGT-141-142 **Offset Presswork****Registration #0239-141-142**

No longer offered. See course CHGT-265-365.

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 presswork is designed to prepare the student for more advanced concepts presented in the next course.

Credit 3

CHGT-365 Lithography II**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**Registration #0239-314****Flexography**

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. (Not offered 1989-90)

Credit 2

CHGT-317,318**Registration #0239-317,318****Computer Applications
in Printing**

A basic course covering computers and how they are used in graphic arts applications. Characteristics and types of computers used are discussed as well as introduction to programming concepts.

Credit 2/Qtr.

CHGT-341**Registration #0239-341****Printing Processes
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**Registration #0239-407****Ink and Color**

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**Registration #0239-421****Imposition and Finishing**

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**Registration #0240-101,102,103****Mathematics**

A three-quarter sequence for students whose high-school mathematics background is insufficient to allow them to enroll in degree-level mathematics course. This is an accelerated intermediate high school algebra course with an introduction to trigonometry.

Credit 0

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. (CTAM-103 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 and Processes**
Registration #0240-205

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

Credit 4

CTAM-206 **Modern Mathematical Methods**
Registration #0240-206

An examination of selected modern mathematical methods used in today's society. This examination includes a study of the nature of these methods, a study of how these methods are used, and a study of the usefulness of these methods in today's society.

Credit 4

CTAM-210 **College Algebra and Trigonometry**
Registration #0240-210

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-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 mod n . (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 n th 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)

Lec. 3, Lab 1, Credit 4

CTBE-411,412,413 Electric and Magnetic Fields**Registration #0241-411, 412, 413**

No longer offered

CTBE-421,422,423 Electronics**Registration #0241-421,422,423**

No longer offered

CTBE-431,432 Electronics (Advanced)**Registration #0241-431,432**

No longer offered

CTBE-433 Electronics (Communications)**Registration #0241-433**

No longer offered

CTBE-434 Digital Logic Design**Registration #0241-434**

No longer offered

CTBE-461,462,463 Electrical Engineering Principles**Registration #0241-461,462,463**

A course for non-electrical majors. Electric and magnetic circuits, electrical measurements, electronic devices, transformers, power systems, machines, and control circuits. (CTAM-305 and CTCP-303 equivalent)

Credit 4/Qtr.

CTBE-501 Electromagnetic Energy Conversion**Registration #0241-501**

No longer offered

CTBE-511,512 Control Systems**Registration #0241-511,512**

No longer offered

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)

Lec. 3, Lab 1, Credit 4

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, chemical 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)

Lec. 2, Lab 1, Credit 3

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)

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

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)

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

CTCC-312 (Lec.)
CTCC-317 (Lab) **Analytical**
Registration #0242-312,317 **Chemistry-Separations**
 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)

Lec. 3, Lab 1, Credit 4

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-511,512 **Instrumental Analysis**
Registration #0244-511,512
 Instrumental techniques of analysis including spectrophotometry, conductance, potentiometry, and refractive index measurement, gas chromatography, mass spectroscopy, NMR, and electron spin resonance. Emphasis is placed on the uses of instrumental methods for structure determination, measurement of reaction, kinetics and mechanisms. (CTCC-313, CTAM-253 or equivalents)

Credit 4/Qtr.

CTCC-521 **Synthetic Organic Chemistry**
Registration #0244-521
 An extensive discussion of the methodology and strategy of the synthesis of complex organic molecules including a discussion of the stereochemistry and mechanism of the synthetic processes. (CTCC-233 and 238 or equivalent)

Credit 3

CTCC-522 **Physical Organic Chemistry**
Registration #0244-522
 Topics include activation parameters, kinetic treatment of mechanism elucidation, linear-free energy concepts, quantitative analysis of conformational and electronic effects, simple Huckel Molecular Orbital Theory, electrocyclic reactions, acidity functions and primary and secondary isotope effects. (CTCC-403 or equivalent)

Credit 3

CTCC-523 **Advanced Topics**
Registration #0244-523 **in Organic Chemistry**
 Several of the following advanced topics in organic chemistry are covered: polyfunctional compounds, modern synthetic methods, stereochemistry, conformational analysis, free radical reactions, natural and synthetic polymers. (CTCC-233 and 238 or equivalent)

Credit 3

CTCC-525 (Lec.)
CTCC-535 (Lab) **Qualitative**
Registration #0244-525,535 **Organic Analysis**
 A combination of chemistry and spectroscopic techniques is used to identify the structure of "unknown" organic compounds. (CTCC-233 and 238)

Lec. 1, Lec./Lab 2, Credit 3

CTCC-528 **Organic Chemistry**
Registration #0244-528 **of Polymers**
 Introduction to the chemistry of synthetic, high molecular weight polymers and a survey of their diverse structures and properties. Mechanisms of condensation, free radical and ionic polymerization. (CTCC-233 and 238 or equivalent)

Credit 3

CTCC-551 **Inorganic Chemistry**
Registration #0244-551
 The properties and structures of the elements and their compounds in relation to electronic and stereochemical principles. Some emphasis on the reactions and spectroscopic identification of inorganic compounds. (CTCC-403 and 407 or equivalents)

Credit 4

CTCC-555 **Biochemistry**
Registration #0244-555
 Introduction to modern biological chemistry, physiological and physical-chemical aspects of energy metabolism, intermediary metabolism, biosynthesis of biopolymers, and metabolic regulations; structure and function of proteins and nucleic acids as an introduction to enzymology, molecular biology, and molecular genetics. (CTCC-233 and 238 or equivalent)

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. (CTCC-403 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. (CTCC-403 or equivalent)

Credit 3

CTCC-563 **Chemical Thermodynamics**
Registration #0244-563
 A study of the basic fundamentals of thermodynamics and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases will be calculated based on spectroscopic data. (CTCC-403 or equivalent)

Credit 3

CTCC-564 **Quantum Chemistry**
Registration #0244-564
 The application of quantum mechanics to the covalent bond, diatomic molecules, resonance and complex molecules; molecular spectroscopy; elements of quantum statistical mechanics. (CTCC-403 or equivalent)

Credit 3

CTCC-565 **Chemical Kinetics**
Registration #0244-565
 Methods of investigating the kinetics of chemical reactions and the theories used to interpret their results. Focus on homogeneous reactions in gas and liquid phases; discussion of references from recent chemical literature. (CTCC-403 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.)

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

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)

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

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**Registration #0245-458**

A continuation of CTCP-457. Many electron atoms, molecular physics, solid state physics and devices. (CTCP-457 or equivalent).

Credit 4

Modern Physics**CTCP-459****Registration #0245-459**

Elementary particles, nuclear structure, nuclear reactions, fission, fusion. Nuclear power, accelerating machines. (CTCP-458 or equivalent)

Credit 4

Nuclear Physics**Contemporary Science****CTCS-221****Registration #0246-221**

An introduction to the fundamental principles of biology for non-science 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

Contemporary Science: Biology**CTCS-222****Registration #0246-222**

An introduction to the fundamental principles of chemistry for non-science 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

Contemporary Science: Chemistry**CTCS-223****Registration #0246-223**

An introduction to the fundamental principles of physics for non-science 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

Contemporary Science: Physics**CTCS-224****Registration #0246-224**

An introduction to the fundamental principles of oceanography for non-science 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

Contemporary Science: Oceanus**CTCS-289****Registration #0246-289**

This course is an introduction to physics for non-science 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

Contemporary Science:**Mechanical Universe****Computer Programming****CTDP-201****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

Computer Techniques**CTDP-215****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

FORTRAN Programming**CTDP-241****Registration #0249-241**

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

Programming I Algorithmic Structures**CTDP-242****Registration #0249-242**

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

Programming II Data Structures**CTDP-243****Registration #0249-243**

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

Programming III Design and Implementation

CTDP-305 **Assembly Language Programming**
Registration #0249-305

A study of assembly language programming methods with topics including computer organization, assembly process, assembly coding, addressing, binary arithmetic, 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 Programming**
Registration #0249-307

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 Techniques and Applications**
Registration #0249-318

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 for Engineers**
Registration #0249-320

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 4

CTDP-488 **Programming Systems Workshop**
Registration #0249-488

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

Credit 4

Computer Systems

CTDS-200 **Introduction to Computers and Programming**
Registration #0250-200

Basic concepts and overview of computer science. The topics include historical development, algorithms, flowcharting and programming in BASIC. Exposure to 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) j.

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 Computer Science**
Registration #0250-202

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 In Application Software**
Registration #0250-203

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

Credit 4

CTDS-230 **Discrete Structure**
Registration #0250-230

No longer offered, see CTAM-265.

CTDS-315 **Digital Computer Organization**
Registration #0250-315

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 4

CTDS-325 **Data Organization and Management**
Registration #0250-325

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 and Implementation**
Registration #0250-335

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 and Automata**
Registration #0250-340

Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis and synthesis, sequential iterative systems and space-time transformations. (CTDS-315)

Credit 4

CTDS-380 **Introduction to Computer Science Theory**
Registration #0250-380

A survey of important topic areas in computer science theory. Topics may include regular expressions; deterministic and non-deterministic finite state machines; analysis of space and time complexity of algorithms; algorithm design paradigms; concepts of NP-Hard and NP-Complete algorithms; introduction to formal correctness of programs; Turing machines and the halting problem! (CTAM-265, CTAM-266)

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 4

CTDS-480 **Formal Languages**
Registration #0250-480

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

Credit 4

CTDS-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, and Compilers**
Registration #0250-525

A survey of three basic programming language processors; assemblers, interpreters, and compilers. The topics include design and construction of language processors, formal syntactic definition methods, parsing techniques and code generation techniques. (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-545 **Processor Design Concepts**
Registration #0250-545

A survey of bit-slice processor design and implementation techniques. Topics include microprogramming and emulation, comparison of microcode and hardwired logic, I/O processors and subsystems. (CTDS-315)

Credit 4

CTDS-550 **Review of Computer Science**
Registration #0250-550

Review of significant advances in computer science which have occurred in the last few years. Designed to give graduating 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, evaluation and selection methodology. The design aspect deals with the problem of specifying physical systems on the basis of logical design specifications and performance analysis of existing and proposed computer systems. The selection aspect covers vendor proposal requests, evaluation and validation of proposals and procurement methods. (CTDS-315 and CTDS-325)

Credit 4

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)

Lec. 3, Lab 1, Credit 4

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)

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

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 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-210**Industrial Plastics****Registration #0255-210**

No longer offered; see CTEF-314

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. (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.

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-101 **Mechanical Blueprint Reading I**
Registration #0262-101

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

Credit 0

CTID-102 **Mechanical Blueprint Reading II**
Registration #0262-102

This course is a continuation of CTID-101 dealing with further study of machine detail and assembly drawings. However, the major emphasis of the course will be the application of modern geometric dimensioning and tolerancing as used on all types of drawings as derived from the ANSI Y14.5 government standards.

Credit 0

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-210 **Computerized Descriptive**
Registration #0262-210 **Geometry**

Computerized Descriptive Geometry is the study of solving spatial 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 the 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. With emphasis on graphic communication rather than skills development.

Credit 2

CTID-212 **Engineering Graphics**
Registration #0262-212

This course covers the fundamental principles of descriptive geometry as used to find graphical solutions to spatial engineering problems. Students are taught methods of drawing an object in any view desired and also problems of ordinary point-line-plane are solvable by the same methods. (CTID-211 or equivalent)

Credit 2

CTID-213 **Engineering Graphics**
Registration #0262-213

The subject of graphical kinematics is introduced by first covering the principles of basic motion; namely velocity and acceleration. These concepts are then applied to the design and analysis of mechanisms such as linkages, cams, gears, pulleys, belts, etc. The graphical approach is emphasized where applicable throughout the course. (CTID-212 or equivalent)

Credit 2

CTID-215 **Manufacturing Processes**
Registration #0262-215

Manufacturing Process 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-217 **Design Considerations**
Registrations #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-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-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. (CTAM-103 or equivalent)

Lec. 3, Lab 1, Credit 4

CTIL-202 (Lec.)
CTIL-207 (Lab) **Elements of Electricity**
Registration #0264-202,207 **and Electronics**

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 solve problems related to various circuit configurations are presented. (CTAM-v103 or equivalent)

Lec. 3, Lab 1, Credit 4

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. (CTAM-103 or equivalent)

Lec. 3, Lab 1, Credit 4

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, amplidyne, 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)

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

CTIL-303 (Lec.)
CTIL-308 (Lab)
Registration #0264-303,308
Pneumatic and 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)

Lec. 3, Lab 1, Credit 4

CTIL-351,352
Registration #0264-351,352
Electromechanical Devices 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 valves, motors, mechanisms and control devices; open loop, closed loop, digital analog, sequential systems. Analysis of systems representative of types found in industrial use today. The laboratory includes analysis and troubleshooting of operational electromechanical systems. (CTIL-301/306 and 302/307)

Credit 4/Qtr.

CTIL-353 (Lec.)
CTIL-358 (Lab)
Registration #0264-353,358
Introduction to 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)
 Lec. 3, Lab 1, Credit 4

Machine Shop

NOTE: All courses must be taken in the proper sequence in each program. For additional information call department, 475-5006.

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

Credit 1/Qtr.

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

Credit 1/Qtr.

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

Credit 1/Qtr.

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

Credit 1/Qtr.

CTIS-151,152,153
Registration #0266-151,152,153
Shop Mathematics
 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

CTIS-154,155,156
Registration #0266-154,155,156
Shop IVigonometry
 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. (CTIS-153 or equivalent)

Credit 0

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

Credit 0

CTIS-161,162
Registration #0266-161,162
Heat Treatment
 Practical heat treatment of metals; carburizing, cyaniding, nitriding, annealing, normalizing and hardening of steels. Relation of tool steels to particular applications and their resulting properties, including hardness, toughness, wear resistance, machinability and movement in hardening; treatment of 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.)
CTIS-206, 207,208 (Lab)
Registration #0266-201,202,203, 206,207,208
Machine Shop
 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)****Registration #0266-204,209**

A combination of CTIS-201, 202, 203 and 206, 207, 208. Offered summer only.

Credit 6

Machine Shop**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

Machine Tool**CAIM-101****Precision Measurement****Registration #0270-101**

The course and use of all common inspection and gauging equipment. Demonstration on set-up and use of CMM contour projection, sine BAR, thread gauges, plug gauges, and snap gauges. The student will demonstrate the proper use and methods for inspection of a PC part with the above equipment.

Credit 0

CAIM-120**Industrial Machine Shop I****Registration #0270-120**

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

Credit 0

CAIM-210**Materials and Methods****Registration #0270-210**

Machine shop theory and techniques involving the basic machine tools, the practical application of cutting material, tool geometry, measuring and inspection, turning and milling, threads and threading, drilling and grinding work. Introduction to plastics and powder metals, their properties and processing.

Credit 3

CAIM-214**Numerical Control****Registration #0270-214****Programming and Machining**

An introduction to the field of numerical control and N/C programming. Techniques for both manual and computer assisted programming of cutter paths are practiced. Programs include: turning and milling in point to point, linear and circular interpolation modes, use of loops, macros, canned cycles and cutter compensation. Operation of state-of-the-art CAM computer, printer, plotter, bit pad, DNC and CNC controls included. (CAIM-120 or equivalent)

Credit 3

CAIM-218**Tool and Gage Making****Registration #0270-218**

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

Credit 3

CAIM-220**Die-making****Registration #0270-220**

Introduction to die-making and its relation to the production process of stamping sheet and plate materials, both metals and non-metals. Empirical (experience) and technical data are used to develop the details, techniques, and theories of cutting and forming processes of pressworking (stamping) dies. Guidelines for the manufacture of die components, selection of proper die sets, and economical materials use are emphasized. (CAIM-231)

Credit 3

CAIM-222**Metallurgy and Heat Treating****Registration #0270-222**

An introductory course in the physical and mechanical characteristics of metals and alloys. Heat treating of steels and the use of the iron-carbon equilibrium diagram, transformation diagram, hardenability of tool steels and alloy steels.

Credit 3

CAIM-231**Industrial Machine Shop II****Registration #0270-231**

Extensive application and advanced projects using machine tools, such as engine lathes, turret lathes, vertical mills, and surface grinders. Explanation and demonstrations on more difficult problems, assemblies and temporary tooling. Emphasis on neatness, time, quality, and accuracy. (CAIM-120, CAIM-106 or equivalent)

Credit 4

**CAIM-232 Intermediate Machine Tool
Registration #0270-232 Technology**

Complex part and assembly machining involving more advanced techniques of turning, milling centers, and surface and cylindrical grinders. Principles of cutting theory and basic cutter grinding are discussed and demonstrated. Advanced manufacturing processes involving electro discharge machining (EDM), numerical control (N/C), and computer-aided manufacturing (CAM) are introduced and applied. (CAIM-231)

Credit 4

**CAIM-233 Advanced Machine Tool
Registration #0270-233 Technology**

This course teaches the manufacturing and assembly processes involved in building a die, jig or fixture needed to produce a part to print specifications. Students manufacture a die, jig or fixture by utilizing standard machining techniques, and also special machines and equipment such as: electrical discharge machine (EDM), cylindrical grinder, jig bore, internal grinder, honer, radius dresser, and heat treating of 0-1 tool steel. Components and piece parts are inspected for conformance to the prints.

Credit 4

**CAIM-240 Advanced Machining Operations
Registration #0270-240**

The lecture portion of this course focuses on the theory and advanced machining applications on the EDM N/C tool grinding, cylindrical grinding and Turret lathe. The student will demonstrate proper set-up and operations on the above machines.

Credit 3

Communications

**CAIG-104 Communication Skills
Registration #0274-104**

A review of basic skills in reading, writing, listening, speaking, studying, and time management.

Credit 0

**CAIG-105 Communicating on the Job
Registration #0274-105**

An application of communication skills to entry-level jobs. Includes writing business letters and memos, giving and following directions, filling out forms, practicing interpersonal communications in simulated job scenes. (CAIG-104)

Credit 0

**CAIG-223 Career Communications
Registration #0274-223**

This course introduces students to their role in the workplace and to the communications required in entry-level technical positions. Students will complete representative samples of forms and reports; write memos and business letters; use journals, manuals, catalogs, and other printed resources; and present job-related information orally to peer audiences and supervisors.

Credit 2

Mathematics

**CAIG-110 Industrial Mathematics I
Registration #0274-110**

This course presents fundamental concepts of arithmetic and algebra that are necessary for problem solving in manufacturing technologies. Topics include operations with fractions, decimals, and signed numbers; solution and evaluation of equations and formulas; perimeter and area of plane figures; surface area and volume of solid figures; ratio, proportion, tapers, pulleys and gears, speeds, feed rpm, and cutting time; SI units of measure; and English metric conversion. (One year of high school algebra or equivalent)

Credit 0

**CAIG-111 Industrial Mathematics II
Registration #0274-111**

This course presents fundamental concepts of geometry and trigonometry that are necessary for problem solving in manufacturing technologies. Topics include pertinent theorems of geometry with applications; right and oblique triangle trigonometry with simple and complex applications; coordinate geometry and point location with CNC-CAD/CAM applications; and binary coding (CAIG-110 or equivalent)

Credit 0

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

Credit 2

**CAIC-215 Special Tool/Equipment Use
Registration #0275-215**

The care and use of special tools and testing equipment used to repair computers will be studied. The student will demonstrate proficiency in a lab situation. (CAIC-212)

Credit 1 -

**CAIC-218 Linear Circuits
Registration #0275-218**

The properties of linear integrated circuits and their applications in power supplies, regulators, amplifiers, oscillators, and multivibrators will be studied.

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

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 Engineering**
Registration #0306-200

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

Class 1, Credit 1 (F)

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

The course covers the specification, analysis, and design of digital systems. The rapid growth of digital computers, 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 transfer 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 Design**
Registration #0306-553

This course deals with the design of linear control systems using signals that are sampled in time and quantized in amplitude. The classical transform methods are first described and then applied to illustrative design examples. This course will focus 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-concurrent)

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

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

Introduction to some common transducers, transformations from raw measured quantity to transducer output. Instrumentation amplifiers, analog switching for applications in multiplexors and sample and hold circuits. The analog to digital and digital to analog conversions processes. Logic families including TTL, ECL, MOS, and their interfaces to each other. (4th year status in Computer Engineering)

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

EECC-561 **Digital System Design for**
Registration #0306-561 **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-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

EECC-722 **Advanced Computer**
Registration #0306-722 **Architecture**

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**
Registration #0306-740 **Computer Engineers**

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-756 **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 microprocessors have vast address spaces and virtual memory capability, incorporate complex I/O facilities, and permit rapid execution of cost-saving, high-level languages. The hardware and software support available for 16-bit microprocessors also makes them a cost-effective alternative to minicomputers. Distributed systems based on microcomputer technology will be investigated with emphasis on interconnect structures, intercommunications, software and hardware. The course will include a laboratory workshop in which each student will be required to design, implement, and test one or more parts of a practical system. Emphasis will be placed on engineering ability and management skill to meet proposed technical goals on time and within budget. (Graduate standing in Computer Engineering with at least three core courses completed or permission of instructor)

Class 4, Credit 4 (S)

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

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**
Registration #0306-772 **Engineering**

Topics and subject areas that are not among the courses listed here are frequently offered under the title of Special Topics. Such courses are offered in a normal format, that is, regularly scheduled class sessions with an instructor.

Credit variable (no regular course schedule)

EECC-784 **Digital Image**
Registration #0306-784 **Processing Algorithms**

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)

EEEE-200 **Electrical Engineering**
Registration #0301-200 **Graphics**

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

Class 0, Lab 2, Credit 1 (F)

EEEE-240 **Introduction to Digital**
Registration #0301-240 **Systems**

Survey of digital circuits and systems. It will describe these circuits operation and typical uses in terms of the external connections to commercially available circuit packages. Laboratory work in the form of home lab assignments is included in the course.

Class 3, Lab 1, Credit 3 (F, S, Ext. day F)

EEEE-310 Numerical Methods
Registration #0301-310

The objective of this course is to develop the ability to solve common engineering equations by means of the digital computer. Specific topics include making a table of values from a formula; obtaining a formula from a table of values; solving linear, nonlinear and transcendental equations; solving systems of equations; finding the solution of an ordinary differential equation; numerical differentiation. (ICSA-220)

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

EEEE-351 Circuit Analysis I
Registration #0301-351

Voltage, current, power, and energy; linearity. Kirchhoff's Laws; series, parallel and series-parallel circuits. Ladder networks. Branch current method of circuit analysis. Nodal, loop and mesh analysis. Thevenin's and Norton's theorems; maximum power transfer; superposition and reciprocity theorems. Inductance and capacitance. Response of RL and RC circuits to step input. Characteristics of common magnetic materials; analysis of magnetic circuits. (SMAM-253)

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

EEEE-352 Circuit Analysis II
Registration #0301-352

Sinusoidal steady state; time domain solution of simple circuits. Power in AC circuits. Complex exponential functions; phasors; impedance and admittance. Nodal, loop and mesh analysis. Network theorems. Transfer functions. Three phase networks; balanced three phase systems. Two-port networks; z , y and h parameters of two-ports. Mutual induction and coupled coils. Linear and ideal transformers. Resonance in parallel and series circuits. (EEEE-351)

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

EEEE-364 Digital Circuits and
Registration #0301-364 Microprocessors

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
Registration #0301-365 Microcomputers

Introductory course on microcomputers. Begins with Computer Architecture, including detailed discussions of the memory unit, the central processing unit, its registers and their functions. This is followed by a study of Computer Arithmetic, Logic Operations, Number Systems and Codes. Computer programming is then introduced at the machine and assembly language levels with emphasis on computer instruction sets and addressing modes. Straight line, branching and looping programs are studied and compared. The student is next introduced to computer input/output with emphasis placed on programmed controlled input/output. The course requires extensive hands-on exercise, ranging from simple computational programs to complex programs using the microcomputer as a digital controller. (EEEE-240)

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

EEEE-441 Electronics I
Registration #0301-441

PN junction. Semiconductor diodes and applications. Bipolar junction transistors and transistor amplifiers. Biasing and small signal analysis. Op amps and linear applications. Junction field effect transistors and amplifiers. Biasing and small signal analysis. (EEEE-351)

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

EEEE-442 Electronics II
Registration #0301-442

Continuation of EEEE-441. Differential amplifiers. Nonlinear op amp circuits. Frequency and pulse response of amplifiers. Feedback amplifiers. MOSFET amplifiers. Biasing and small signal analysis. Active loads. (EEEE-352, 441)

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

EEEE-453 Linear Systems I
Registration #0301-453 (Continuous)

Introduction to signal analysis and concepts of linear systems, Fourier series; evaluation of Fourier coefficients. Circuit analysis with periodic inputs.

Exponential form of Fourier series. Relationship between the exponential and trigonometric forms. Differentiation and integration of Fourier series. Fourier transforms; evaluation of Fourier transforms, Linear; series; input and output FT. Energy spectrum and energy spectral density. Laplace transform; evaluation of Laplace transform. Inverse LT through partial fraction expansion; application of LT to circuits and systems. Transfer functions (Bode diagram). (EEEE-352, SMAM-306, SMAM-420)

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

EEEE-455 Linear Systems for Microelectronics
Registration #0301-455

Introduction to signal analysis and concepts of linear systems. Fourier series, evaluation of Fourier coefficients. Exponential form of Fourier series. Relationship between the exponential and trigonometric forms. Linear systems, input and output FT. Energy spectrum and energy spectral density. Two dimensional FT. Applications to linear optical systems. (The course cannot be used by EE majors as a substitute for EEEE-453) (SMAM-306, EEEE-352)

Class 4, Credit 4

EEEE-471,472 Electromagnetic Fields I, II
Registration #0301-471,472

Vector analysis electrostatics and dielectrics, conduction current fields, magnetics, time-varying fields. Maxwell's equations and wave equations. Concepts of retarded potentials Electromagnetic propagation in waveguides, free space and transmission lines. Concepts of reflection, transmission and impedance matching. (SMAM-328, SPSP-313)

EEEE-471: Class 4, Credit 4 (S, SR, Ext. day S)

EEEE-472: Class 3, Lab 3, Credit 4 (F, W, Ext. day F)

EEEE-513 Introduction to Automatic
Registration #0301-513 Control

A 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 Conversion**
Registration #0301-531

A development of the basic relationships of field energy, magnetic force, torque and generated voltage in an electromechanical device. Expansion of these fundamentals into an understanding of the operational characteristics of the electrical machine. (EEEE-352)

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

EEEE-534 **Introduction to Communication Systems**
Registration #0301-534

Review of linear systems as applied to communication signal processing. Non-linear devices in communication systems. Introduction to Fourier transform and its role in spectral analysis of signals and systems. Introduction to amplitude modulation DSB-SC, AM, SSB, VSB and their applications. Introduction to frequency and phase modulation techniques. Noise theory and the role of noise in communication systems. (SMAM-351, EEEE-453)

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

EEEE-535 **Introduction to Power Electronics**
Registration #0301-535

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

Class 3, Lab 3, Credit 4 (offered on sufficient demand)

EEEE-544 **Physics of Electronic Devices**
Registration #0301-544

This course will provide an understanding of the physical mechanisms which govern the operation of semiconductor devices. The relationships between the physical and structural parameters of the device and its electrical performance will be studied. Topics include semiconductor fundamentals, pn junction diodes, bi-polar transistors, FET and MOSFET. (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 teach students how to analyze digital electronic circuits. Topics include transistors in the saturation, active and cutoff regions; normal and inverse models. JFET and MOSFET in saturation and triode regions. The following logic families are covered in detail: TTL, ECL, NMOS, PMOS, and CMOS. A discussion of the applications and characteristics of analog switches concludes the course. (EEEE-240, 544, 472)

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

EEEE-554 **Linear Systems II (Discrete)**
Registration #0301-554

Review of (continuous) linear systems concepts and techniques. Time-frequency signal and system relationships; time-bandwidth products; convolution in time and frequency. Discrete representation of continuous signals; sampling theorem, sample and hold action, A/D and D/A conversion. Elements of discrete signal processing: conceptual view, special sequences, linearity and shift invariance, difference equations, impulse response sequence and the convolution sum. Linear discrete shift invariant discrete system analysis: general input-output difference equation, response to exponential sequences, the Z transform, the inversion integral, the transfer function, transforms of common sequences, basic theorems, partial fraction expansions. "Frequency response" of discrete systems sinusoidal input/output, frequency response, relations between Z plane and S plane; frequency response in Z plane, aliasing effects. Introduction to digital filters; difference equations and transfer functions, block diagram realizations FIR and IIR systems. Central sum, central shift, partial fraction, cascade effects on algorithms, aliasing effects and the bilinear transform, FIR filters and windows. Frequency domain methods, continuous system analogy, the discrete Fourier transform, processing in the frequency domain, intra to FFT. Quantization, effect: single quantization coefficient quantization, arithmetic quantization, signal scaling and overflow. (EEEE-453)

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

EEEE-590 **Thesis**
Registration #0301-590

A research or development project to be carried out under the general supervision of a faculty member. The project need not be of the "state-of-the-art" type, but a reasonable problem of theoretical and/or experimental investigation. To be arranged with an individual faculty member.

Credit 4

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 the use of it in a manufacturing environment. The course will develop an understanding of how information obtained from these images is used for industrial automation. Topics include: image formation and sensing, discretization, effect of lighting, image recognition, binary images, geometrical properties, image segmentation, image processing, edge detection, differential operators, template matching, correlation techniques, control of robots, and industrial vision systems. (EEEE-554 and EEEE-513 or equivalent)

Class 4, Credit 4

**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, and the direct method of design are discussed and examples are presented. The student is expected to utilize available computer-aided design packages (ACSL, CNTRON-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)

**EEEE-621 Microwave Engineering
Registration #0301-621**

Review of basic electromagnetic theory. TEM transmission lines. Microwave waveguides. Microwave passive components. Ferrite components. Microwave solid-state devices. Microwave integrated circuits. (EEEE-472)

Class 3, Lab 3, Credit 4 (offered on sufficient demand)

**EEEE-622 Antenna Design
Registration #0301-622**

This is a design oriented course in antenna. 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 the basic, practical and popular antenna configurations; e.g., linear dipoles, arrays, horns, reflectors, and microstrip antennas. The student will also be exposed to the state-of-the-art methods used in the measurement of antenna characteristics, such as radiation pattern, gain, directivity, and input impedance. The primary part of this course will be a design project involving the design of an antenna which will include construction and testing of the antenna. The project will require a report and a presentation to the class with a demonstration. (EEEE-472)

Class 3, Lab 3, Credit 4 (offered on sufficient demand)

**EEEE-645 Special Semiconductor
Registration #0301-645 Devices**

This course covers devices and applications not normally encountered in the required electronic sequence. Four-layer devices such as the SCR, PUT, and Triac are discussed in some detail along with typical power conversion applications. Auxiliary services like the UJT and optocouplers are included. The use of bipolar power transistors and power MOSFETS in switching applications, especially as switching regulators, is described; and the performance of these devices is compared with that of the four-layer devices. The laboratory portion of the course consists of experiments to delineate the devices along typical applications. Following this, each student team designs and evaluates a switching power supply, then constructs and tests a design project of his/her choice. (EEEE-442)

Class 3, Lab 3, Credit 4 (offered on sufficient demand)

**EEEE-650 Design of Digital Systems
Registration #0301-650**

This deals with the design of synchronous and asynchronous systems of digital logic. Particular consideration is given to design implementation on programmable logic devices (PLDs). Design techniques are based on top down algorithms using state tables and ASM charts along with microprogramming. Design for testability and its effect on strategies are discussed. The practical aspects of system components and fabrication are surveyed including crosstalk, noise, and the Bergeron diagram. Two hardware design projects are required of the students. (EEEE-240)

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

**EEEE-665 Microcomputer-Based
Registration #0301-665 Systems Design**

This course will cover the effective applications of 8-bit microprocessors in the design of digital systems. Hardware and software organizations and design tools will be discussed. Memory system design including dynamic RAMS and DMA control will be studied. Serial and parallel I/O techniques including interrupts will be considered. LSI interface devices for interfacing peripherals will be discussed. Interfacing microcomputers with the analog world using A/D and D/A converters will be considered. Design case-studies of typical microcomputer-based systems will be discussed. (EEEE-365)

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

**EEEE-666 16-Bit Microcomputer
Registration #0301-666 Systems**

This course will cover both hardware and software aspects of 16-bit family microcomputers. The architecture details, timing and instruction sets will be discussed. Memory, serial and parallel I/O interfacing techniques including standard interface chips will be used. Multiprocessor concepts will be introduced. (EEEE-365)

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

**EEEE-670 Introduction to
Registration #0301-670 Microelectronics**

Introduction to the physics and chemistry of fabricating integrated circuits. Topics include mask making, epitaxial layer growth, diffusion, oxidation, ion implantation, and metallization. The course includes a design project where the student designs an integrated circuit including the circuit layout and process specification. Students will also use computer modeling and simulation programs such as SPICE, BISIM, and Supreme. This course is a prerequisite for EEEE-676, IC Processing Laboratory, in which integrated circuits are actually made. (EEEE-544)

Class 4, Credit 4 (SR, F)

**EEEE-672 Optical Devices and Systems
Registration #0301-672**

An introductory applied optics course designed not only to familiarize and review optical fundamentals but to introduce state-of-the-art concepts and applications. Fundamental aspects of laser operation, lens system analysis, optical modulation, optical detection, and noise problems associated with optical components will be discussed. Applications to fiber optics, integrated optics, and solar systems will be considered. A demonstration lab complements the lectures. (SPSP-315, EEEE-471, 472, concurrently)

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

**EEEE-674 Fiber Optics: Theory and
Registration #0301-674 Application**

To familiarize the engineer with the basic concepts involved in dealing with the ever-expanding field of fiber optics. Fundamentals as well as design applications will be discussed: light wave characteristics; fiber optical waveguide fundamentals and selection; fiber optical coupling. Source and detector characteristics and selection will be considered. Examples of practical optical systems will be analyzed. A project lab assignment will be part of the course. (SPSP-312, EEEE-472)

Class 3, Lab 3, Credit 4 (S)

EEEE-676 **I. C. Processing Laboratory**
Registration #0301-676

This is a laboratory course designed to introduce the student to integrated circuit processing. The following topics will be investigated: safety, vacuum technology and evaporation of metals, artwork generation, photoreduction, photoresist technology, water characterization, water cleaning metal semiconductor fabrication, diffusion, MOS device fabrication, I. C. fabrication, wire bonding and packaging. Each laboratory exercise requires extensive preparation on the part of the student, in the form of research, reading, computations and device design. (EEEE-670)

Class 2, Lab 6, Credit 4 (S)

EEEE-677 **Digital Filters and Signal**
Registration #0301-677 **Processing**

Topics include the design of digital IIR filters, and the analysis and design of digital air filters and the significance of linear phase. The DFT is reviewed and FFT algorithms are studied in depth. Special high-speed signal processing computer chips are considered and reference is made to machine language programming of these and other microcomputers. Applications of digital signal processing are then considered including speech processing, linear predictive coding and fast algorithms for special matrix inversion. The course concludes with an introduction to two-dimensional signal processing with applications to image processing. Class demonstrations are given and several computer assignments will be required. (EEEE-554)

Class 4, Credit 4 (F, S)

EEEE-679 **Active and Passive Filters**
Registration #0301-679

The first half of this course deals with the filter transfer functions, poles and zeros, and concepts of filter amplitude and phase response. Butterworth, Chebyshev and elliptic filters are considered as well as low-pass/high-pass and low-pass/band-pass transformations. The second half of the course deals with methods of practical filter design with emphasis placed on active 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 digital communication systems. Topics include binary and M-ary signaling and performance, receiver and network synchronization techniques and multiple access techniques. (EEEE-534, SMAM-351)

Class 4, Credit 4 (W, S)

EEEE-694 **Information Theory and Coding**
Registration #0301-694

The course introduces the student to the notion of quantitative measure 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)

Credit 4

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, loud-speaker 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)

Credit 4 (F, W, S)

Industrial 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 (W)

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 (F)

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 (F-516, SR-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 (W)

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 (SR)

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 (SR)

EIEI-503 **Simulation**
Registration #0303-503

A first course in simulation emphasizing the role of the computer in developing simulation models. The SLAM simulation language is emphasized. (EIEI-202, SMAM-351 or equivalent)

Class 4, Credit 4 (F)

EIEI-510,511 **Applied Statistics I, II**
Registration #0303-510,511

An applied approach to statistics utilizing theoretical tools acquired in other math-stat courses. Heavy emphasis on understanding and applying statistical analysis methods in real-world situations in engineering. Topics include quality control, reliability, analysis of variance, and regression. (SMAM-351, 352)

Class 4, Credit 4 (F-510, S-511)

EIEI-520 **Engineering Economics**
Registration #0303-520

Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting. (SMAM-351 or permission of instructor)

Class 4, Credit 4 (W)

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 (S)

EIEI-560 **Project Design**
Registration #0303-560

A design course oriented to the solution of on-site industrial engineering problems. Each student group will attempt to define, analyze, design, and implement a solution to actual ongoing problems in the Rochester community. (Permission of instructor)

Class 4, Credit 4 (S)

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 (SR)

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**

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**

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**

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: Newton's Laws, the principle of transmissibility of forces, couples, centroids, trusses, frames, machines and friction. Introduction to strength of materials: axial stresses and strains, statically indeterminate problems, thin-walled pressure vessels, direct shear, torsion, and bending. (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 function. (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 Programming****Registration #0304-342**

This course introduces the students to the fundamentals of programming through the learning of the FORTRAN language. Topics covered include structured programming techniques using sequential IF-THEN-ELSE and DO WHILE structures. Various forms of the input/output are learned including formatted I/O and END-OF-FILE detection. 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 2, 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 is designed to illustrate the mechanical behavior of common engineering materials. Students investigate the material response to axial loads and perform experiments in simple torsion analysis 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 third-year mechanical engineering 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 I****Registration #0304-413**

This is a basic course that introduces the classical theory of thermodynamics. After the complete first law analysis of air standard cycles (Carnot, Otto, Diesel, etc.) the Clausius and Kelvin-Planck statements of the second law are correlated with the concept of entropy. Both real and reversible processes are studied on the pressure vs. specific volume and the temperature vs. entropy coordinate systems. Also, the students are introduced to the properties of pure substances, and open systems. (SMAM-306, EMEM-336)

Class 4, Credit 4 (F, W)

EMEM-415 **Fluid Mechanics I**
Registration #0304-415

Physical characteristics of a fluid: density, stress, pressure, viscosity, temperature, vapor pressure, compressibility. Descriptions of flows: Lagrangian and Eulerian; stream lines, path lines, streak lines. Classification of flows. Fluid statics: hydrostatic pressure at a point, pressure field in a static fluid, manometry, forces on submerged surfaces, buoyancy, standard and adiabatic atmospheres. Flow fields and fundamental laws: the flux vector, systems and control volumes, Reynolds Transport theorem, integral control volume analysis of basic equations for stationary and moving control volumes. Inviscid Bernoulli and the Engineering Bernoulli equations, some applications. 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 and Energy Lab I**
Registration #0304-416

This course is to be taken concurrently with Fluid Mechanics (EMEM-415). This is a laboratory course consisting of 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, 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. Applications of the first and second law to closed and open systems; elementary heat transfer considerations for electrical engineers. (SPSP-312)

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

EMEM-437 **Introduction to Machine Design**
Registration #0304-437

The analysis and theory of machine design and applications to systems design problems; particular emphasis is placed on the design and analysis of machine elements. A discussion of engineering professionalism and ethics. (EMEM-347, EMEM-348)

Class 4, Credit 4 (F, W)

EMEM-439 **Dynamics**
Registration #0304-439

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 modeling and solving engineering problems using computers and interpreting and analyzing the numerical results obtained. Topics include roots of algebraic and transcendental equations, solutions of homogeneous and non-homogeneous systems 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. (EMEM-437)

Class 4, Credit 4 (S, SR)

EMEM-514 **Heat Transfer I**
Registration #0304-514

This is a basic course in the fundamentals of heat transfer by conduction, convection, and radiation, together with applications to typical engineering systems. Topics covered include one-dimensional steady state and transient heat conduction, radiation between black bodies and gray bodies, correlations for the Nusselt number in forced and natural convection, and an introduction to heat exchanger design by LMTD and NTU methods (EMEM-413, EMEM-415)

Class 4, Credit 4 (F, W)

EMEM-518 **Advanced Computational Techniques**
Registration #0304-518

The theoretical base obtained in Numerical Methods, EMEM-440, is extended to discrete analysis. The course covers finite element and finite difference techniques and their applications in mechanical engineering (structural analysis, heat transfer, fluid mechanics). (EMEM-440)

Class 3, Lab 2, Credit 4 (S, SR)

EMEM-543 **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 harmonic 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 3, Credit 4 (F, W)

EMEM-54S 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. (EMEM-439; 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.

Class 4, Credit 4 (S, SR)

EMEM-551 Thermal Fluid Science and Energy Lab II**Registration #0304-551**

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. (EMEM-415, EMEM-416, EMEM-514)

Lab 3, Credit 1 (S, SR)

EMEM-599 Independent Study**Registration #0304-599**

An assigned project encompassing both analytical and experimental work integrating the student's education in mechanical engineering. (Upper-level standing)

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. (EMEM-413, 415, 437, 440, 514, 543, and one of the technical elective courses).

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.)

EMEM-60S Applications in Fluid Mechanics**Registration #0304-60S**

This Group I course deals with specific design-oriented applications of fluid mechanics. The course will cover one of the following topics: (a) hydrodynamics, (b) dispersion and diffusion in the environment, (c) aerodynamics, and (d) two-phase flows. Students are required to design, and sometimes to build, a prototype. Use of digital computer is encouraged in the design process. (EMEM-440, EMEM-516, EMEM-550)

Class 4, Credit 4 (F, W)

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

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-63S Heat Transfer II**Registration #0304-63S**

The course considers numerical solution of heat transfer problems requiring the use of digital computer programming. It also investigates forced and natural convection heat transfer to single phase fluids and fluids with phase change. It includes a major design project, homework assignments, one-hour classroom tests and a comprehensive final examination. (EMEM-440 and EMEM-514)

Class 3, Lab 2, Credit 4 (S, SR)

EMEM-652**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, homework assignments, one-hour classroom tests and a comprehensive final examination. (EMEM-415, EMEM-413)

Class 4, Credit 4 (S, SR)

Fluid Mechanics of**Turbomachinery****Free Elective Courses**

These are offered at least once every three years.

EMEM-637**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)

Laser Engineering**EMEM-658****Registration #0304-658**

A design-oriented course in mechanical vibrations and noise control with emphasis on design applications and instrumentation. Free and forced vibrations of 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)

Engineering Vibrations**EMEM-643****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 (S, SR)

Control Systems**EMEM-660****Registration #0304-660**

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)

Refrigeration and Air**Conditioning****EMEM-650****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. (EMEM-516)

Class 4, Credit 4 (TBA)

Gas Dynamics**EMEM-672****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)

Dynamics of Machinery**EMEM-651****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)

Viscous Flows**EMEM-694****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)

Stress Analysis**EMEM-680****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)

Advanced Thermodynamics**EMEM-685****Registration #0304-685**

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, curved bars, and frames; rotating disks; introduction to composite materials (EMEM-437 and EMEM-440)

Class 4, Credit 4 (TBA)

Advanced Strength of Materials

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 Engineer**Registration #0304-690**

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

EMEM-698 Independent Study Design Project**Registration #0304-698**

This is a design-oriented independent study requiring a major design project. (Senior standing)

Credit 4

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 Microelectronics**Registration #0305-201**

This course will provide the student with introductory and career information about the profession of microelectronic engineering. Students study how integrated circuits are made and 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-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 micro-electronic 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-44L, 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-563. Topics emphasize advanced lithographic processes. (PIMG-563, EMCR-573)

Lab 3, Credit 1 (F, W)

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****Registration #0305-650** **Processing Lab**

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

FADC-520 Professional Design Business Registration #0402-520 Practices and Ethics

Ethical principles will be discussed along with sound business practices; setting up in business; invoicing and costing; the designer and the law; professional associations.

Class 3, Credit 3 (offered on sufficient demand)

FADD-301,302, 303 Industrial, Interior and Packaging Registration #0403-301,302,303 Design (Sophomore Core)

An introduction to the fields of industrial, interior, and packaging design. Emphasis is on basic skills and processes for design conceptualization and development. Prerequisite for major in Industrial, Interior and Packaging Design. (Foundation program or equivalent required)

301—Systems and Exhibits

302—Graphic Visualization

303—Drafting

Lab 6, Credit 4 (offered each year)

FADD-311,312,313 Industrial, Interior and Packaging Registration #0403-311,312,313 Design

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-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-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)

FADF-205,206, 207 **Creative Sources**
Registration #0404-205,206,207

This course is designed to make students aware of their environment, their physical being and their experiences as tools for creative problem solving. This will be accomplished through lectures, individual and group assignments and demonstrations.

Class 1, Lab 1, Credit 2 (offered each year)

FADF-210, 211, 212 **Drawing**
Registration #0404-210,211,212

A basic foundation in drawing as a form of creative expression and a means to communicate information. Through the use of organic and inorganic materials, attention is given to individual response to "seeing" as interspersed with all sensory conditioning. The figure is utilized in the analysis of action, structure, and gesture through quick sketches.

Lab 9, Credit 4 (offered each year)

FADF-221,222, 223 **Design for Photo I**
Registration #0404-221, 222, 223

Study of principles of two-and three-dimensional design as a means of communication and expression.

Class 1, Lab 2, Credit 2 (offered each year)

FADF-231,232, 233 **2-D Design**
Registration #0404-231, 232,233

The elements of design and color and their structural relationship as applied to problems in two dimensions using a variety of media.

Lab 6, Credit 3 (offered each year)

FADF-241,242,243 **3-D Design**
Registration #0404-241, 242,243

The elements of design and color and their structural relationship as applied to problems in three dimensions. A variety of media are used.

Lab 6, Credit 3 (offered each year)

FADF-261,262, 263 **Drawing (Crafts Majors)**
Registration #0404-261, 262,263

Drawing in a variety of media. Introduction to line, form, and color as elements of pictorial expression. Organic and inorganic materials are used.

Lab 6, Credit 3 (offered each year)

FADF-321,322,323 **Design for Photo II**
Registration #0404-321,322,323

Emphasis upon problems which are related to visual phenomena, fundamentals, and communications. Expression through image making viewing and discussion.

Class 1, Lab 2, Credit 2 (offered each year)

FADP-301,302,303 **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 encouraged. A limited edition portfolio project is developed with the participation of all students.

Lab 12, Credit 6 (offered each year)

FADR-404,405, 406 **Printmaking-IUustration****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 lithography. 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)

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)

School for American Craftsmen

FSCC-200 **Ceramics Materials and 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**

An elementary course in design and techniques in ceramics. Each quarter different techniques are taught including wheel, hand building, glaze, and decorating.

Lab 6, Credit 3 (offered each year)

FSCC-300 **Ceramics Materials and Processes (Sophomore Major)**

Sequential course for three quarters that stressed 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**

An elective course providing an opportunity for more advanced study in ceramics. Wheel and hand built pottery, along with glaze information, will be studied.

Lab 6, Credit 3 (offered on sufficient demand)

FSCC-400 **Ceramics Materials and Processes (Junior Major)**

Sequential course stressing industrial forming methods such as mold making, slip casting, and jiggering and jolly. Projects will include multiples, limited editions, designing for industry and architectural applications. The third quarter will be the planning, design and execution of the "Journeyman's Piece." To include a course on kiln type fuels and construction.

Lab 15, Credit 5 (offered each year)

FSCC-500 **Ceramics Techniques and Thesis (Senior Major)**

Sequential course for three quarters focusing on thesis development of a body of work that reflects self expression, and a personal direction in clay. This research and thesis project 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**

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**

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**

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**

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**

Traces the historical changes that art has undergone. Traces the interaction between philosophic thought and artistic styles throughout art history. Explores art as a reflection of human values.

Class 3, Credit 3 (offered each year)

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

FSCF-350 **Asian Art**
Registration #0410-350
 A study of the art of India, China, and Japan in the area of painting, printmaking, sculpture, architecture and the crafts with emphasis on their implications for contemporary artists, designers and craftsmen.
 Class 3, Credit 3 (offered each year)

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

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

FSCF-380 **Contemporary Art**
Registration #0410-380
 A study of the painting, printmaking, sculpture, architecture and crafts from the 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 Processes (Freshman Major)**
Registration #0411-200
 A basic survey course of the properties, techniques and technology of glass, plus an overview of glass history. Individuals are encouraged to participate in a variety of hot and cold glass techniques: blowing basic shapes, stemware, color applications, stained/leaded glass, lamination, polishing, sand casting, and slumping/fusing. Basic knowledge of technique lays the foundation for concept development.
 Lab 15, Credit 5 (offered each year)

FSCG-251, 252, 253 **Glass Elective I**
Registration #0411-251, 252, 253
 A survey course emphasizing furnace glassblowing and stained glass as a means of personal expression and appreciation. A portion of the course is a basic investigation of the history, chemistry, techniques and technical aspects of glass.
 Lab 6, Credit 3 (offered each year)

FSCG-300 **Glass Materials and Processes (Sophomore Major)**
Registration #0411-300
 Techniques of stationary/multi-sectional mold blowing, color overlay, graphal, and latticino are examples of continued emphasis on blown glass. Neon bending, sealing and bombarding; gravity casting, pate-de-verre, engraving, fabrication and architectural stained glass are offered. In-depth history of glass and the decorative arts, plus practical chemistry of glass, batching and LEC will be learned.
 Lab 15, Credit 5 (offered each year)

FSCG-351,352,353 **Glass Elective II**
Registration #0411-351,352,353
 Prerequisite: Glass Elective 251, 252, or 253. This course provides an opportunity for more advanced work in both hot and cold glass. Emphasis is placed upon individual expression with glass and may involve slumping, casting, blowing, cutting, polishing or sculptural construction.
 Lab 6, Credit 3 (offered on sufficient demand)

FSCG-400 **Glass Materials and Processes (Junior Major)**
Registration #0411-400
 Design projects from decorative arts companies are undertaken. Knowledge of glass studio design/construction, equipment and business practices is acquired. The journeyman's series piece is planned, designed and executed. 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 (Senior Major)**
Registration #0411-500
 Based upon the three previous years of investigation, the senior-level glass student will present a proposal which will be offered as evidence of qualification for the baccalaureate degree. The senior will present a resume, portfolio and a research paper related to his/her exhibition at the end of the academic year.
 Lab 24, Credit 8 (offered each year)

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 Processes (Freshman Major)**
Registration #0412-200
 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-loom, 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 small scale making of 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. Limited production of small accessories including jigs, and pricing. 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 basic chair construction, drawer and solid wood carcass construction, issues related to production work and student initiation of specific interest projects. The course includes a machine maintenance program.

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, discussion groups, gallery visits, papers, and reports.

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 and reports.

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. Analysis of construction problems in both traditional and contemporary furniture.

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)

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 imagemaking of their particular period, i.e., daguerreotypes, colotypes, 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. (PPHL-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, trompe l'oeil and so on. Students will prepare an oral debate or a written term paper.

Class 2, Credit 2

PPHA-460 Photography for Printers Registration #0921-460

A workshop in black-and-white and color photography for non-photography majors. Technical and aesthetic information will 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. (Biomed. Photo. I)

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-301; basic color course)

Class 2, Lab 6, Credit 4

PPHB-501,502,503 Photo Concentration**Registration #0901-501,502,503**

Investigating, planning, organizing and producing an audiovisual presentation, a learning package or an informational program for a biomedical communications client. (Completion of biomedical photographic communications AAS degree requirements; at least one upper-division photo elective in media; permission of the instructor)

Class 2, Lab 8, Credit 4

PPHB-551,552,553 **Special Topics in**
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.

Class 3, Credit 3

PPHF-207 **Introduction to Portable**
Registration #0902-207 **Video I**

A basic course for novices. Emphasis is on video taping 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 **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-310 **Materials and Processes of**
Registration #0902-310 **Moving Image II**

A technical survey of the tools and materials used in video production. (PPHF-210, PPHF-203)

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 offline insert editing. Viewings and discussion of student work, application workshops, outside readings and viewings supplement lecture presentation and production work. (PPHF-203, 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, storytelling forms. Students are responsible for writing film or television scripts on subjects of their own choosing and for completing several brief written exercises in areas such as character, dialogue, the interview, suspense, and plot. Although this course is designed primarily to meet the needs of film and television majors, it is not restricted to those students.

Class 2, Lab 3, Credit 3 (W)

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 film making 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-303, 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-203, 310)

Class 1, Lab 2, Credit 2 (F)

**PPHF-411 Visualization and Commercial
Registration #0902-411 Film Production**

A general review of professional production methods and the theory and practice of visualizing an expressive film continuity. Basic synchronous sound recording is included. (PPHF-203 or permission of the instructor)

Class 2, Lab 6, Credit 5 (F)

**PPHF-412 Film Planning and
Registration #0902-412 Studio Operations**

Introduction to studio crew work and editing systems for professional film. Budgeting and an elementary view of the economics of production are also included. Film writing is introduced and related to production planning. Camera, lighting and editing equipment are provided, but students are expected to provide sensitized goods and processing. (PPHF-411 or permission of the instructor)

Class 2, Lab 6, Credit 5 (W)

**PPHF-413 Film Project with
Registration #0902-413 Synchronous Sound**

A short (5-10 min. suggested) film is produced by student teams. Advanced sound editing, sound mixing and A&B roll conforming are included. Cameras, lighting and editing equipment are provided but students are expected to provide sensitized goods and processing.

Class 2, Lab 6, Credit 5 (S)

**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 video tape with sound. Emphasis is placed upon various postproduction 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-203, 310)

Class 3, Credit 3

PPHF-442 **Film/Video Internship**
Registration #0902-442

This course is designed to provide the students with on-the-job experience in the field of film/video. The student will seek and acquire a school approved internship position in a business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the internship coordinators will assist the student in evaluating the experience. The coordinator should be the faculty member most familiar with the student's internship field. (Permission of internship coordinator)

Credits 1-6/Qtr. (F, W, S)

PPHF-511 **Motion Picture Workshop I**
Registration #0902-511

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-512 **Motion Picture Workshop II**
Registration #0902-512

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. (Motion Picture Workshop I or equivalent)

Class 9-4 p.m., Credit 9

PPHF-541 **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 r (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, 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. (Applied Photo I)

Class 4, Studio 5, Credit 5

PPHL-315**Colloquia****Registration #0904-315**

A lecture/presentation offering the specific interests and passions of the faculty. The range is academically wide and varied. (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 locations 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**Narrative/Documentary****Registration #0904-416,417,418****Editorial Photography I**

This course will explore the use of the photographic image in narrative, documentary and editorial form. The emphasis of the course will allow the students a variety of experiences. There will be emphasis on publication and public need. (Applied Photo II)

Class 4, Field 5, Credit 5

PPHL-434**Advertising Photography****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-441, 442,443)

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. (Applied Photo II)

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 CIC-441 (with department chairperson's approval; note that this is one credit less than CIC-441) or take one or both sessions as photo electives. (PPHL-311, 312, 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 CIC-441 (with department chairperson's approval; note that this is one credit less than CIC-441) or take one or both sessions as photo electives. (PPHL-311, 312, 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-311, 312, 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 audio-visual presentation. Students will be encouraged to meet professional standards while developing a strong personal point of view. (PPHL-311, 312, 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-505 History of Applied Photography
Registration #0904-505**

A chronological investigation into many areas of applied photography, including advertising, documentation, illustration, news portraiture, scientific, and travel. The works of major photographers and the influence of specific publications and events upon the style and use of photography will be examined.

Class 3, Credit 3

**PPHL-516,517,518 Narrative/Documentary/
Registration #0904-516,517,518 Editorial Photography II**

This course will explore and expand the use of the photographic image in the narrative/documentary and editorial point of view. Emphasis will be upon publication and professional use of the image. (PPHL-416, 417, 418)

Class 4, Field 5, Credit 5

PPHL-53S, 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. Prerequisite: 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. (PPHM-213, PPHS-203, or PPHT-213)

Class 2, Lab 8, Credit 4

PPHM-302 **Automated Printing**
Registration #0905-302

Part of a three-quarter sequence of student involvement in automated processing and finishing on a full production basis. This course covers the theory and practice of automated printing. (PPHM-213, PPHS-203, or PPHT-213)

Class 2, Lab 8, Credit 4

PPHM-303 **Custom and Professional**
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. (PPHM-213, PPHS-203, or PPHT-213)

Class 2, Lab 8, Credit 4

PPHM-310 **Survey of Production**
Registration #0905-310 **Processing and Finishing**

Provides the non-photographic processing and finishing major with an opportunity to become knowledgeable in the operational procedures and services of a processing and finishing laboratory. (PPHM-203)

Class 2, Lab 2, Credit 2 (S)

PPHM-315 **Electricity and Electronics**
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**
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**
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. (PPHM-203)

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 Transparency 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-211, 213, 301, 302,303)

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 necessary creativity, craftsmanship, theory and visual communications to undertake advanced study in the medium. The theory and technical aspects are taught as they relate to solving photographic problems.
 Class 4, Studio 4, Lab 4, Credit 7

PPHT-210 **Materials and Processes of Photography**
Registration #0920-210
 An intensive 10-week summer course for students entering a transfer program in Biomedical Photographic Communications or Imaging and Photographic Technology. This course replaces PPHT-211, 212, 213. (Either this course or the PPHT-211, 212, 213 sequence is also a requirement in the Professional Photographic Illustration Program.)
 Class 9, Credit 6 (SR)

PPHT-211,212,213 **Materials and Processes of Photography**
Registration #0920-211,212,213
 Basic study of the technology of photography, with the emphasis on applications to real photographic problems. Among the topics studied are image formation and evaluation, photosensitive materials, exposure, processing, tone reproduction, visual perception, color theory, variability, quality control, and photographic effects. An independent study project is required.
 Class 3, Credit 3

PPHT-220 **Survey of Imaging and Photographic Technology**
Registration #0920-220
 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 j
 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-211, 212, 213)
 Class 2, Lab 3, Credit 3

PPHT-302 **Technical Photographic Chemistry**
Registration #0920-302
 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 timesharing computer facilities will be introduced with emphasis on specific hardware and software packages available on these facilities including word processing. Introductory material on Pascal programming will be presented. Programming assignments will be required. (Limited to Imaging and Photographic Technology students or by the permission of the instructor)

Class 2, Credit 3

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. (Photo I 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. (Tech Photo n)

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-425,426,427 **Nature Photography**
Registration #0920-425,426,427

Students will learn the fundamentals of professional nature photography as exhibited by such magazines as *Audubon* and *National Wildlife*. Topics include selection and care of equipment, use of strobes, adapting to adverse weather conditions, sales of photographs, copyright law, free lance, and more. Students will be required to spend a minimum of several hours per week shooting in natural environments. (Photo I 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 Transfer II**
Registration #0920-443

This quarter of the dye transfer program is devoted to the variations of standard techniques and further extension of improvement of procedures. Difficulty of procedure will determine number of assignments required. (PPHT-442 or equivalent)

Class 1, Lab 6, Credit 4

PPHT-444 **Reversal Color Printing**
Registration #0920-444

A one-quarter course on reversal color printing procedures, printing and processing. The student will gain proficiency in using reversal print material. (PPHT-312 or permission of the instructor)

Class 1, Lab 4, Credit 3

PPHT-446,447, 448 **Advanced Color**
Registration #0920-446,447,448 **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. After completing the prerequisite Co-op Seminar (PPHT-511), 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. (PPHT-511)

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, electro-photography, 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-512 **Co-op Internship**
Registration #0920-512

This course is designed to provide students with on-the-job experience in the field of imaging and photographic technology. After completing the prerequisite Co-op Seminar (PPHT-511), 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. (PPHT-511)

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

Storage Applications Design

PPHV-731 **Storage Applications Design I**
Registration #0922-731

An exploration of the technology, psychology, and aesthetics of modern storage applications with their massive image-information-delivery capacities, including an analysis of the hardware and software of videodiscs and optical discs as image banks with attendant databases and the effects of interactivity on system design. (Completion of undergraduate degree or equivalent; some background in computers or communication arts or science)

Class 4, Credit 4

PPHV-732 **Storage Applications Design II**
Registration #0922-732

An experiential laboratory working with existing interactive software, authoring systems, original image retrieval programs, for existing image banks primarily on videodisc and optical disc; also involving experience with interactive input devices such as keyboard and touchscreen. (PPHV-731)

Class 4, Credit 4

PPHB-733 **Storage Applications Design III**
Registration #0922-733

Having already acquired an understanding of the theory and practice of modern storage applications, primarily in the area of videodisc and optical disc, students will be assigned to project teams in such a way that a balanced blend of artistic and scientific background is achieved where possible. The project team will be assigned an application which will be taken from the assessment of the end user's need right through final production and software design which will include, in some shared projects, actual production on "Draw" disc or videodisc, so that an up-and-running system is the product of the project team rather than a paper design. (PPHV-732)

Class 4, Credit 4

PPHV-734 **Image Bank Management**
Registration #0922-734

An adaptation of database concepts to the special problems of the massive, randomly-accessible signal stores now possible with optical storage. (PPHV-736)

Class 4, Credit 4

PPHV-735 **Communication Theory**
Registration #0922-735

Analysis of all communication forms in terms of a taxonomy which divides communication forms into immediate and mediate, and then further subdivides in terms of channel capacity and characteristics such as one-way systems, two-way interactive systems, etc. Within the mediate class, the course shall consider, among other things, the comparative effects on expression and impression processes of the television medium, computer storage, interactive video, and so forth. (Permission of instructor)

Class 4, Credit 4

PPHV-736 **Microcomputer Control**
Registration #0922-736

A survey of current computer-driven videodisc playback systems, involving both microcomputers and supermicrocomputers. Topics covered include hardware configurations, videodisc instruction sets, software interfaces, and system utilization. The course requires computer and video literacy.

Class 4, Credit 4

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 I**
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 Engineers**
Registration #0925-221

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 linewidth, special exposure effects, and contact and projection printing systems.

Credit 4

PIMG-225 **Introduction to Imaging Science II**
Registration #0925-225

This is an intensive course covering material from the first two years curriculum. Topics include: interaction between light and matter, optics, advanced mathematics for imaging science, and chemical imaging systems. The course will prepare students with backgrounds in chemistry, calculus, and physics to enter the third-year curriculum in Imaging Science.

Credit 18

PIMG-231 **Basics of Imaging Science**
Registration #0925-231

Basics 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 any imaging system.

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 FORTRAN for Imaging science**
Registration #0925-241

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 and Matter**
Registration #0925-345

This course emphasizes the interaction of electromagnetic energy with various states of matter. This includes the creation, propagation, and destruction of electromagnetic energy. Topics covered include: the electromagnetic spectrum; reflection, absorption, and transmission of energy; vibrations and simple excitations; molecular orbitals; band theory; and optical interactions.

Credit 4

PIMG-351,352 **Math and Computation for Imaging Scientists**
Registration #0925-351,352

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-401 **Radiometry**
Registration #0925-401

The course serves as an introduction to the physics of light, its generation, propagation, absorption and measurement. This is combined with an introduction to the human visual process, to general photometry and radiometry, to light sources and to light receivers. (SMAM-205, SPSP-313)

Class 3, Lab 6, Credit 4

PIMG-404 **Technical Communications**
Registration #0925-404

A course for third-year students in Imaging Science to develop communications skills in preparation for the fourth-year research project. Literature searches; project selection research notebooks; scientific databases; proposal writing; written and oral presentations. (Third-year status in Imaging Science, or permission of the instructor)

Class 2, Credit 2

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 regression 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 (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-501,502,503 Research**Registration #0925-501,502,503**

An investigation of a problem in imaging science of engineering including planning and execution of experiments, statistical data analysis, and reporting results orally and in a written paper. (PIMG-404, 413)

Class 2, Lab 2 (F) Credit variable

Class 2, Lab 6, Credit 4 (W, S)

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, PIMG-303)

Class 3, Credit 3

PIMG-521,522,523 Image Systems and**Registration #0925-521,522,523 Evaluation**

An analytical approach to analysis and evaluation of photo-optical and other image recording systems; objective and subjective evaluation techniques and their correlation. The use of convolution, correlation, autocorrelation, and Fourier methods in the analysis of the image-recording systems. Laboratory work in the design of photo-optical systems. (PIMG-402, SMAM-305, SPSP-313)

Class 2, Credit 2 (F, S)

Class 2, Lab 6, Credit 4 (W)

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 Imaging Science Center)

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-207, 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 system 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-571,572 **Photomicrolithography**
Registration #0925-571,572

A course relating imaging and photographic science principles in optics, photographic and conventional chemistry and image evaluation to the field of photomicrolithography for integrated circuit and other microelectronic device fabrication.

Class 3, Lab 4, Credit 4

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 Production 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 managerial 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 Production 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**Registration #0910-280****Leadership Concepts**

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**Registration #0910-320****Publishing and Management**

A survey course designed to give the student insights into the editorial, production, management, fulfillment and distribution processes vital to success of any magazine. Leaders from the magazine publishing industry are invited to present 3-hour guest lectures on a major aspect of their profession. Graduates of the printing program who have attained prominence within the industry are often guest speakers, encouraging interaction between current and former students.

Class 3, Credit 3

PPRM-340 Electrostatic Reproduction**Registration #0910-340****Methods and Technology**

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.

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 Measurement**Registration #0910-375****and Improvement**

Explores practical techniques that printing companies can use in the areas of methods improvement, work measurement and control, production standards and operations indicators, equipment evaluation, proposals and financial analysis, systems analysis and standard practice instructions.

Class 4, Credit 4

PPRM-380 Supervision in**Registration #0910-380****the Graphic Arts**

This course is designed to enable the student to meet the social, employee and management needs in the manning of a graphic arts operation. Subjects covered are: the nature of the employment relation; hiring; motivation and training; discipline; firing; layoffs and plant closures.

Class 4, Credit 4

PPRM-415 Advanced Ink and Color**Registration #-0910-415**

Further study of ink and color with emphasis on relationship to printing processes and print qualities. Study of inks for special purposes as well as ink-jet and electrostatic printing. New types of inks such as acrylic ink, water based inks, etc. New ideas in inks such as IR drying. Study of materials used in ink manufacturing and the effects on printing processes and print qualities. Study of color with emphasis on color gamut system and problems in process color printing. Study of ink-paper relationship. Further study of ink rheology and other physical properties. The course will deal with inks for all the processes. (PPRM-315 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 Estimating Practice 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.

Class 4, Credit 4

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 Labor Relations in the Graphic Arts (0910-511). 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-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

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-352, 372, 373)
 Class 2, Lab 6, Credit 4

PPRT-317 **Calligraphic Forms**
Registration #0911-317
 An introduction to the basics of calligraphy, exercises in use of broadedge pen to develop primary forms of Italic, Roman Capitals, and Uncial letter styles. Evolution of letter forms. Consideration of historical origins of letters, use of basic tools, understanding of methods and disciplines stressed.
 Class 3, Credit 3

PPRT-319 **Newspaper Design**
Registration #0911-319
 A study of the methods of designing modern newspaper pages; a look at a variety of front page design methods as well as inside pages; placement of editorial content and ads; problems involved in designing section pages and special pages and editions; the standard format vs. the tabloid format; page sizes, column widths, and space between columns; how a computer can be used in creating designs for newspaper pages.
 Class 2, Lab 3, Credit 3

PPRT-320 **Newspaper Production I**
Registration #0911-320
 A study of the methods of producing a newspaper by the use of photocomposition systems and the offset process. Students organize a staff, design a newspaper, set type, paste up paper, go to camera, make plates and go to press.
 Class 2, Lab 3, Credit 3

PPRT-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-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 Newspaper Production Systems**
Registration #0911-330
 The production of a newspaper by photocomposition methods and the offset process. A continuation of PPRT-320, Newspaper Production I, in more depth, with special emphasis on pre-press operations, and the production of special 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 box-making. 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 In America**
Registration #0911-335
 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 on 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 the Printing Processes course. 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 Printing Processes Concepts, 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 the Printing Processes Concepts course. 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; photo-mechanical 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 sharpen their ability to be able 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. (Concepts of Design and Typography, 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 prepress 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 room-light variety. In addition to standard practices the student also works with the latest model line-up tables, a Micromodifier for spreads and chokes and receives basic instruction in electronic page make-up (Autoprep 5000). Other automated prepress 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 **Half-tone 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-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 Gravure Process, 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-451 **Typography II**
Registration #0911-451

The student is expected to design and produce finished typographic projects. Only the requirements and restrictions for each program are given to the student, who can interpret them any way, as long as it is within the prescribed limitations. Critiques will be held when each project is completed. Topics included in the lectures are: typographers and a look at their work; typographic style; typographic trends; review of design concepts; typographic movements; and private presses. The serious student of typography will find this a challenging course. (PPRT-351)

Class 2, Lab 6, Credit 4

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 type faces that we use every day. Classification methods are discussed and analyzed. With slides, we look at representative type faces, learn their visual characteristics for identification, who the designers are and the foundries, etc., that created them.

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 prepress systems. (PPRT-372)

Class 2, Lab 3, Credit 3

PPRT-500 **Quality Control in the 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.

Class 3, Credit 3

PPRT-541 **Typographic Workshop****Registration #0911-541**

Allows students to create and solve typographic problems of their own choice. Complete freedom is given and experimentation is encouraged, giving students opportunities to meet their own objectives and satisfaction.

Class 2, Lab 6, Credit 4

PPRT-551 **Special Topics-Printing****Registration #0911-551**

This course presents and investigates technological topics which normally are not covered in the regular curriculum on a one-time basis. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Topics to be covered are announced in advance.

Credit variable

PPRT-572 **Electronic Color Imaging and Color Control**

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)

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 Law Enforcement** **Registration #0501-206**

The course is intended to provide the student with an overview of the fundamental concepts of organization and administration, and to provide also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively. (GCJC-203, 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 micro-computers. 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 on sufficient demand)

GCJC-409 **Legal Rights of Convicted Offenders**
Registration #0501-409

This course is designed to present an in-depth study of the substantive and procedural law as it affects convicted offenders. Considerable attention is devoted to the study of constitutional rights and privileges, how they apply to convicted offenders, and the methods employed to secure these rights. Conviction and its consequences are explored, as is the sentencing process. The rights of prisoners, probationers, and parolees are reviewed. In addition, the various remedies for enforcement of these rights are discussed, including direct appeals, collateral attacks, and a variety of post-conviction remedies. The course is intended for students who wish to pursue a career in law enforcement, corrections, probation, parole or law. However, students interested in some other aspect of criminal justice that deals with convicted offenders, may find this course useful.

Class 3, Credit 4 (offered on sufficient demand)

GCJC-410 **Correctional Administration**
Registration #0501-410

This course presents the history and development of the principles of management and organizational theory as they developed the field of corrections. This developmental evaluation is followed by a presentation of certain principles and philosophies concerning agency administration which have proved effective in business, industry, and many elements of government, with the intention of discussing their applicability to prisons, probation, parole, and other community correctional programs. (GCJC-201, 207)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-411 **Seminar in Corrections**
Registration #0501-411

This course is a sequel to Corrections. It presents a critical evaluation of the contemporary correctional programs in the United States. Programs discussed include: jails, prisons, probation, parole, halfway houses, study release, work release, prison furloughs and various community-based correctional techniques. Emphasis is placed upon the theories of penology and rehabilitation, which provide direction to the correction system today, and the theoretical positions which may affect the future corrections. (GCJC-201,207)

Class 3, Credit 4 (offered annually)

GCJC-412 **Social Control of Deviant Behavior**
Registration #0501-412

Designed as a professional elective for criminal justice majors interested in 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 on sufficient demand)

GCJC-415 Domestic Violence**Registration #0501-415**

This course is designed for social work students, criminal justice students, and professionals who are interested in examining the problems related to domestic conflict and violence. Included will be a study of the dynamics of violence as reflected in child abuse, incest, marital rape, spouse and parental abuse, and violence among siblings.

Credit 4 (usually offered summers for one week)

GCJC-416 Forensic Photographic**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 #0510-510 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 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-512 Minority Groups and the**Registration #0501-512****Criminal Justice System**

The course will examine the role traditionally attributed to the members of minority groups as criminals and analyze their interaction with the criminal justice system. Heavily relying on the conflict perspective, the course will review the literature on the creation of laws, the breaking of laws, and the processing of minority members in the criminal justice system. (GCJC-201,203)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-514 Planning and Change in the**Registration #0501-514****Criminal Justice System**

It is the objective of this offering to expose the student to issues of planning within the criminal justice system. Police, courts and corrections will be discussed in view of current and proposed changes. The planning of change will be emphasized with regard to organizational issues. In addition, attention will be given to surveying various strategies for accomplishing change. This course is designed to give the advanced student the opportunity to intensely scrutinize the prospective shape of the criminal justice system. (GCJC-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 Relations
Registration #0501-518

This course examines the goals and objectives of agencies operating within, or directly related to, the criminal justice system in relation to mutual expectations, the community and the agency, in the delivery of services. Emphasis will be on intergroup responsibilities in exploring strategies to reduce conflict in the solving of public problems within the sphere of the criminal justice system. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-520 Sentencing Process
Registration #0501-520

This course is intended to provide the student with a broad overview of the law of sentencing and the alternatives presently available in this area. Emphasis will be placed on the traditional methods of punishment now available in the courts, including, but not necessarily restricted to: fines, imprisonment, probation and suspended sentences. The course will also look to the power of the court in exercising its discretion in the sentencing process. (GCJC-201, 207, 304)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-522 Victimless Crime and the Law
Registration #0501-522

The course is designed to familiarize the student with many of the implications and ramifications of efforts to control "victimless" crimes. Course discussions concentrate on the illegal activity associated with prostitution, gambling, homosexuality, drug use and pornography. In this course the social, moral, legal and practical consequences of legalizing such activities are examined and evaluated. (GCJC-201, 203, 301)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-523 Crime and Violence
Registration #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**
Registration #0501-541 **Criminal Justice**

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-542 **Field Research Techniques**
Registration #0501-542

The course combines the use of both qualitative and quantitative research methods and applies them to the collection and analysis of data from field settings. Emphasis is placed on the use of multiple samples and the techniques of multivariate analysis. Students will draw upon social science theory to develop a research design, analyze data and prepare a report on a topic from Human Services, Criminal Justice or Public Policy. (GCJC-401)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-599 **Independent Study**
Registration #0501-599

A combined student/faculty member effort on a chosen topic beyond the normal sequence of course selections. It provides the qualified self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.

Class variable, Credit variable (offered annually)

Economics

The following courses are required for the BS degree. See listings under Social Science or 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

GSSE-303 **Principles of Economics III**
Registration #0511-303

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)

GSSE-520 **Intermediate Price Theory**
Registration #0511-520

GSSE-521 **Intermediate Macroeconomic Theory**
Registration #0511-521

GSSE-522 **International Trade and Finance**
Registration #0511-522

GSSE-523 **Monetary Analysis and Policy**
Registration #0511-523

GSSE-524 **Industrial Organization**
Registration #0511-524

GSSE-526 **Research Methods for Economics**
Registration #0511-526

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)

GSSE-527 **Seminar in Applied Economics**
Registration #0511-527

A senior-level course emphasizing applications of economic analysis and quantitative methods to economic decision-making. Cases will be drawn from both the private and public sectors of the economy. (Limited to BS in economics degree seniors)

Class 3, Credit 4 (offered occasionally)

GSSE-528 **Applied Econometrics**
Registration #0511-528

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 will be placed on the dangers of misuse of regression techniques.

Class 3, Credit 4 (offered occasionally)

GSSE-529 **Economic Forecasting**
Registration #0511-529

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. (GSSE-528 and BBUQ-330)

Class 3, Credit 4 (offered occasionally)

Professional and Technical Communication

The following courses are required for the BS degree. See listings under Language, Literature and Communication for full course descriptions, unless otherwise indicated.

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-440 Registration #0502-440	Human Communication	GLLC-521 Registration #0502-521	Intercultural Communication
GLLC-442 Registration #0502-442	Persuasion	GLLC-522 Registration #0502-522	Persuasion and Social Change
GLLC-443 Registration #0502-443	Writing and Thinking	GLLC-523 Registration #0502-523	Interpersonal Communication
GLLC-444 Registration #0502-444	Technical Writing	GLLC-524 Registration #0502-524	Communication and Documentary Film
GLLC-501 Registration #0502-501	Effective Speaking	GLLC-525 Registration #0502-525	Special Topics in Communication
GLLC-504 Registration #0502-504	Theories of Communication	GLLC-526 Registration #0502-526	Advanced Public Speaking
GLLC-505,506 Registration #0502-505, 506	Research Methods I and II	GLLC-527 Registration #0502-527	Teleconferencing Communication in Management
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 two-credit courses to students in the third year of the Professional and Technical Communication Degree Program. (GLLC-440, GLLC-505)		Professional Electives: Writing	
Class 1,505 Credit 2, 506 Credit 2		GLLC-446 Registration #0502-446	Advanced Technical Writing
GLLC-507 Registration #0502-507	Professional Writing	GLLC-517 Registration #0502-517	Newswriting
GLLC-508 Registration #0502-508	Organizational Communication	GLLC-518 Registration #0502-518	Creative Writing: Prose Fiction
GLLC-509 Registration #0502-509	Senior Thesis in Communication	GLLC-519 Registration #0502-519	Advanced Creative Writing
Senior Thesis in Communication 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. (GLLC-504, 505, 506)		Social Work	
Class 4, Credit 4 (offered annually)		Core Courses	
GLLC-510 Registration #0502-510	Visual Communication	GSWS-099 Registration #0516-099	Social Work Program Seminar
GLLC-514 Registration #0502-514	Mass Communication	This seminar is designed to give the social work student the opportunity to meet and exchange ideas with other social work students, family, and practitioners. It is also designed to foster identification and cohesion among the students as future or current social work professionals.	
Professional Electives: Communication		Class 1, Credit 0	
GLLC-441 Registration #0502-441	Small Group Communication	GSWS-210 Registration #0516-210	The Professional Social Work Role
GLLC-445 Registration #0502-445	History of the English Language	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.	
GLLC-512 Registration #0502-512	Film and Society	Class 3, Credit 4 (F)	
GLLC-513 Registration #0502-513	Interviewing		
GLLC-515 Registration #0502-515	Uses and Effects of the Media		

**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 (W)

**GSWS-216 Community Services I
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 will become more aware of their current skills in attending, responding, personalizing and initiating. They will 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 plays and direct experience. The skills will later be developed in the course Interviewing and the Helping Relationship. (GSWS-210)

Class 3, Credit 4 (W)

**GSWS-217 Community Services II
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 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-210, 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**

The course is designed to give the social work student a basic understanding of the family as client. Students will look at the family from the perspective of an outside observer whose purpose is to analyze family interaction to assess problems and plan interventions. Emphasis will be on the contemporary American family, including its structure and functions and roles of family members and the family in society. (GSWS-210, 440, GSSS-210)

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, SMAM-309)

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-405, third-year standing)

Class 3, Credit 4 (W)

**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-435, 456, GSSS-210, third-year standing)

Class 3, Credit 4 (S)

GSWS-475 Interviewing and the Helping Relationship
Registration #0516-475

This course is the first in a three-year course sequence offered concurrently with laboratory or field instruction dealing with generalist social work practice. All three courses emphasize the differential use of social work techniques (e.g., interviewing skills, assessment, data-collection and problem-solving) and intervenive 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-435, 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 field work experience will be reviewed. Major focus will be on idiographic "single subject" design research and a review of quantitative research, Chi-square, PPMCC, Spearman's rho, T-test, ANOVA, and qualitative analyses popular in social work research. (CTAM-361)

Class 3, Credit 2 (F)

GSWS-540 Evaluation of Practice
Registration #0516-540

This is the second of a two-course sequence and will be built on material learned in Advanced Social Work Research and its prerequisite. Students will learn about baseline assessments, the ethics of research, and experimental research. They will also learn about report writing, grant writing, and the politics of research. Also, concerns and issues in research with special populations and cross-cultural research will be explored. (CTAM-361)

Class 3, Credit 2 (W)

GSWS-550 Social Intervention
Registration #0516-550

See GSWS-475 (GSWS-505, 506, 527, 535; corequisite with GSWS-551,560)

Class 3, Credit 4 (W)

GSWS-551 Field Instruction II
Registration #0516-551

See GSWS-506 (GSWS-505, 506, 527, 535; corequisite with GSWS-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-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 and Psychology****Registration #0516-320**

This course presents the chemistry of alcohol and its effect on the body and brain, as well as signs, symptoms, addiction and withdrawal. The study of normal and abnormal personality development and the psychological and social mechanisms of alcohol use and alcoholism in our society are emphasized. (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, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)

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-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, GSHH-493, GSSP-210,440, GSSS-210, 526, 527, SBIG-211, 212)

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, GSHH-493, GSPP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)

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, GSHH-493, GSSP-210,440, GSSS-210, 526, 527, SBIG-211, 212)

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, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-506 Services for Children and Their Families**Registration #0516-509**

This course is designed to give social work students a beginning knowledge of social work services to children and their families. Specific services included are preventive services, homemakers, day care, protective services, foster care, adoption, unmarried parents, institutional care and mental health services. The development of each type of service will be discussed, as well as the reasons why each service is needed and for what type of situation. The social worker's role in each area will also be considered. (GSWS-302, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211,212)

Class 3, Credit 4 (every other year)

GSWS-512 Advanced Intervention with Individuals**Registration #0516-512**

This course builds upon the knowledge base of generalist social work practice and develops students' understanding of the specific way in which these concepts and theories are applied in social intervention with individuals. Use will be made of case studies and role playing to further develop the students' skills in this area. (GSWS-550,551, 560)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-513 Advanced Intervention with Families**Registration #0516-513**

This course is for students who have completed the practice sequence and field instruction, and have learned the theories and concepts of generalist social work intervention. This course builds on that knowledge base and develops the students' understanding of the specific ways in which these concepts and theories are applied in intervention with families. (GSWS-550, 551, 560)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-522 Advanced Intervention in Communities**Registration #0516-522**

This course examines community intervention as a social work method. The roles and functions of the community intervention practitioner and alternate methods of practice are analyzed, such as locality development, social planning and social action. The course will investigate specific applications of community intervention theory to political influence processes, coalition, neighborhood associations and regionalization. (GSWS-550, 551, 560)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-523 Advanced Intervention with Groups**Registration #0516-523**

This course examines social treatment as one form of group work practice. There are different service procedures and approaches which may be applied to client groups, and each may have utility in pursuing distinct service objectives. The course will investigate the scope, techniques and functions of generalist social work practice in such diverse settings as social service agencies, business, correctional institutions and communities. (GSWS-550, 551,560)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-525 Grant Writing**Registration #0516-525**

This course is designed to provide the student with a series of readings and experiential exercises necessary for writing a grant proposal. Focus will be on funding sources which provide money for social welfare programs and for research into social work. (GSWS-535)

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, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212) (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, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212) (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 #0516-638

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, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211,212)

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 #0502-330

This course develops the language skills needed to write effectively. It should be taken in the freshman year.

Class 3, Credit 4 (offered quarterly)

GLLC-440 **Human Communication**
Registration #0502-440

Human Communication is an overview of the field of communication, including the contexts of interpersonal, group, mass, and public communication. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered occasionally)

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 communication designed to influence one's beliefs, values, attitudes, and actions. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 of 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 writing tasks, such as instructional memos; letters of inquiry; reports (trip, progress/status, accident, research, feasibility); problem analyses; specifications; flow charts; technical manuals. Students enrolling in Technical Writing should have command of clear and logical standard written English prose. 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.) (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 or a professional elective in the Professional and Technical Communication Degree Program.

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 in the social sciences will be covered. This is a required professional course for the Professional and Technical Communication Program and also may be taken as a liberal arts elective. (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. Student enrolling in Professional Writing should have command of clear and logical standard written English prose. This is a required professional course 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-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. This is a required professional course for the Professional and Technical Communication Program and also may be taken as a liberal arts elective. (GLLC-440 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GLLC-510 Visual Communication
Registration #0502-510**

Visual Communication 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. Visual Communication is a liberal arts elective, without prerequisite, required for Professional and Technical Communication majors.

Class 3, Credit 4 (offered annually)

**GLLC-513 Interviewing
Registration #0502-513**

Interviewing examines dyadic communication as it occurs in the organizational, professional interviewing context. Emphasis is placed on the major types of interviews: informational, selection, and persuasive. Students are provided with theory, as well as opportunities for skills development. This is a professional elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective.

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. This is a required professional course for the Professional and Technical Communication Program and also may be taken as a liberal arts elective.

Class 3, Credit 4 (offered annually)

**GLLC-515 Uses and Effects
Registration #0502-515 of the Mass Media**

An analysis of the "effects" and the "uses and gratifications" of mass communication research with focus on building mass communication theory. NOTE: Students may find GLLC-514 a useful introduction to this course. This is a professional elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective.

Class 3, Credit 4 (offered annually)

**GLLC-516 Creative Writing/Poetry
Registration #0502-516**

An exploration of techniques of writing poetry in both open and closed forms. 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-517 Newswriting
Registration #0502-517**

Practicum in basic techniques of news writing and gathering for the daily press. Emphasis will be primarily on writing for the print media. Emphasis on frequent writing against a deadline. This is a writing elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective.

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. This is a writing elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLC-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. This is a professional elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective.

Class 3, Credit 4 (offered annually)

GLLC-524 **Communication and**
Registration #0502-524 **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. This is a professional elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective.

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-FTC 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. This is a professional elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective. (GLLC-501 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLC-530,482,483,528 **Beginning German I, II, III, IV**
Registration #0502-530,482,483,528

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)

GLLC-533,486,487 **Beginning Spanish I, II, III**
Registration #0502-533,486,487

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)

GLLC-536 **American Sign Language I**
Registration #0502-536

This course presents a study of the origins, nature, and development of American Sign Language (ASL), and its variants, as used by the deaf population of North America. Integral to the course is the linguistic structure of ASL and the nature of signing as a linguistic modality.

Class 3, Credit 4 (offered annually)

GLLC-537,484,485 **Beginning Japanese I, II, III**
Registration #0502-537,484,485

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. (Permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLC-540, 480,481 **Beginning Chinese I, II, III**
Registration #0502-540,480,481

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)

GLLC-543,544,545 **Beginning Arabic I, II, III**
Registration #0502-543,544, 545

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. (Permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLC- 548,549,550 **Beginning Japanese IV, V, VI**
Registration #0502-548,549,550

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 enable students with some prior knowledge of Japanese to communicate more fluently in modern Japanese. Although the student will learn reading and writing skills, the primary emphasis will be the acquisition of oral fluency. (GLLC-485 or permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLC-551,552,556 **Beginning Chinese IV, V, VI**
Registration #0502-551,552,556

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 enable students with some prior knowledge of Mandarin to communicate more fluently in modern Mandarin. Although the student will learn reading and writing skills, the primary emphasis will be the acquisition of oral fluency. (GLLC-485 or permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLC-553 **Creative Interpretation in Sign**
Registration #0502-553

Creative approaches to the interpretation of selected literary classics (prose, poetry, fiction, drama) through the visual medium of sign (sign language and sign-mime). (Sign language)

Class 3, Credit 4 (offered occasionally)

GLLC-563,564,565 **Beginning French II, III, IV**
Registration #0502-563,564,565

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.

Class 4, Credit 4 (offered annually)

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 stories with critical commentary in order to provide source materials on the nature and development of this genre. The course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-443 **The Novel**
Registration #0504-443

The Novel provides a close reading and analysis of several novels selected to show the range of narrative techniques, methods of characterization and plot construction, and styles representative of the genre. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-444 **Film as Literature**
Registration #0504-444

This course examines the nature of narrative in both film and literature, the various aspects of adaptation of literature into film, and the relationship between social reality and storytelling in documentary film. This course is a non-technical, non-chronological study of film with a balance of roughly 50% literature and 50% film. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-445 **Great Authors**
Registration #0504-445

This course provides extended study of the works of specific great authors (listed in the course titles that follow). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also can be taken for the Literature Concentration or elective credit. Detailed descriptions, objectives and content/methods appear under each subtitle (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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: 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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 modern world. 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-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. (0504-332 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. (0504-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-446 **Modern Literature:**
Registration #0504-446 **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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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. (0504-332 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)

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-S45 **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-^13
 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 overview of American attitudes and philosophies as they have shaped and been embodied in our artistic heritage. Emphasis will be placed on American art from 1850 to the present. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.
 Class 3, Credit 4 (offered annually)

GSHF-446 **American Film**
Registration #0505-446
 This course will develop an understanding of theories, styles and trends in American film through a historical and sociological study of the medium. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.
 Class 3, Credit 4 (offered annually)

GSHF-447 **The American Musical Theatre**
Registration #0505-447
 This course will survey the development of American opera and the American musical theatre, highlighting representative works, composers, librettists and performers of both the "cultivated and vernacular traditions." This course is part of the American Artistic Experience Concentration and 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 **German 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 Renaissance**
Registration #0505-512

A study of drawings from the 15th to the 20th centuries, including the work by Leonardo da Vinci, Michelangelo, Durer, Rembrandt and Picasso.

Class 3, Credit 4 (offered occasionally)

GSHF-514 **Cubism to the Present**
Registration #0505-514

An investigation into modern man's struggle to preserve his identity in our fast developing technological world as reflected in the vitality and diversity of today's visual arts. Differences and similarities with art forms of earlier eras and other cultures also will be discussed.

Class 3, Credit 4 (offered occasionally)

GSHF-519 **Rembrandt Van Rijn: His Art and Times**
Registration #0505-519

A study of the life, art and times of the Baroque master. Emphasis will be placed on his stylistic evolution, his relation to his society and to the Baroque style, and on his humanistic world view.

Class 3, Credit 4 (offered occasionally)

GSHF-520 **Picasso**
Registration #0505-520

The life and work of one of the most influential artists of our century.

Class 3, Credit 4 (offered occasionally)

GSHF-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 Tribal Art**
Registration #0505-532

After an investigation of the world of "primitive" man and the function of art in a tribal environment, this course will focus on preliterate societies of sub-Saharan Africa.

Class 3, Credit 4 (offered occasionally)

GSHF-534 **Renaissance and Baroque Art**
Registration #0505-534

This course examines the stylistic development of painting in Europe from 1420 to 1650. The Renaissance style will be analyzed and studied through the works of painters, with emphasis placed on stylistic evolution through the 15th century and the classical synthesis created in the high Renaissance. Mannerist and Early Baroque paintings will be discussed from the point of view of the Renaissance style to investigate concepts of stylistic continuity, evolution, and change. Paintings also will be discussed within their culture and political contexts.

Class 3, Credit 4 (offered occasionally)

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 occasionally)

**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 GSHH302 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.

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.

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 occasionally)

GSHH-483 **Christianity in the West**
Registration #0507-483

This course traces the development of Christian thought in the broad historical context of Western Civilization. It concentrates on major movements and outstanding personalities. This history of Christian thought is examined against the background of economic, political, social and intellectual currents. The study sheds light on both the conflicts within and the criticisms from outside and Christian tradition. This course is part of the Perspectives on Religion Concentration and 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 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 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 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.
 Class 3, Credit 4 (offered occasionally)

GSHH-502 **Europe of the Dictators:**
Registration #0507-502 **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.
 Class 3, Credit 4 (offered occasionally)

GSHH-503 **The History of Russia**
Registration #0507-503
 A study of the historical context and development of Russian society and the factors leading to the emergence of the Soviet regime.
 Class 3, Credit 4 (offered occasionally)

GSHH-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.
 Class 3, Credit 4 (offered annually)

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.
 Class 3, Credit 4 (offered annually)

GSHH-545 **Revolutionary Leaders in**
Registration #0507-545 **Latin America**
 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-555 The History of the Soviet Union**Registration #0507-555**

A study in depth of the Bolshevik revolution, the rise of Stalin, industrialization and collectivization, the terror and purges, the process of de-Stalinization under Krushchev and his successors, and current developments in the Soviet Union.

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**Registration #0507-557 Democracy in Their Theoretical Foundations**

A political and historical appraisal of these philosophies. Emphasis is placed upon the claims they make with regard to the individual and the state and the changes they demand for the future.

Class 3, Credit 4 (offered occasionally)

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**Registration #0508-444**

Technology
Modern society is increasingly based on technology. With each advance due to technology, unanticipated problems are also introduced. Society must define and solve these problems or the advances may be diluted or lost. In this course we will study several interactions between technology and the world in which we live. We will investigate how various technologies developed and compare the expected effects of the new technologies with the actual results. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-445 Biomedical Issues in Science**Registration #0508-445**

and Society
A study of the impact of science and technology on life, our view of life, and of the value issues that arise from this impact. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-446 Makers of Modern Science**Registration #0508-446**

This course is designed to help the student understand the life of modern science through the lives of modern scientists. Modern science is understood to be science from the Scientific Revolution of the 16th and 17th centuries to the present. Much recent scholarship has been devoted to analyzing science in context; i.e., the way it actually develops in particular social and political environments as well as through the lives of individuals. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

**GSHN-481 Introduction to Environmental Studies
Registration #0508-481**

This course seeks to make students aware of the environmental consequences of modern technology by investigating to what degree various technological systems conflict with the basic ecological principles. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

**GSHN-482 Energy and the Environment
Registration #0508-482**

In this course we will look at the current situation, its environmental implications, and try to determine how we got here, why we got here, and where we may be able to go in the next 20 to 50 years. We will look at the nature, uses, and relative importance of our sources of energy; high technology and low or appropriate technology; hard energy paths and soft energy paths. We will look especially at the role of government policy in the energy area. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

**GSHN-483 Environmental Values
Registration #0508-483**

We seek to identify, interpret, and trace the values associated with concern for the environment, and the factors that induced change in these values. Concern with the environment is not a new concept; its history reaches to ancient times, but the values related to this concern have drastically changed. Understanding environmental values helps one become a better prepared participant in the environmental decision making. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

**GSHN-484 Environmental Policy
Registration #0508-484**

Public compliance with environmental regulations has become increasingly complicated as a result of many laws and regulations instituted since the mid 1960s. The purpose of this course is to study the consequences of major environmental legislation and regulations and to examine the actions of both citizens and the corporate sector as they comply with these laws. The course also will focus on the economic and social implications and value of environmental regulation and enforcement and will identify current developments in the area. This is a concentration course in the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

**GSHN-485 Development of U.S. Energy Policy
Registration #0508-485**

An examination of the development of U.S. energy policy from the mid-19th century to the present. A number of policies have affected the supply of and demand for energy for many years, and an examination of the development of these policies will aid in understanding some of the current energy conflicts and debates. This course is part of the Environmental Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered occasionally)

**GSHN-486 Modern Warfare Technology
Registration #0508-486 and Arms Control Problems**

In this course we will study the importance of science and technology to defense matters. We investigate how modern weapons, both nuclear and conventional, their delivery systems, and reconnaissance and surveillance methods have seriously affected the character of armed conflict and of preventing wars. However, we shall also see how scientists, by providing their expertise, have been able to influence national security and attempts to control arms. This course is part of the Peace Studies Concentration and 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 learn the conceptual development of the 20th century theories of time and space with major emphasis on their applications in the present decade. These views, which grew out of the rigorous mathematical logic of relativity theory and quantum theory, represent one of the most profound revisions of intellectual thought in human history. We learn how any vestige of an absolute frame of reference in space and time, and how cause and effect and strict determinism were demolished and how probability was introduced by means of these theories.

Class 3, Credit 4 (offered occasionally)

**GSHN-507 Community Energy Planning
Registration #0508-507**

This course is designed to allow the student to understand the concepts underlying community energy self-reliance, how to analyze a community's energy supply and consumption, and how to evaluate possible energy futures for a community based as much as possible on conservation and alternative energy strategies.

Class 3, Credit 4 (offered occasionally)

**GSHN-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)

GSHP-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)

GSHP-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)

GSHP-210 **Philosophy: Selected Issues**
Registration #0509-210

An introduction to some of the major problems, methods and insights of philosophy with readings from both classical and contemporary sources.

Class 3, Credit 4 (offered quarterly)

GSHP-211 **Philosophy: Ethics**
Registration #0509-211

An introduction to moral philosophy through an analysis, comparison and evaluation of some main theories that have been offered as systematic ways of making moral decisions, and through discussions of contemporary moral problems.

Class 3, Credit 4 (offered quarterly)

GSHP-213 **Philosophy: Critical Thinking**
Registration #0509-213

An introduction to philosophical analysis, especially as it may be applied in contexts other than professional philosophy.

Class 3, Credit 4 (offered quarterly)

GSHP-440 **Philosophy of Religion**
Registration #0509-440

A critical examination of a number of important issues connected with religion. These include the nature of religion itself, the existence of God, the problem of evil, and questions about the language we use when we talk and write about religion. This course is part of the Philosophy Concentration and the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-441 **Logic**
Registration #0509-441

An introduction to the basic principles of logic. The main emphasis will be on symbolic, or formal logic, but some attention may be paid to informal logic as well. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered quarterly)

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.

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.

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-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)

GSHP-480 **Philosophy and Peace**
Registration #0509-480

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 also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-483 **The Biblical Tradition**
Registration #0509-483

An examination of Judaism and Christianity as they are presented in the Old and New Testaments. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

Social Science

GSSA-210 **Cultural Anthropology**
Registration #0510-210

This course is a study of the nature, method, and scope of human culture—the patterns of thought and behavior with which mankind makes decisions, criticisms, choices and judgments in order to satisfy the needs of life and experience.

Class 3, Credit 4 (offered quarterly)

GSSA-440 **Culture in Crisis**
Registration #0510-440

The Chinese proverb "may you be cursed to live in interesting times" sets the tone for this course. Change in all subsystems of human culture is the hallmark of the 20th century. The stress and strain that accompany change challenge every traditional way of life in the world today. From peasant revolutions and millenarian movements, to the feminist activism of the past generation, causes and consequences are explored in historical and cross-cultural perspective. This course is part of the Social Change in a Technological Society Concentration and 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 h@w 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 annually)

GSSE-444 **Public Finance**
Registration #0511-444

This course is a study of the economics of the public sector. Topics include but are not limited to: taxation and public expenditures and their effect on the allocation of resources, distribution of income, and employment; market failure; public goods; the economics of public choice; and the application of public finance principles and normative questions to public economic issues. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-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 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-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)

GSEE-451 **Forensic Economics**
Registrsation #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 also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSE-520 **Intermediate Price Theory**
Registration #0511-520

Intermediate Price Theory develops the tools of analysis utilized in contemporary economics to study the process of price formation in a capitalist society. Topics covered in the course include the theories of consumer behavior, cost and production, alternative market structures, and the pricing of factors of production. (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 and Finance**
Registration #0511-522

This course introduces the students to the theory and the practical issues of the export/import markets, the international flow of capital, and international investment decisions. In addition, the students study the foreign-exchange and the Eurodollar markets and the investment opportunities in them. The role of multi-national corporations in international trade and finance is also discussed. (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 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

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

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

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 occasionally)

GSSM-450 State and Local Politics**Registration #0513-450**

This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. It will illustrate differences in state governments by comparing other states to New York, and will use the Rochester area for comparisons with local governments found elsewhere. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-451 The Legislative Process**Registration #0513-451**

This course examines the role of the legislature in the U.S. political process. The primary emphasis will be the study of the U.S. Congress, but some attention also will be directed to state legislatures. Topics to be studied include elections, party organization, committees, interest group activities, and executive-legislative relations. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-452 The American Presidency**Registration #0513-452**

This course is a study of the role of the presidency in the American political system. Among the topics to be considered are: the nomination and election process, evolution, expansion and limitation of presidential powers, factors in decision making, and the various leadership functions performed by the American Presidency. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-453 American Foreign Policy**Registration #0513-453**

A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures and philosophies shaping the development and implementation of foreign policy. This course is part of the American Politics Concentration and the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-454 Political Parties and Voting**Registration #0513-454**

Political parties are a crucial part of the democratic process. Parties serve as a critical link between citizens and their government, as parties promote policies favored by their voters. This course studies parties; their history, their future and their role in the democratic process. Its overall emphasis is on the degree to which parties perform or fail to perform as links between citizens and government. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered quarterly)

GSSM-455 **Politics and Public Policy****Registration #0513-455**

This is a course in the politics of the policy process. The basic questions of the course are: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government implement public policy? How does government evaluate public policy? This course is part of the American Politics Concentration and also may be taken as an elective (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-456 **The Judicial Process****Registration #0513-456**

This course examines the structure and function of the state and federal courts in the American political system. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215)

Class 3, Credit 4 (offered annually)

GSSM-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 annually)

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-480 **Psychology of Women**
Registration #0514-480

This course examines the relevance and applicability of present psychological theory and research to the understanding of the development and behavior of women. Major topics covered include: psychological and biological sex differences, psychological theories of women's development, the relationship between female personality development and various sociocultural factors, women's place in society, women and their bodies, and women and mental health. This course is part of the Women's Studies Concentration and 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-501 **Industrial Psychology**
Registration #0514-501

Consideration of principles, application and current research in industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership and communication. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-504 **Attitude Formation and Persuasion Techniques**
Registration #0514-504

The course will focus on current theories of attitude formation, and seek to apply them to contemporary events to achieve an understanding of how those who wish to shape or change attitudes do so. (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-514 **Behavior Modification**
Registration #0514-514

This course will teach you the skills of changing your behavior by controlling your environment and the consequences of your behavior. (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-519 **Psychology of Altered States of Consciousness**
Registration #0514-519

This course will cover such topic areas as the specialized consciousness in the two halves of the brain, dreaming, hypothesis, meditation, systematic relaxation, and parapsychology. The course format will be discussion/demonstration. (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 in 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 quarterly)

GSSS-445 Television and Social Change**Registration #0515-445**

This course will analyze how television and other modern media affect social and cultural change. It will emphasize historical development, structure, organization, function and effects of mass media in society. Issues to be discussed will include: ethnicity, race, age and sex-role stereotyping; the consequences of broadcasting violence; children and the media; the business of television; economic control; the entertainment industry; the production of culture; the global reach of television and its consequences. (GSSS-210 or GSSA-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

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)

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 Hispanic American Culture**Registration #0515-482**

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 occasionally)

GSSS-483 Afro-American Culture
Registration #0515-483

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-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, pre-marital and marital sexual behavior, and alternative sexual choices. Frequently these issues raise questions of sexual attitude and value and these will be examined and clarified.

Class 3 + 2 hr. weekly seminar, Credit 4 (offered biannually)

**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 occasionally)

**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 in a two-quarter sequence designed to introduce the student to the basic principles of economics. This course will focus on basic economic concepts and macroeconomics. Topics of primary interest include economic methodology, the economizing problem, capitalist ideology, supply and demand, national income accounting, income determination, inflation, money, and the role of government in the economy. Other topics in basic economics will be selected by the instructor.

Class 3, Credit 4 (offered occasionally)

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 in invertebrate animals with reference to classification, structure, function, and ecology. (One year of general biology or permission of instructor)

Class 2, Lab 6, Credit 4 (offered upon sufficient request)

SBIB-302

Vertebrate Zoology

Registration #1001-302

Morphology, physiology, behavior, classification, and ecology of chordates. (One year of general biology)

Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SBIB-303

Comparative Vertebrate Anatomy

Registration #1001-303

A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)

Class 3, Lab 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-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, bio-geography and representative ecosystems. (One year of general biology)

Class 3, Lab 3, Credit 4 (F)

SBIB-350 **Molecular Biology**
Registration #1001-350
 The study of 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 (offered upon sufficient request)

SBIB-370 **Biological Writing**
Registration #1001-370
 Written technical communication in the biological sciences with emphasis on components of report writing: analysis, definition, description, instruction, data presentation, literature research, abstracting and editing. (Third-, fourth-, fifth-year status)
 Class 1, Rec. 1, Credit 2 (F, W)

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-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
 Principles of anatomy, biochemistry, genetics, taxonomy, ecology of viruses, bacteria, molds, algae and protozoa. Useful and harmful activities. Basic laboratory techniques, microscopy, staining, counting, identifying. (One year of general biology, one year of organic chemistry)
 Class 3, Lab 4, Credit 5 (F, W)

SBIB-407 **Microbial and Viral Genetics**
Registration #1001-407
 The study of the molecular genetics of bacteria, bacteriophages, fungi, and eucaryotic viruses. (SBIB-350,421; SCHO-334)
 Class 3, Lab 3, Credit 4 (F, S)

SBIB-417 **Industrial Microbiology**
Registration #1001-417
 Use of yeasts, molds, and bacteria for fermentations of economic importance. Industrial aspects of strain selection, cultivation, assay, production and recovery of fermentation products. Microbiology, biochemistry, chemistry and engineering aspects. (SBIB-404, SCHO-334)
 Class 3, Lab 3, Credit 4 (W, 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. Field studies of various plant communities will be conducted. (SBIB-340)
 Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SBIB-421 **Genetics**
Registration #1001-421
 Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (SBIB-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 (W)

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 (F)

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 (offered upon sufficient request)

SBIB-442 **Hybridoma Techniques**
Registration #1001-442
 Designed to acquaint each student with the basic methods employed in the production of hybridoma cell lines and monoclonal antibodies. To include preparation of viable cell suspensions, cell culture fusion techniques, cloning, and monoclonal antibody production and characterization. (SBIB-445)
 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 (offered upon sufficient request)

SBIB-472 Introduction to Oceanography**Registration #1001-472**

An introduction to the study of the world ocean, with emphasis on fundamental principles, concepts and processes of biological, geological, chemical, and physical oceanography. (SBIB-340 or permission of instructor)

Class 3, Lab 3, Credit 4 (offered upon sufficient request)

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 (offered upon sufficient request)

SBIB-490 Transmission Electron Microscopy**Registration #1001-490**

A lecture/laboratory course covering operation, maintenance and calibration of transmission electron microscopes; preparation of biological, chemical and physical specimens for the transmission electron microscope; black-and-white photographic darkroom techniques. (Fourth- or fifth-year status and permission of instructor)

Class 1, Lab 6, Credit 4 (offered upon sufficient request)

SBIB-491 Scanning Electron Microscopy**Registration #1001-491**

A lecture/laboratory course covering operation, maintenance and calibration of scanning electron microscopes; preparation of biological, chemical and physical specimens for the scanning electron microscope; black-and-white photographic darkroom techniques. (Third-, fourth- or fifth-year status)

Class 1, Lab 6, Credit 4 (offered upon sufficient request)

SBIB-541,542,543 Biology Research**Registration #1001-541,542,543**

Faculty directed projects of research usually involving original field or laboratory work encompassing a period of at least two quarters. Final results are presented in written and oral formats. (Third-year status with a GPA or 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, S)

SBIB-599 Independent Study: Biology**Registration #1001-599**

Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (One year of general biology)

Class variable, Credit variable (F, W, S, 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 (offered upon sufficient request)

SBIB-721 Introduction to Pharmacology**Registration #1001-721**

Laboratory work to accompany the lectures in Introduction to Pharmacology. (Corequisite SBIB-720)

Lab 3, Credit 1 (offered upon sufficient request)

NOTE: The following courses may not be taken for biology credit by biology or biotechnology majors.

SBIG-210 Microbiology in Health and Disease**Registration #1004-210**

An introduction to microorganisms; their relationship to the environment and human health; 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, S)

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 4 (W)

SBIG-212 **Human Biology II**
Registration #1004-212

A general study of human anatomy and physiology with emphasis on mechanisms by which the nervous and endocrine systems coordinate and integrate body functions. This second course includes discussion of nutrition, metabolism and respiratory, circulatory, lymphatic, urinary and reproductive systems.

Class 3, Lab 3, Credit 4 (S)

SBIG-289 **Contemporary Science: Biology**
Registration #1004-289

A study in various biological topics relevant to contemporary problems of society. Topics may include population biology, pollution, disease control, human heredity, contagious diseases, marine biology, bioethics.

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

SBIG-315 **Medical Genetics**
Registration #1004-315

A survey of selected human variations and diseases of medical importance, with emphasis on the underlying genetic principles. (SBIB-203 or equivalent)

Class 2, Credit 2 (S)

Chemistry

NOTE: SCHG courses, except SCHG-309, may not be taken by chemistry or polymer chemistry majors.

SCHA-261 **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 bioenergetics 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, cryogenics, 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-D,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)

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, SR)

*D, daytime offering; X, extended day (after 5 p.m.)

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, SR)

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, SR)

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, SR)

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, SR)

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, SR)

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 heterogeneous 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 (Corequisite 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 SCH-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-end-point 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-240 **Fundamentals of Chemistry**
Registration #1011-240

Basic training in general chemistry assuming no prior experience, concentrating on those aspects important to the fields of engineering technology. Emphasis will be placed on atomic structure, periodicity, bonding, structure of compounds, physical and chemical properties, acids and bases, oxidation-reduction, and kinetics. (SCHG-275 may be taken concurrently.)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SCHG-271 **Basic Chemistry**
Registration #1011-271

Basic training in general chemistry assuming no prior experience, concentrating on those aspects important to the field of water conservation. (SCHG-275 should be taken concurrently)

Class 3, Credit 3 (offered every year) (W)

SCHG-272 **Chemistry of Water 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-275 **Basic Chemistry Lab**
Registration #1011-275

Laboratory to be taken concurrently with SCHG-240 or 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 Waste Water**
Registration #1011-276 **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-281 **Chemical Foundations I**
Registration #1011-281

Basic concepts of general chemistry including measurement, atomic theory, chemical bonding, stoichiometry, the liquid and solid states, properties of water. (SMAM-204)

Class 3, Recitation 1, Credit 4 (offered every year) (W)

SCHG-282 **Chemical Foundations II**
Registration #1011-282

Basic concepts of general chemistry including solutions, colligative properties, acid-base theory, pH, titrations, oxidation-reduction, organic functional groups, addition and condensation polymers. (SCHG-281)

Class 3, Recitation 1, Credit 4 (offered every year) (S)

SCHG-289 **Contemporary Science: Chemistry**
Registration #1011-289

This course examines a broad range of contemporary scientific topics with a chemical basis. These may include nuclear power, sources of energy, air and water pollution, medicines and drugs in addition to the chemical laws and structure of the atom.

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

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 Imaging Science**
Registration #1011-310

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)

SCHO-231,232 **Organic Chemistry**
R'igistration #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, aldehydes, and ketones. Organometallics and spectral analysis (IR, UV, NMR) are also included. (Corequisite SCHO-436) (SCHO-431)

Class 3, Credit 3 (offered every year) (F, W)

SCHO-433 Organic Chemistry III**Registration #1013-433**

A continued survey of reactions of major organic functional groups, including carboxylic acids, carboxylic acid derivatives, amines, and enolate anions. Structure, nomenclature, reactions, and properties of important classes of bio-organic molecules are also included. (Corequisite SCHO-437) (SCHO-432)

Class 3, Credit 3 (offered every year) (S, SR)

SCHO-435,436 Preparative Organic Chemistry**Registration #1013-435, 436**

Synthesis of organic compounds utilizing a variety of laboratory techniques. Purification techniques and spectral characterization will be routinely used. (SCHO-431 should be taken concurrently with SCHO-435, SCHO-432 with SCHO-436.) (SCHC-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-601 Organic Chemistry of Polymers**Registration #1013-601**

The chemistry of high molecular weight organic polymers and their properties are introduced and discussed in depth. Mechanisms of step-growth and chain-growth polymerization reactions, polymer reactions and degradations are studied. (SCHO-433)

Class 4, Credit 4 (F, W) (X*)

SCHP-301 Introduction to**Registration #1014-301****Polymer Technology**

Introduction to the history of polymer chemistry, the terminology of polymers, the structures and properties of commercially significant polymers, and the major polymer processing techniques. (SCHO-432 or equivalent)

Class 2, Credit 2 (offered every year) (F, W)

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) (F-X,* S, SR)

SCHP-442 Physical Chemistry II**Registration #1014-442**

Introduction to quantum mechanics and spectroscopy, radioactivity; Planck's law; photoelectric effect; the Bohr atom; deBroglie, Schrodinger, and Heisenberg theories; eigenvalue/eigenfunction equations; variation and perturbation theory; quantum statics; Heitler-London theory of covalent bonds; selection rules and spectroscopy. (Should be taken concurrently with SCHP-446.) (SMAM-306, SCHP-441)

Class 3, Credit 3 (offered every year) (F, W-X, D*)

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) (F-X,* S, 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-D, X*)

SCHP-447 Physical Chemistry**Registration #1014-447****Laboratory III**

Laboratory experiments in chemical dynamics. (Should be taken concurrently with SCHP-443.)

Lab 3, Credit 1 (offered every year) (S-D, X, * SR)

SCHP-602 Physical Chemistry of Polymers**Registration #1014-602**

Study of the theoretical and experimental aspects of polymer characterization. In addition, theoretical considerations of the configuration of polymer chains and statistical thermodynamics of polymer solutions will be related to experimental results. (SCHP-443)

Class 4, Credit 4 (offered every year) (S, SR) (X*)

•Offered once each year or in quarter indicated during regular daytime (D) or extended day (X) hours (after 5 p.m.)

SCHP-603 **Structure-Property Relationships in Polymers**
Registration #1014-603

An introduction to amorphous and semicrystalline polymeric systems; thermomechanical, tensile and impact properties of polymers; rubber elasticity, viscosity, viscoelasticity. (SCHO-60I or SCHP-602)

Class 4, Credit 4 (F, W) (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-60I or SCHP-602)

Lab 6, Credit 2 (F, W)

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, W)

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)

Class 4, Credit 4 (W) (X*)

SCHP-648 **Basics of Pulsed NMR**
Registration #1014-648

An introduction to the principles of pulsed nuclear magnetic resonance (NMR) spectroscopy. Lectures on instrumentation, pulse sequences, Fourier transforms, and artifacts will be presented. (SCHA-311)

Class 1, Credit 1 (offered every year) (F)

SCHA-711 **Instrumental Analysis**
Registration #1008-711

Theory, applications, and limitations of selected instrumental methods in qualitative, quantitative, and structural analysis. Topics covered include mass spectroscopy, nuclear magnetic resonance, electrochemistry, surface methods and new analytical methods. (SCHA-312)

Class 3, Credit 3 (offered every year) (F, W)

SCHA-720 **Instrumental Analysis Lab**
Registration #1008-720

Lab accompanying SCHA-711. Experiments include AA, fluorimetry, coulometry, ^{13}C and ^1H NMR, polarography. Assignments depend on student background. (Corequisite SCHA-711)

SCHB-702 **Biochemistry: Biomolecular Conformation & Dynamics**
Registration #1009-702

Introduction to biological chemistry. Chemical structures, reactions, molecular organization and physiological functions of the molecular components of cells; amino acids, proteins, enzymes, enzyme kinetics, co-enzymes, biochemical thermodynamics, carbohydrates and lipids, membrane structure, and active transport. Emphasis is on the structure-function relationships of biomolecules, their solution behavior and dynamics. (SCHO-433, 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)

SCHG-704 **Biochemistry: Nucleic Acids and Molecular Genetics**
Registration #1009-704

The biochemistry of inheritance, expression of genetic information, protein biosynthesis, differentiation, viral and bacterial infection and the "origin of life." (SCHB-702)

Class 3, Credit 3 (offered every year) (S, SR)

•Offered during extended day hours (after 5 p.m.)

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 **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)

NOTE: All 700- and 800-level courses are extended day (after 5 p.m.) courses.

**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**

Xenobiotic mechanism, chemical carcinogenesis, drug-induced toxicology, environmental and genetic toxicology, teratology and bioassay/biometrics. (SCHO-433)

Class 3, Credit 3 (offered upon sufficient request)

**SCHO-736 Spectrometric 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: polyfunctional compounds, modern synthetic methods, stereochemistry, conformational analysis, free radical reactions, natural products, new synthetic reagents. (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 every year) (S)

**SCHO-832 Stereochemistry
Registration #1013-832**

Advanced treatment of steric relationships and stereoisomerism 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 comprehensive treatment of heterocyclic chemistry. Based on the concept of 7t-excessive and rr-deficient ring systems, the student will be introduced to categorical similarities and differences among various heterocyclic systems. In addition, the course will explain the logical consistency of the numerous syntheses and relative reactivities of heterocyclic compounds as demonstrated by their chemical reactions and spectroscopic properties. These results of reactivities and synthetic studies are then applied to a number of commercially important heterocyclic compounds. (SCHO-433)

Class 4, Credit 4 (offered upon sufficient request)

**SCHP-741 Chemical Thermodynamics
Registration #1014-741**

A study of the basic fundamentals of thermodynamics and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases will be calculated based on spectroscopic data. (SCHP-443, 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**

Matrix formulation of quantum mechanics; variation and perturbation methods, group theory molecular orbital energies and complex molecules, calculation of vibrational frequencies and selection rules for complex molecules. Emphasis on use of spectroscopy and quantum chemistry to obtain chemical information. (SCHP-442)

Class 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 nuclear-magnetic resonance (NMR) spectroscopy. Topics covered include classical and quantum mechanical theory, Fourier transform techniques, pulse sequences, instrumentation, instrumental techniques, and modern applications such as 2D-NMR and solid state NMR. (SCHP-443)

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****Trigonometry**

Topics include a review of the fundamentals of algebra; solution of linear, fractional and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic and trigonometric functions; systems of linear equations. (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: Mathematics**
Registration #1016-289

A basic survey of mathematical structures as well as an introduction to problem solving. Topics will be chosen from foundations of mathematics, algebra, topology, number theory, graph theory, probability and statistics. These structures will be examined as they occur naturally in modern settings. **NOTE: Not acceptable for science credit for College of Science majors.**

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-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) (F, 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 Value Problems**
Registration #1016-318

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 Equations**
Registration #1016-338

The course includes: power series solutions of ordinary differential equations at ordinary and regular singular points; Fourier series and an introduction to their use in the solution of heat and wave equations. **NOTE: This course may not be taken for credit if credit is to be earned in SMAM-318.**

Class 4, Credit 4 (offered every year) (S)

SMAM-351 **Probability****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. (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 situation. 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; Latin square 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, multiple and sequential sampling plans and some standard sampling plans. (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; classical and Bayesian methods in estimation theory and mathematical justification of standard test procedures. (SMAM-352)

452: Chi-square test; Neyman-Pearson theory of hypothesis testing; nonparametric methods; sufficient statistics and further topics in statistical inference. (SMAM-451)

Class 4, Credit 4 (offered every year) (451-F, W; 452-S, SR)

SMAM-454 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. (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, and a discussion of specific industrial sampling methods. (SMAM-355)

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 Programming
Registration #1016-466

The optimization of functions of integers; theory and practice of branch and bound; implicit enumeration; cutting plane duality and related solution techniques; heuristics, and applications. (SMAM-465)

Class 4, Credit 4 (offered every year) (S)

SMAM-467 Theory of Graphs and Networks
Registration #1016-467

The basic theory of graphs and networks, including the concepts of circuits, trees, edge and vertex separability, planarity and vertex coloring and partitioning. There is a strong emphasis on applications to physical problems and on graph algorithms such as those for spanning trees, shortest paths, non-separable blocks and network flows. (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-353; 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, ICSEA-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-521,522 Probability Theory
Registration #1016-521,522

Selected topics in applied probability and statistics to meet the needs and interest of the students. (SMAM-305, 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. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-531,532 Abstract Algebra
Registration #1016-531,532

531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265, 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. (SMAM-353, 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 and confidence regions. Special topics including geometric aspects of linear regression, orthogonal polynomials, weighted least squares, ANOVA models, etc., as time permits. (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 III

Registration #1017-273

This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in SPSP-213) (SPSP-271)

Lab 2, Credit 1 (offered every year) (F, S)

SPSP-289

Contemporary Science-

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 majors**

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 give an appreciation of the significance of physics in our contemporary technological society. A minimum of mathematics is used. A laboratory or discussion option may be offered for small group meetings once a week, which reinforce the material given in demonstration lectures and audiovisual presentations. **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, beta, and gamma decays, Q-values, nuclear fission, nuclear fusion. (SMAM-305; SPSP-312, 313)
 Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-315 Introduction to Semiconductor Physics
 Registration #1017-315
 Kinetic theory of gases and transport phenomena; Drude's theory of metals; quantum mechanics of a particle in a box; atomic orbitals; band theory of metals, insulators, and impurity semiconductors; Fermi-Dirac distribution; equilibrium charge-carrier densities in metals, insulators, and semiconductors; operation principles of diodes, bipolar junction transistors, and MOSFETs. (SMAM-306, SPSP-314)
 Class 4, Credit 4 (offered every year) (W, S)

SPSP-317 Introduction to Computational Physics
 Registration #1017-317 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 Techniques
 Registration #1017-321
 An introduction to equipment and procedures common to the physics research laboratory. The oscilloscope and ac circuit analysis, statistics, vacuum systems including vacuum pumps and gauges, the laboratory notebook, and writing for publication. (SPSP-312, 313, 372, 373)
 Class 3, Lab 3, Credit 4 (offered every year) (F, transfer students only; W)

SPSP-331 Introduction to Electricity and Electronics
 Registration #1017-331
 Fundamentals of electricity; construction and measurements of electrical and electronic circuits encountered in a scientific laboratory. (Two quarters of college-level physics)
 Class 3, Lab 3, Credit 4 (offered upon sufficient request) (S)

SPSP-341 Foundations of Scientific Thinking
 Registration #1017-341
 Definition of science; historical perspective; ingredients of the scientific quest; the scientific method; scientific explanation, laws, theories, and hypotheses; the role of mathematics; probability and induction; science and other disciplines. (At least a year of basic sciences at the college level)
 Class 2, Credit 2 (offered upon sufficient request) (F, W)

SPSP-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 modern quantum physics, such as: photoelectric effect; Franck-Hertz experiment; X-ray diffraction; optical diffraction and interference; atomic spectroscopy; electron microscopy; nuclear spectroscopy; radioactive half-life; Millikan oil drop; black-body radiation. Students enrolled in SPSP-315 may include experiments in semiconductor solid state physics. (SPSP-314, SPSP-321)

Lab 3, Credit 1 (offered every year) (S)

SPSP-375 University Physics Lab I
Registration #1017-375

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-376 University Physics Lab II
Registration #1017-376

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (SPSP-375 or 371) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-377 University Physics Lab III
Registration #1017-377

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (SPSP-375 or 371, SPSP-376 or 372) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-401,402 Intermediate Mechanics
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 and applications of discrete and integrated circuits in analog and digital electronics. (SPSP-313,321)

Class 3, Lab 3, Credit 4 (offered every year) (S)

SPSP-432 Computer Interfacing to Laboratory
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 Schrodinger 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**

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**

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**

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 modern 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. (Third-year standing in NMT program)

Class 1, Credit 1 (F, W, S)

SCLM-401**Hematology/****Registration #1024-401****Immunoematology**

A study of the blood (erythrocytes, leukocytes, platelets, coagulation factors and blood group antigens). Descriptions of the cellular components of the blood in health and in disease. Cellular and immunological functions and their interrelationships. Hemostasis and coagulation mechanisms. Structures of antigens and antibodies and mechanisms of antigen-antibody reactions. Lab procedures demonstrate cell counting techniques, coagulation studies, antigen-antibody reactions and compatibility testing of various blood groups. (SBIB-306 or permission of instructor)

Class 3, Lab 3, Credit 4 (S)

SCLM-405**Diagnostic Bacteriology and Mycology****Registration #1024-405**

Study of bacteria and fungi that cause human disease. Lecture and laboratory subjects include microorganisms growth, isolation, identification, antibiotic sensitivity, and related human immunological and serological responses. (SBIB-404)

Class 3, Lab 3, Credit 4 (W)

SCLM-406**Virology****Registration #1024-406**

Molecular biology, chemistry, epidemiology and clinical aspects of viruses; morphology, genetics, immunology, environmental effects; methods of isolation, cultivation, identification; assays. Human virus diseases. (One year of general biology)

Class 4, Credit 4 (offered upon sufficient request)

SCLM-412**Parasitology****Registration #1024-412**

Ecology, structure, life cycle metabolism, pathology and control of human parasites. Insects, protozoa, nematodes, flukes and tapeworms of medical importance. Chemotherapy and immunology of human parasites. Emphasis on recognizing human parasites.

Class 3, Lab 3, Credit 4 (offered, upon sufficient request)

SCLM-432**Biology Laboratory****Registration #1024-432****Techniques I**

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**Biology Laboratory****Registration #1024-433****Techniques II**

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, quality control, computer systems and data processing are covered. (Fourth-year standing in NMT program)

Credit 2 (W)

SCLN-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, done calibration, and licensing regulations regarding the handling and use of radiopharmaceuticals are covered. (Fourth-year standing in NMT program)

Credit 2 (W)

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 2, Credit 2 (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-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, emphasis will be on aspects of the development and reversal of functional abnormalities in disease states. Cellular damage will be integrated with organ failure and multi-organ systemic disease and healing.

Class 4, Credit 4 (W)

SCLC-712 Statistics and Quality Control**Registration #1023-714**

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**

Toxicology, therapeutic drug monitoring, electrolytes, acid-base, vitamins, oncology, hepatitis, coagulation, and various standard methods. (Permission of instructor)

Class 4, Credit 4 (S)

SCLC-821 Advanced Clinical Chemistry II**Registration #1023-821**

Proteins, enzymes, hemoglobins, iron, renal functions, lipids, quality control, automation, and method selection. (Permission of instructor)

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 (F)

SCLC-870 **Clinical Chemistry Seminar**
Registration #1023-870
 Credit 1 (W)

SCLC-872 **Special Topics in Clinical Chemistry**
Registration #1023-877
 In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of regular courses will be presented. These courses will be structured as ordinary courses with specified prerequisites, contact hours and examinations.
 Class variable, Credit variable (offered upon sufficient request)

SCLC-877 **External Clinical Chemistry Research**
Registration #1023-877
 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. (SESM-701 or equivalent)
 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 electro-dynamics and fluid mechanics; statistical mechanics; Maxwell-Boltzmann, Bose Einstein, and Fermi-Dirac distributions and their applications. (SESM-701 or equivalent)
 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
 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. (SESM-701 or equivalent)
 Class variable, Lab variable, Credit 4)

SESM-707 **Experimental Techniques**
Registration #1028-707
 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 Selection I**
Registration #1028-710
 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-711** **Materials Properties and Selection II**
Registration #1028-711
 Mechanical properties of metallic polymeric materials; application and selection of such materials based on strength, fatigue, impact, creep, processing, and economy. (SESM-710)
 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)
 Class 4, Credit 4
- SESM-717** **Materials Degradation Corrosion**
Registration #1028-717
 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 Polymers**
Registration #1028-721
 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** **Electrical and 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 equivalent)
 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 Semicrystalline Materials**
Registration #1028-736
 Electrical, thermal, and optical properties of amorphous materials; model of conduction. (SESM-701, 703, 704 or equivalent)
 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 of I. C. Processing**
Registration #1028-770
 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 by 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

Department of Support Service Education

Interpreting

NITP-200 **Sign Vocabulary Development** **Registration #0850-200**

This course affords students the opportunity to develop, expand and refine sign vocabulary skills that prepare them for future courses in interpreting. Vocabulary introduced will include at least 300 signs.

Class 1, Lab 1, Credit 1

NITP-203 **American Sign Language I** **Registration #0850-203**

Students will be able to generate and accurately produce ASL classifiers and ASL idioms, recognize and accurately produce non-manual grammatical markers, use appropriate body/facial expressions, apply grammatical features of ASL, and manipulate sign utilization to vary meaning. (CHGD-0234-211, 212)

NITP-204 **American Sign Language** **Registration #0850-204** **Interpreting I**

Students apply the skills and principles learned in Principles of American Sign Language. The student will practice interpreting from English to American Sign Language (ASL). Practice will include interpreting both live talent and audiotapes. The speed of the spoken message will be between 80-111 words per minute. (NITP-203)

Class 3, Lab 2, Credit 3 (offered annually)

NITP-205 **American Sign Language** **Registration #0850-205** **Interpreting II**

The course is built around a series of advanced vocabularies necessary for interpreting in the community and in educational environments. Materials are structured so that students progressively increase transmission skills from 80 to 120 words per minute. Students' skills in American Sign Language (ASL) will be enhanced with ongoing critiques. (NITP-204)

Class 3, Credit 3 (Elective)

NITP-206 **American Sign Language II** **Registration #0850-206**

This course develops conversational fluency in American Sign Language. Students incorporate appropriate use of ASL classifiers, non-manual grammatical markers, and grammatical features of ASL in a conversational setting. This is a required course. (NITP-203)

Class 2, Lab 2, Credit 3 (offered annually)

NITP-210 **Fingerspelling and Number** **Registration #0850-210** **Comprehension**

Students improve their ability to comprehend fingerspelled words and manually signed numbers within messages signed at a conversational rate of speed. Instructional activities include games, drills, and voice interpreting in a lecture/lab format.

Lab 6, Credit 3 (F, W, S)

NITP-211 **Voice Interpreting I** **Registration #0850-211**

This course will increase the student's ability to receive the spoken and signed messages of hearing-impaired people. It also refines students' ability to use vocal modulation to prepare for the voice interpreting task. This is a self-paced lab course. Students learn by viewing videotapes and completing a series of exercises. The videotapes contain hearing-impaired people communicating orally, in Signed English or in ASL. (NITP-210)

Class 2, Lab 2, Credit 3 (W)

NITP-212 **Voice Interpreting II** **Registration #0850-212**

This course develops the student's ability to generate a spoken English equivalent while viewing/listening to a hearing-impaired person's signed/spoken message. This is a self-paced lab course. (NITP-211, 331)

Class 1, Lab 4, Credit 3 (F)

NITP-213 **Voice Interpreting III** **Registration #0850-213**

This course continues development of the voicing task. More complex videotaped samples of signed/spoken messages of hearing-impaired persons are delivered at a faster rate than those in Voice I and II. This is a self-paced lab course. (NITP-212)

Class 3, Credit 3 (F, W)

NITP-251,252 **Aspects and Issues of** **Registration #0850-251,252** **Deafness I, II**

The student learns the communication and psycho-social/cultural aspects of deafness through panels, discussions, readings, and field trips. (NITP-251, no prerequisite; NITP-252, prerequisite, NITP-251)

Class 3, Credit 3 (offered annually)

NITP-261 **Theory and Practice of** **Registration #0850-261** **Interpreting I**

This course addresses the current theory and practice of the profession of interpreting. Topic areas include: (1) general communication principles of their application to the interpreting task; (2) the history of the profession of interpreting; (3) different types of interpreting and related terminology; (4) general skills required in interpreting and current applications by professional interpreters; (5) overview of the professional code of ethics and its rationale; (6) populations served by interpreters, e.g., hearing-impaired speechreaders, deaf/blind individuals, multiple handicapped individuals, etc.; (7) resources available to students related to interpreting and mainstreaming; (8) current issues facing the profession, i.e., multiple roles, mainstreaming specialists.

Class 3, Credit 3 (offered annually)

NITP-262 **Theory and Practice of** **Registration #0850-262** **Interpreting II**

Students use a communication process model to acquire a theoretical base for the interpreting task. Addressed are the linguistic principles associated with sign language and the interpreting task, and skills in positioning and lighting. These courses include lectures and student participation in small and large group activities. (NITP-261)

Class 3, Credit 3 (offered annually)

NITP-271,372 The Professional Interpreter I, II
Registration #0850-271,372

Students develop a broad understanding of interpreting as a profession, national standards for certification, and the concepts contained in the RID Code of Ethics. Other areas of concentration are interpersonal skills, self-critique, professional development, and resume writing. Course work includes panels, role plays, discussions, reading, and lectures. (NITP-271, no prerequisite; NITP-372, prerequisite, NITP-262 and 271)

Class 3, Credit 3 (offered annually)

NITP-281,382 Interpreting Practicum I, II
Registration #0850-281,382

These field experiences provide an opportunity to practice and integrate skills acquired in the classroom and laboratories. They include instructional and non-instructional activities on the RIT campus and in the Rochester community, under the supervision of the interpreter manager on site and the instructor responsible for the course. (For 281: NITP-211, 251, 262, 271, 331; for NITP-382: 212,252, 332, 372,395)

Class 10, Credit 5 (available any quarter)

NITP-283,384 Interpreting Seminar I, II
Registration #0850-283,384

Designed as part of the field experience, students share their experiences and concerns as practicing interpreters. Panels of interpreters and consumers of interpreting services are used. (Corequisite NITP-281, 382)

Class 1, Credit 1 (available any quarter)

NITP-331,332 Expressive Transliteration I, II
Registration #0850-331,332

These two courses concentrate on expressive transliteration as it relates to "conceptually accurate English. Students develop the skills required to present a spoken message that is in a signed English mode. Emphasis is placed on conceptual accuracy, accuracy of fingerspelling, vocabulary development, facial expression and body movement, and self-critiquing skills. (NITP-202)

Class 2, Lab 2, Credit 3 (S,F)

NITP-342 Deaf-Blind Interpreting
Registration #0850-342

Students are prepared to interpret for deaf-blind consumers. These topics concerning deaf-blindness include: causes and effects, aspects and issues of deaf-blindness, information and resources, interpreting modes, and methods of communication. Practice with deaf-blind consumers is included where possible. (NITP-211,271, 331)

Class 3, Credit 3 (Elective)

NITP-343 Expressive Oral
Registration #0850-343 Interpreting/TVansliteration

This course concentrates on the skill of expressive oral transliteration. Students develop the skill of receiving an auditory message and reproducing it in a highly visual modality by applying the principles of clear speech production and support techniques. Emphasis will be placed on speech production principles, natural gestures, body language, facial expression, and speed of transmission. (NITP-252, 211)

Class 2, Lab 2, Credit 3 (F)

NITP-391 Principles of
Registration #0850-391 Tutoring/Notetaking

This course prepares personnel to provide tutoring and notetaking support services for hearing-impaired people in mainstreamed educational settings. The methodology is appropriate for elementary, secondary, and postsecondary educational levels. (NITP-251)

Class 3, Credit 3 (offered annually)

NITP-392 Tutoring/Notetaking
Registration #0850-392 Practicum

Students provide tutoring and notetaking services to hearing-impaired students. A minimum of 10 hours per week is committed to taking notes in class and tutoring outside of class. Practicum sites include the Rochester City School District, the Monroe County Board of Cooperative Educational Services (BOCES) program, colleges of RIT, and other Rochester area universities and colleges. Supervision is provided. (NITP-391)

Class 10, Credit 3 (available any quarter)

NITP-395 Mainstreaming: Educational
Registration #0850-395 Programs and Alternatives

This course explores the goals and processes of education of the hearing impaired and covers current demographic, legal, economic and social trends affecting education of the hearing impaired; identifies criteria and processes for the establishment of quality support services for deaf students. (NITP-251)

Class 3, Credit 3 (offered annually)

NITP-396 The Support Service
Registration #0850-396 Professional

This course addresses the knowledge and skills necessary for functioning in a variety of educational and/or non-educational settings where the support service provider will have more than one major responsibility. Case studies and practical experience in the field will be used to enhance students' awareness of what it means to be a support service professional. (NITP-281, 382, 391, or permission of instructor)

Class 3, Credit 3 (S)

NITP-397 Contemporary Studies in
Registration #0850-397 Support Services

This course addresses the dynamic nature of support services and special education. As changes and growth happen in the field, this course will address "state-of-the-art" issues. Some examples are: court decisions; state or federal legislation; research findings; developments of new techniques or technology; in-service training programs for faculty and/or service providers; management of support services. The course will be offered as new topics arise, or if a lecturer with specific expertise is available to conduct the course. (NITP-281)

Class 1-3, Credit variable 1-3 (S) (Elective)

NITP-399 Independent Study
Registration #0850-399

This course provides the student with the opportunity for supervised exploration of special topics related to interpreting, deafness, tutoring, notetaking, and/or mainstreaming. (NITP-205, 252, 262,331,391)

Credit variable 1-3 (W, S, SR)