Course Numbering

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

First letter: College offering the course
Second and third letters: School or department of that college
Fourth letter: Discipline

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

Second and third numbers: Course differentiation and sequencing

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

Course prerequisites are shown in parentheses after course descriptions.

Course of Study 1987-1988

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

Rochester Institute of Technology
Office of Admissions
One Lomb Memorial Drive
P.O. Box 9887
Rochester, NY 14623
or telephone (716) 475-6631

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College of Applied Science and Technology

School of Computer Science and Technology

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

Department of 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.

Undergraduate Courses

ICSA-200 Survey of Computer Science
Registration #0602-200
An introduction to the field of computer science and technology for non-majors, serving as a basic literacy course and as a first course in the computer science minor sequence. Topics include an introduction to Pascal, the use of Pascal as a vehicle for the design and implementation of simple programs, basic computer organization concepts, and problem solving with computer software. Programming projects will be required.
Class 4, Credit 4

ICSA-205 Computer Techniques
Registration #0602-205
Students will be introduced to computer systems, learn problem solving techniques, and have an opportunity to study the FORTRAN programming language. Topics available for study include straightline programming, decision and repetition capabilities, formatted input/output, data structuring, and the use of subprograms. 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, 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 Computer Networks
Registration #0602-411
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 Management
Registration #0602-483
An introduction to issues in data management in organizations, and the role of database management systems in addressing these issues. Topics include the uses and needs for data in organizations, review of simple data structures, the influence of computer architecture and I/O devices on the management of data, basic file organizations supporting data management (sequential, direct access, indexed sequential), logical data models and their physical implementation, database administration, and DBMS selection. (ICSA-300 or permission of instructor)
Class 4, Credit 4

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

ICSA-700 Computer Programming and Problem Solving
An introductory course in the use of computers, interactive environments, file systems, editor. Programming in a modern software development environment with a structured programming language such as Pascal or Ada, covering: control structures, procedures and functions, recursion, arrays, pointers, file I/O, records. Application areas cover: numerical methods, sorting and searching, graphics, text processing. Programming projects will be required. (Pre-calculus)
Credit 4

ICSA-701 Programming I
Fundamentals of computer programming and problem solving using a modern software development environment and a structured programming language (Pascal or Ada). Introduction and use of an interactive editor and file system. Applications in business, science, mathematics, engineering, education, systems programming, and graphics will be covered. Techniques will be introduced for data representation and structuring, sorting, and searching. Programming projects will be required. (Computer literacy, pre-calculus; discrete math is a corequisite.)
Credit 8

ICSA-702 Programming II
The concept of computer programming at various levels of application. At a lower level is a macro assembly language. At a higher level, a new language—APL, Snobol, etc. Combining program segments written in assembly language with segments in a known high-level language. Modern programming practices, tools and techniques from the point of view of the software life-cycle: specification, design and prototyping, coding and verification, integration, and maintenance. A study of a programming language (e.g., Ada) and a software engineering environment (e.g., Unix) that supports these programming practices. Programming projects will be required. (ICSA-701 or equivalent)
Credit 8

ICSA-703 Algorithms and Data Structures
Topics include data abstraction, data representation, data structures, such as linked lists, trees, stacks, queues, hash tables, sparse matrix techniques, searching and sorting techniques, file structure and maintenance. Programming projects will be required. (Programming proficiency in some high-level structured programming language, discrete mathematics)
Credit 4

ICSA-704 Assembly Language Programming
Introduction to computer architecture (von Neumann machine): addressing methods—direct, indirect, immediate, absolute, indexing, base register, etc.; operations-machine instructions, directives or pseudo-operations, and macros; representing program paradigms in assembler language—decisions, loops, subroutines, arrays, links, etc.; assembly language program design techniques; macro definitions and use; libraries. Programming projects will be required. (ICSA-700, 701 or a programming proficiency in some high-level language.)
Credit 4-4

ICSA-705 Discrete Computational Structures
The fundamental concepts of discrete mathematics which are necessary for understanding the mathematical foundations of computer science. Topics include: structures defined on countable sets elementary symbolic logic, patterns of mathematical proof, vectors and matrices, graphs and networks, combinatorics, formal languages, abstract mathematical systems. The relevance of the chosen topics to Computer Science and the applications of computers to these topics are stressed. (College algebra, computer literacy)
Credit 4

ICSA-706 General-Purpose Software Tools
In this course students will be introduced to computers and problem solving by learning to use general-purpose application software. Students will use a variety of general-purpose software tools such as a spreadsheet, data base package, outline and word processors, 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. (Graduate Standing)
Class 4, Credit 4

ICSA-707 Advanced Programming
An introductory course in the life-cycle issues of large and single/multi-programmer programs. Structured and modular programming, data abstraction and information hiding. The Chief programmer concept. Specific focus on modern programming practices (specification, design and prototyping, coding and verification, integration and maintenance) and tools (software engineering environments such as Unix and software engineering languages such as ADA). Programming projects will be required. (ICSA-703)
Credit 4

ICSA-708 Computer Organization and Programming
An introduction to the basic concepts and terminology of hardware and software systems. Basic hardware is elementary circuit design-gates, Boolean algebra, simple combinational, circuits (adders, decoders, multiplexers) and simple sequential circuits (various flip-flops, registers, serial adders, counters). The Operating System as the major software providing a "virtual" interface—virtual memory (paging, segmentation, etc.), file systems, multi-programming, traps and interrupts, etc. The intent of this course is to prepare the student for future courses in computer architecture and operating systems. Programming projects will be required. (ICSA-704, ICSA-703)
Credit 4

ICSA-709 Fundamentals of Computer Hardware
A study of the concepts of computer hardware design and organization needed for effective computer software design and system implementation. Topics include computer peripherals and interfacing techniques; Boolean algebra; digital logic design; integrated circuit logic families; central processing unit design; microprogramming; buses and addressing, interrupts and direct memory access; hierarchical memories; system performance evaluation; and a survey of commercially available computers. (ICSA-700, ICSA-703)
Class 4, Credit 4

ICSA-720 Principles of Data Management
Introduction to topics in analysis and design of data representations. This includes external data structuring for sorting and searching applications, file structures: Sequential, Indexed, Random, and Inverted, and data base concepts: views, architectures, normalization, and data manipulation. Programming projects will be required. (ICSA-700, ICSA-703, ICSA-709)
Class 4, Credit 4
Computer Science Courses

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

ICSA-820 Software Engineering Concepts
Registration #0602-820
An introduction to the field of software engineering. The overview encompasses analysis and design methodologies and techniques, programming design languages, software project management principles, and quality assurance and control. (ICSA-700, 703, 709, BBUQ-740, 781, BBUA-703)
Class 4, Credit 4

ICSA-821 Analysis and Design Techniques
Registration #0602-821
An examination of current methodology and techniques in systems analysis and design. Methodologies covered include those of Yourdon, Warnier, and Jackson. Students will be required to demonstrate a practical mastery of a combination of several of the techniques that are presented. Application areas will include traditional information systems, distributed systems, and real-time systems. (ICSA-720, 725, 820)
Class 4, Credit 4

ICSA-822 Program Design and Implementation
Registration #0602-822
Presents techniques for developing, expressing and implementing program and systems designs. Emphasis is placed on the use of formal tools in the production of correct and reliable programs. Application areas will include traditional information systems, distributed systems and real-time systems. An introduction to formal proofs of program correctness is included. Course work is expressed in a program design language and implemented in a modern programming language such as ADA, MODULA-2 or MESA as part of a team effort. Programming projects will be required. (ICSA-821)
Class 4, Credit 4

ICSA-830 Software Project Management
Registration #0602-830
An examination of the organizational, managerial and technical aspects of software development. Examines the use of models and software metrics in the following areas: cost estimation and manpower allocation, evaluation of alternative designs, implementation measures, and test management. Other topics include: configuration management, reviews, and inspections, management and control of the maintenance process. (BBUQ-744)
Class 4, Credit 4

ICSA-835 Program Testing and Reliability
Registration #0602-835
Topics covered include testing schemes (black-box, white-box), integration schemes, validation testing, graphic analysis. Reliability models (seeding, hazard) are covered. Software maintenance techniques and tools are covered. (ICSA-820)
Class 4, Credit 4

ICSA-890 Graduate Seminar in Applied Computer Studies
Registration #0602-890
Current topics and advances in applications of computer technology for graduate students. (Permission of instructor)
Credit 2-4

ICSA-895 Software Engineering Project
Registration #0602-895
Under faculty supervision, student teams participate in an industry-sponsored software development project. The project will apply the knowledge and technology mastered in all previous software engineering course work and laboratories. (ICSA-823, 830, 835)
Class 4, Credit 4

ICSA-899 Independent Study
Registration #0602-899
Faculty directed study of appropriate topics to a tutorial basis. This course may be used by a graduate student to study particular applications of computers that are not covered in depth in other courses. (Permission of instructor)
Credit 2-4

ICSA-725 Principles of Distributed Systems
Registration #0602-725
Introduction to data communications, transmission, terminal handling, fundamentals of networking, high-level protocols, local networks. Issues in control of distributed systems. Communicating sequential processes, concurrency, redundancy, reliability. (ICSA-700, 703)
Class 4, Credit 4

ICSA-726 Computer Networks
Registration #0602-726
Introduction to computer networks and media access. The role of the network in distributed computing and systems. (ICSA-700, 703, 709)
Class 4, Credit 4

ICSA-729 Data Communications
Registration #0602-729
An introduction to data communications systems. Digital communication concepts, data representation and coding, digital waveforms, modulator demodulator devices, how digital signals are transmitted. (ICSA-700, 703, 709)
Class 4, Credit 4

ICSA-730 Computer Network Architecture
Registration #0602-730
An introduction to computer network architecture and protocols. The design and implementation of protocols and architectures of several network layers. (ICSA-700, 703, 709, BBUQ-740, 781, BBUA-703)
Class 4, Credit 4

ICSA-780 An Introduction to Data Communications
Registration #0602-780
Introduction to the study of data communications and its role in overall computer system design. (ICSA-700, 703)
Class 4, Credit 4

ICSA-790 Computer Networks and Applications
Registration #0602-790
An examination of current methodology and techniques in systems analysis and design. Methodologies covered include those of Yourdon, Warnier, and Jackson. Students will be required to demonstrate a practical mastery of a combination of several of the techniques that are presented. Application areas will include traditional information systems, distributed systems and real-time systems. (ICSA-720, 725, 820)
Class 4, Credit 4

ICSP-241 Programming I Algorithmic Structures
Registration #0601-241
An introduction to programming emphasizing the development and implementation 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 the course.
Class 4, Credit 4

ICSP-242 Programming II Data Structures
Registration #0601-242
An introduction to the basic data structures used in computer applications. Both abstract concepts and implementation details will be discussed, including comparisons of alternative implementations. Topics include arrays, records, pointers, dynamic storage allocation, linked lists, stacks, queues, trees. Programming projects are required. (ICSP-241)
Class 4, Credit 4

ICSP-243 Programming III Design and Implementation
Registration #0601-243
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. (ICSP-242)
Class 4, Credit 4

ICSP-305 Assembly Language Programming
Registration #0601-305
A study of assembly language concepts and programming methods, including computer organization, assembly process, addressing, binary arithmetic, relocatability, storage allocation, subroutine linkage, looping and address modification, character manipulation, bit manipulation, floating point arithmetic, decimal instructions, some system I/O macros and debugging techniques. Programming projects will be required. (ICSP-243)
Class 2, Lab 4, Credit 4

ICSA-899 Independent Study
Registration #0602-899
Faculty directed study of appropriate topics to a tutorial basis. This course may be used by a graduate student to study particular applications of computers that are not covered in depth in other courses. (Permission of instructor)
Credit 2-4
ICSP-306 Systems Programming Fundamentals
A study of systems programming concepts and techniques. Topics include the roles of assembly languages, systems implementation languages, systems macros and supervisor calls, program linkage, reentrant and recursive subroutines, I/O programming at the device level, macros and conditional assembly. Programming projects will be required. (ICSS-325)
Class 4, Credit 4

ICSP-307 Business Applications 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 table processing and generation, and complex I/O processing. Project management, programming teams, and the module stubs for prototype development are used in the course. Programming projects will be required. (ICSS-325)
Class 4, Credit 4

ICSP-319 Scientific Applications 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
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
A workshop for the application of programming systems specification, design and implementation techniques. Topics include data modeling, (with and without a database management system), system specification and design charting techniques, and project scheduling and management. Students will work in teams to solve specific problems. Programming projects will be required. (ICSP-307, ICSS-435, ICSS-485)
Class 4, Credit 4

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

ICSS-202 Introduction to Computer Science
An introduction to the field of computer science. Topics include computer representation of information, integer (binary and decimal) and floating point arithmetic, logical operations, character codes, and 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
An introduction to computer design and implementation. Topics include a review of arithmetic and Boolean algebra, combinatorial and sequential circuit design, flip-flops and adders, storage mechanisms and their organization, instruction fetching, decoding and execution in a simple CPU, input/output subsystems, interrupts, and variations in memory addressing. The laboratory introduces elementary integrated circuit building blocks including gates, flip-flops, registers, and counters. Additional experiments include an introduction to interrupts. (ICSP-305)
Class 3, Lab 2, Credit 4

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

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

ICSS-360 Fundamentals of Computer Science for Transfer Students
This course covers selected topics from ICSP-241, 242 and 243. It introduces the student to the Unix operating systems, and the Pascal language, which is then used to examine various data structures including records, linked lists, stacks, queues, trees and graphs. The use of recursion is also studied. This course is intended for students with previous programming experience, but with no background in data structures. Open only to transfer students; not to be taken as a Computer Science Elective.
Class 4, Credit 4

ICSS-400 Logical Design
An in depth study of the logical design of digital circuits. Topics include combinational circuit design with emphasis upon use of MSI and LSI circuits and CAD tools, sequential circuit synthesis, both synchronous and asynchronous, and an introduction to interfacing techniques. Additional topics to be covered include testing, CAD tools such as logic simulators and logic reduction programs, analog IC’s such as op amps, integrated circuit technologies, and an introduction to VLSI design. (ICSP-315, SMAM-265 or equivalent, and SPSP-313)
Class 3, Lab 2, Credit 4

ICSS 420 Data Communication Systems
This course is an introduction to the concepts and principles of computer communication subsystems. It examines the effects of topology, communication media and software protocol on network performance, cost and reliability. The course covers the physical interconnection of machines, first-level software constructs, operations 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
Registration #0603-435
Students are introduced to basic concepts of system specification, design, system implementation and project management. Tools used include PERT/CPM (scheduling tools), structured English, structured flowcharts, and decision trees (description tools), data-flow diagramming (description and design tool), and hierarchical design of programming systems (design tool). A study of structured design methods is included. (ICSS-325)
Class 4, Credit 4

ICSS-440 Operating Systems
Registration #0603-440
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlock, multiprogramming and multiprocessing, processor scheduling and resource management, memory management, overlays, static and dynamic relation, 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-470 Finite State Machines and Automata
Registration #0603-470
Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis and synthesis, sequential iterative systems, and space-time transformations. (ICSS-315, SMAM-265)
Class 4, Credit 4

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

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

ICSS-515 Analysis of Algorithms
Registration #0603-515
A course covering the mathematics and techniques needed to analyze the computational complexity of algorithms. Several classic algorithms will be studied, to determine their space and time efficiency. (ICSS-325, SMAM-265 or equivalent)
Class 4, Credit 4

ICSS-520 Computer Architecture
Registration #0603-520
An introduction to computer architecture. Includes a survey of computer architecture fundamentals exemplified in commercially available computer systems, including classical CPU and control unit design, design of arithmetic units, register allocation, primary memory organizations and access, internal and external bus structures, and virtual memory schemes. Alternatives to classical machine architecture, such as the stack machine and the associative processor, are defined, and then compared. Parallel processors and distributed systems are also presented, along with an analysis of their performance relative to non-parallel machines. Programming projects will be required. (ICSS-440, SMAM-265 or equivalent, and SPSP-313)
Class 4, Credit 4

ICSS-521 Introduction to Microprocessor Systems
Registration #0603-521
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. (ICSS-315)
Class 3, Lab 2, Credit 4

ICSS-530 Fundamentals of Discrete Simulation
Registration #0603-530
An introduction to computer architecture. Includes a survey of computer architecture fundamentals exemplified in commercially available computer systems, including classical CPU and control unit design, design of arithmetic units, register allocation, primary memory organizations and access, internal and external bus structures, and virtual memory schemes. Alternatives to classical machine architecture, such as the stack machine and the associative processor, are defined, and then compared. Parallel processors and distributed systems are also presented, along with an analysis of their performance relative to non-parallel machines. Programming projects will be required. (ICSS-440, SMAM-265 or equivalent, and SPSP-313)
Class 4, Credit 4

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

ICSS-541 Introduction to Computer Networks
Registration #0603-541
This course presents the concepts and principles of the higher level protocols of the ISO reference model, as introduced in ICSS-420 Data Communication Systems. Included in this course will be the investigation of routing techniques, local area networks, interconnection of networks, security issues and user level services. Programming projects will be required. (ICSS-420)
Class 4, Credit 4
ICSS-542 Distributed Systems Laboratory
Registration #0603-542
This course will build on topics developed in ICSS-420 Data Communication Systems 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 logical design, computer architecture, data communications, and operating systems. Laboratory work will include the design, implementation, debugging, and documentation of major hardware/software projects. Topics to be presented in the lecture include busses, interfacing bit slice architectures, microprogramming, microprocessors, analog interfacing, and real time computing. Additional topics related to the specific laboratory projects will also be covered. Programming projects will be required. (ICSS-400, ICSS-420 and ICSS-520)
Class 3, Lab 2, Credit 4

ICSS-560 Compiler Construction Laboratory
Registration #0603-560
A course in the design and implementation of high-level language compilers. Laboratory projects to be assigned in the areas of parsing, code generation, code optimization, and language design. (ICSS-580)
Class 4, Credit 4

ICSS-565 Computer Systems Selection Laboratory
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 and Technology)
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, anti-aliasing, 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 Laboratory
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 4, Credit 4

ICSS-599 Independent Study
Registration #0603-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to study particular computer science topics in greater depth. (Faculty approval is required prior to registration.)
Class 4, Credit 4

ICSS-600 Laboratory
Registration #0603-600
A study of the techniques and approaches used to audit computer data centers and systems. Topics include the methodology and tools of EDP auditing, internal departmental controls, program controls, input/output controls, data security, physical security, computer hardware controls and data communication control. (Fourth-year standing in Computer Science and Technology)
Class 4, Credit 4

ICSS-690 Seminar in Computer Science
Registration #0603-690
Current advanced topics in computer science. Open to graduate students and fourth- and fifth-year undergraduates. (Prerequisites set by instructor)
Class 4, Credit 4

Graduate Courses

Computer Science

Undergraduate Computer Science and Technology students may take 700 and 800 level courses only by consent of the School Director and the consent of the instructor.

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

ICSS-706 Foundations of Computing Theory
Registration #0603-706
Review of discrete mathematics with emphasis on graph theory and proof techniques. A study of computer programs in the abstract, including program flow graphs, program transformations, the structuring theorem, abstract automata, and formal languages. An overview of computability and algorithmic complexity. (ICSA-705, 703)
Credit 4

ICSS-709 Programming Language Theory
Registration #0603-709
An introduction to several important programming languages and the basic concepts of language design and specification. Topics will include data and control structures, subprogram sequencing and control, and parameter passing. Languages selected will include examples of string processing, applicative, systems programming, and concurrent languages. Programming projects will be required. (ICSA-702 or equivalent)
Credit 4/Qtr.
ICSS-711 Advanced Topics in Programming Language Theory
Registration #0603-711
An introduction to non-traditional programming paradigms and language translation techniques. Topics will include language translators, parsing, syntax directed translation and storage management for retentive and nonretentive languages. Languages studied will include examples of functional, logic, object-oriented and data-flow languages. Programming projects will be required. (ICSS-706, 709)
Credit 4

ICSS-720 Computer Architecture
Registration #0603-720
Review of classical computer architectures, the design of operation codes and addressing modes, data formats, and their implementations. Analysis of internal and external bus structures. Architectural features to support virtual storage and page-replacement policies, high-level language features, and operating systems. Speed-up techniques. Future directions. Programming projects will be required. (ICSS-720)
Credit 4

ICSS-721 Microprocessors and Microcomputers
Registration #0603-721
A study of microprocessors, microcomputers and microcomputer applications. Topics to be covered include microprocessor architecture, microcomputer organization and buses, parallel and serial interface techniques, analog interfacing, interrupts, and development trends in microprocessors. Emphasis will be on the use of microprocessors and small microcomputers. Single board microcomputer systems are used in laboratory projects to explore hardware and software design issues, as well as memory design and I/O interface techniques. Programming projects will be required. (ICSS 720)
Credit 4

ICSS-730 Simulation and Modeling I
Registration #0603-730
Computer simulation techniques are examined. Topics include abstract properties of simulations modeling, analysis of a simulation run, and statistics. One or more general purpose simulation languages will be taught. Programming projects will be required. (ICSS-703, statistics)
Credit 4

ICSS-731 Simulation and Modeling II
Registration #0603-731
Design and validation of systems models using advanced statistics and queuing theory. Programming languages that support simulation and procedural applications (Simscript, Simula, SLAM). Continuous systems simulation and programming packages. Applications to world population models, computer operating systems, etc. Programming projects will be required. (ICSS-730)
Credit 2-4

ICSS-735 On-Line Information Systems Design
Registration #0603-735
The structured analysis, design, and implementation of on-line information systems are discussed. Topics include data and algorithm structuring, measures of software complexity, software behavior modeling, and packaging. System development and project management also are highlighted. (ICSS-708)
Credit 4

ICSS-738 Data Base Concepts
Registration #0603-738
An introduction to the storage and processing of formatted data using data base management systems. Topics include: objectives of data base management, file and indexing structures, data base system architectures, normalization theory, data base machines and distributed data bases. Several existing and experimental systems will be studied. (ICSS-703, 708)
Credit 4

ICSS-739 Data Base System Implementation
Registration #0603-739
An examination of the technical issues related to the implementation of shared access data bases. Topics include concurrency control, transaction processing, reliability and recovery. Extensions to the distributed processing environment also are covered. Programming projects will be required. (ICSS-738)
Credit 2-4

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

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

ICSS-770 Fundamentals of Computer Graphics
Registration #0603-770
Topics include basic concepts, 2-D transformations, windowing, clipping, interactive and raster graphics, 3-D transformations and perspective, hidden line and surface techniques, graphical software packages and graphics systems. Programming projects will be required. (ICSS-703)
Credit 4

ICSS-771 Advanced Topics in Computer Graphics
Registration #0603-771
Animation techniques and packages. Modelling of solids, including shading, perspective, hidden line and surface removal. Three-dimensional graphics software packages; algorithms and heuristics. Special purpose computer hardware for graphics. Programming projects will be required. (ICSS-770)
Credit 2-4

ICSS-781 Artificial Intelligence
Registration #0603-781
An introduction to the theory and techniques underlying the development of "intelligent" computer software. Emphasis will be placed on programming techniques and languages used in artificial intelligence research. Students will be required to design and implement programs that use these techniques to build game players, theorem provers, natural language understanding systems or other rudimentary artificial intelligence projects. Programming projects will be required. (ICSS-706, 708, 709)
Credit 4

ICSS-782 Knowledge Based Systems
Registration #0603-782
This course presents an introduction to the issues and techniques of building knowledge based systems. Topics will include a survey of existing expert system architectures and implementations, knowledge presentation techniques, expert system building tools, and knowledge acquisition. In addition to examining existing expert systems, students will implement expert systems or expert system building tools in a Lisp or Prolog environment. Programming projects will be required. (ICSS-781)
Credit 4
ICSS-801  Software Engineering
Registration #0603-801
An introduction to software engineering methodologies and technologies useful for developing quality, cost-effective and schedule-meeting software. The course focuses on the engineering of programming systems products. Emphasis is placed on quantitative models. Topics include: current problems in software development, Halstead's software science, complexity metrics, specification and design metrics, cost estimation models, growth dynamics, software reliability models, and models of program testing. (ICSS-708, 709)
Credit 4

ICSS-802  Software Engineering II
Registration #0603-802
A projects course in applied software engineering with emphasis on the use of software based engineering tools. Available tools include High Order Software's specification and code generation system and Stanford University's WEB, an integrated programming and documentation system. Students work in small teams on software development projects. Programming projects will be required. (ICSS-801)
Credit 2-4

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

ICSS-810  Operating Systems II
Registration #0603-810
This laboratory practice course is designed to provide the student with practical experience in implementing many of the notions discussed in Operating Systems I. The class, with the instructor serving primarily as a technical advisor, designs the kernel of a small operating system in class in the first two to three weeks. This kernel is module tested and downloaded to a stand-alone processor and test run until it is debugged. Then students form into groups of three to five persons each and choose a project to pursue which involves implementing additional features of the operating system. Typical projects are: file systems, memory management, scheduling, and inter-process communications. Programming projects will be required. (ICSS-809)
Credit 4

ICSS-811  Topics in Operating Systems
Registration #0603-811
This is a "topics" course in which the instructor chooses an advanced topic of interest and explores it with the class. The topic may vary from the implementation of an operating system feature through the study of topics not covered in Operating Systems I to queuing theory or other theoretical topics. Programming projects will be required. (ICSS-809)
Credit 2-4

ICSS-846  Information Storage and Retrieval
Registration #0603-846
A study of contemporary approaches to the storage and retrieval of unformatted text with emphasis on document data bases. Students use the experimental SMART information storage and retrieval system, and an AT&T Videotex system for project assignments. Topics include: traditional approaches to indexing and retrieval, text analysis and automatic indexing, clustering algorithms, the SMART system, the extended Boolean logic model, pattern matching algorithms and videotex. (Completion of the bridge program)
Class 4, Credit 4

ICSS-850  Computability
Registration #0603-850
Computability is the heart of theoretical computer science, for it attempts to formalize the notion of computation. Topics include computation by while-programs, Turing machines, recursive function theory, Symbol-Manipulation Systems, program methodology, the limitation of the concept of effective computability. (ICSS-706)
Credit 4

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

ICSS-852  Coding Theory
Registration #0603-852
The study of error-correcting codes and the application to reliable communication of digitally encoded information. Topics include cyclic codes, hamming codes, quadratic residue codes, B.C.H. codes, designs and codes, weight distributions. (ICSS-706)
Credit 4

ICSS-856  Theory of Parsing
Registration #0603-856
Application of theoretical concepts developed in formal language and automata theory to the design of programming languages and their processors, syntactic and semantic notation for specifying programming languages, theoretical properties of some grammars, general parsing, non-backtrack parsing, and limited backtrack parsing algorithms. (ICSS-706)
Credit 4

ICSS-860  Compiler Construction
Registration #0603-860
The structure of language translators, lexical and syntactic analysis, storage allocation and management, code generation, optimization, error recovery. Programming projects will be required. (ICSS-706, 709, 711)
Class 4, Credit 4

ICSS-890  Seminar
Registration #0603-890
Current advances in computer science, (Permission of the instructor)
Credit variable 2-4

ICSS-894  Seminar in Thesis
Registration #0603-894
Preparation for the master's thesis. (36 credits of graduate study)
Credit 3
Undergraduate Courses

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

IPKG-301
Engineering Design Graphics
Registration #0607-301
A basic course in engineering drawing. Topics include, but are not limited to, lettering, line quality, use of instruments, freehand 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 fibre, metal, plastic, and glass packaging materials. (IPKG-201)
Lab 4, Credit 2

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

IPKG-312
Packaging Materials II
Registration #0607-312
The manufacture, physical and chemical properties, and uses of common packaging materials. Emphasis is on paper, paperboard, wood, and glass used in packaging applications. (IPKG-201)
Class 3, Credit 3

IPKG-321
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 compatibility and suitability of container for intended use will be analyzed for basic container types. Students will practice structural design and testing of prototype containers. Primary emphasis will be on rigid paperboard, glass, plastic and metal containers. (IPKG-301, 311, 312)
Class 2, Recitation, Lab 2, Credit 4

IPKG-322
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.
Class 3, Credit 3

IPKG-431
Packaging Production Systems
Registration #0607-431
A study of package forming and filling, closing, product/package identification, inspection, and other machinery commonly used in packaging, plus consideration of handling and storage/retrieval systems. The characteristics of such equipment and maintenance programs will be considered. Students will gain practice in setting up complete production lines for packaging various products. (IPKG-321, 322)
Class 2, Lab 4, Credit 4

IPKG-432
Packaging for Distribution
Registration #0607-432
An exploration of different shipping, storage, and use environments common to various products and packages. Structural design of shipping containers for product physical protection and methods for testing and predicting package performance will be studied. (IPKG-301, 321, 322)
Class 2, Lab 4, Credit 4

IPKG-433
Packaging for Marketing
Registration #0607-433
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a scientific marketing tool. The course concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market. Advertising, marketing demographics, and the impact of color upon packaging will be considered. Students will gain practice in the development of a complete package system. (IPKG-431, 432)
Class 2, Lab 4, Credit 4
IPKG-499 Packaging Co-op
Registration #0607-499
One quarter of appropriate work experience in industry.
Credit 0

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

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

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

IPKG-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. (IPKG433, 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, SBIB-559; Professional elective)
Class 3, Credit 3

IPKG-570 Point of Purchase Displays
Registration #0607-570
An interdisciplinary course considering the unique requirements for display packaging at the retail point of purchase. The retail store environment, display techniques, customer motivation, product tie-ins, construction techniques, production and distribution requirements, product promotion and point of purchase support materials and activities, design, and printing of point of purchase displays. (Course is intended to be an interdisciplinary, senior elective for students in packaging, packaging design, audio-visual technology, retailing and printing.) (IPKG-433, FADK-403, BRER-410, ICIC-450, PPRM-403 or department approval, depending on major. Professional Elective)
Class 2, Lab 4, Credit 4

IPKG-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
Graduate Courses

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

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

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

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

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

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

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

IPKG-770 Advanced Computer Applications
Registration #0607-770
Study of the application of computer techniques and data processing for packaging applications: specification development, test simulation, optimum sizing of package systems, process control, and similar applications will be presented. Computer program development and individual research on an interest basis.
Credit 2 Credit Variable

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

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

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

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

School of Engineering Technology

Upper Division Civil Engineering Technology

ITEC-099 Introduction to Civil Engineering Technology
Registration #0608-099
Introduces transfer students to the CET program in order to ease the transition from their previous college. 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-404 Applied Mechanics of Materials
Registration #0608-404
Basic strength of material and statics are reviewed. Advanced topics are covered to include stress and strain, Mohr’s circle concept, transversely loaded members, statically indeterminate problems, Euler’s equations, and column decision principles. (Statics and strength of materials)
Class 4, Credit 4

ITEC-420 Hydraulics
Registration #0608-420
Study of principal physical and mechanical properties of liquids, hydrostatic pressure and forces; pressure measuring devices; buoyancy and flotation, flow of liquids in closed conduits, and introductory principles of piping systems design; pumps and pump selection, flow of water in open channels and introduction to their design. (Physics; ITEC-421 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, hydrostatic 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; and introduction to construction specifications for materials and methods.  
Class 4, Credit 4

ITEC-428 Technical Communications  
Registration #0608-428  
The principles of organizing data and information into clear and concise engineering memos, letters, reports, and presentations. The techniques of library research, word processing, and oral 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. (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 designs 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. (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. (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 will be followed. (ITEC-490)  
Class 4, Credit 4

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

ITEC-500 Labor Relations  
Registration #0608-500  
Introduction to the fundamentals of labor law and its applications to the construction industry. Topical areas include the Fair Labor Standards Act, Davis-Bacon Act, Title VII of the Civil Rights Act, National Labor Relations Act, hiring halls, pre-hire agreements, strikes and open shop construction. Several guest speakers representing government, private industry and organized labor will 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 1, Recitation 2, Credit 2
ITEC-510 Design of Water Treatment Facilities
Principles of water treatment plant design, conceptual and hydraulic design of water purification and conditioning facilities. Includes: settling, filtration, softening, disinfection, organics removal, and plant design construction elements. (ITEC-438)
Class 2, Credit 2

ITEC-513 Computer Techniques in Civil Engineering Technology
Designed as a supplement to the introductory programming course. Topics include: word processing; use of packaged programs such as COGO and MINITAB; electronic mail; spread sheets and design of user-friendly programs. Work will be done using timesharing, primarily, but with some time devoted to personal computers. (ICSA-205)
Class 2, Credit 2

ITEC-514 Land Planning
The environmental and social aspects of land planning are covered as well as the engineering and cost considerations. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wet lands, other planning and control tools, solar access planning, and urban revitalization.
Class 2, Credit 2

ITEC-516 Analysis and Design of Reinforced Concrete Structures
The course is organized to continue with the study of reinforced concrete that was begun in ITEC-495. Topics include retaining walls, footings, two-way slabs, torsion, rectangular tanks, yield line analysis of slabs, and an introduction to prestressed concrete. The strength method of the ACI code is used. (ITEC-495)
Class 3, Recitation 2, Credit 4

ITEC-518 Masonry Design
An introduction to masonry design and construction. Both brick and concrete masonry will be covered, with the emphasis on concrete masonry. Topics covered included 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. (ITEC404)
Class 2, Credit 2

ITEC-520 Design of Wastewater Treatment Facilities
Principles of wastewater treatment plant design, conceptual and hydraulic design of activated sludge and trickling filter plants are studied. Tertiary treatment facilities, such as nitrogen and phosphorus removal will be discussed. Processes, plant design, and construction elements are stressed. (ITEC-438)
Class 3, Lab 2, Credit 4

ITEC-522 Principles of Treatment of Water and Sewage
Principles of microbiology and its application to water and wastewater treatment processes with emphasis on setting, chemical precipitation, adsorption, disinfection, granular medium filtration, aerobic suspended and attached growth, and anaerobic suspended growth. (ITEC-438)
Class 3, Lab 3, Credit 4

ITEC-525 Hazardous Waste
Identification, classification and legal aspects of hazardous waste. Generator, transport, storage and disposal of hazardous waste with emphasis on chemical landfill and incineration of hazardous and toxic wastes. (ITEC-438)
Class 4, Credit 4

ITEC-526 Industrial Wastewater
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
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-404, ITEC-528 must be taken concurrently.)
Class 3, Credit 3

ITEC-528 Soil Mechanics Laboratory
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
The course exposes the student to the field 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.
Class 4, Credit 4

ITEC-535 Pavement Design
This course expands upon the background of the Transportation Engineering core course, providing additional detailed engineering knowledge on pavement design. Included with the theoretical knowledge will be the development of, and practice in, the necessary design skills. The course includes not only the design of new pavements, but also addresses the very active programs in pavement recycling, bridge and pavement rehabilitation, and strengthening. Problems are attacked in a practical manner, utilizing the expertise of national organizations and state highway departments involved in this work. (ITEC-530)
Class 3, Lab 2, Credit 4

ITEC-544 Contracts and Specifications
This course includes a fundamental overview of contract law, followed by the application of this material into the contracts for construction. Subsequently, the student is exposed to construction specifications. Substantial use is made of actual documents from the New York State Department of Transportation, the Construction Specification Institute, and trade standards, such as an ANSI, ASTM, and others. Students are required to develop and assemble a mock-up set of contract documents.
Class 2, Credit 2
ITEC-546 Professional Principles and Practices
A treatment of legal and ethical aspects of the profession; review
of codes of ethics and current professional problems; featuring
several guest speakers representing different segments of the civil
engineering field.
Class 1, Credit 1

ITEC-550 Construction Practices
A supervised investigation within a civil technology area of stu-
dent interest. (Consent of the sponsor and departmental
approval)
Class 2, Credit 4

ITEC-552 Analysis and Design of Steel Structures
This course is organized to continue with the study of structural
steel that was begun in ITEC-495. Topics include torsion, con-
tinuous 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
An introduction to basic construction management and organi-
ization. Topics include CPM scheduling, estimating, bidding, heavy construction
methods, techniques, methods, and equipment applications. This is a survey course for non-construction students.
Class 4, Credit 4

ITEE-310 Electricity
Circuits using DC sources are analyzed. Components stressed are the inductor, capacitor, diode, transistor, relays, and photo
device.
Class 3, Lab 3, Credit 4

ITEE-311 and Practices
A treatment of legal and ethical aspects of the profession; review
of codes of ethics and current professional problems; featuring
several guest speakers representing different segments of the civil
engineering field.
Class 3, Recitation 2, Credit 4

ITEE-401 Transformed Circuits I
Frequency response of network functions as solved by use of pole-zero diagrams and Bode diagrams. Mutual inductance. The Fourier series solution of circuits with non-sinusoidal inputs. (ITEE-402)
Class 3, Recitation 2, Credit 4

ITEE-402 Transformed Circuits II
AC circuits and devices with topics of phasor algebra, reactance, impedance, AC power and power factor, power factor correction, resonance, maximum power transfer, bandwidth, and three-phase circuits. The computer will be used to solve matrices with complex numbers. (ITEP-201)
Class 3, Lab 3, Credit 4

ITEE-404 Control Systems I
Analysis and application of closed-loop control systems for sta-
bility, accuracy, transient response; block diagram algebra and
transfer functions, Routh's and Nyquist's stability criteria; gain
and phase margin, Bode plots, steady-state error, lead and lag
compensating networks, microprocessor-based control systems. (ITEE-402, SMAT-422)
Class 3, Lab 2, Credit 4
ITEE-411  Electrical Principles for Design I
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
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
Applications of microprocessors for manufacturing engineering technology students. Application of the Z80 microprocessor, with emphasis on the interface to TRS80 microcomputers. Microcomputers as applied to robotics and numerically controlled machinery. (ITEE-412)
Class 3, Lab 2, Credit 4

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

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

ITEE-425  Power Concepts
Steady-state AC circuits both single and three phase, transformers, dynamometer theory, motor characteristics, DC and stepper motors, solid-state power electronic devices and application to control of motors.
Class 3, Lab 1, Credit 3

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

ITEE-437  Computer Programming 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-499  Cooperative Education
One quarter of appropriate work experience in industry.
Credit 0

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

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

ITEE-530  Operational Amplifiers
The design of Class A and B low frequency power amplifiers is studied with special attention to transistor ratings and heat sinking requirements. Principles of transformer design. Class C RF amplifiers and Class D regulators are also covered. (ITEE-428)
Class 3, Lab 2, Credit 4

ITEE-534  Analog Communication 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
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 4, Credit 4

ITEE-536  Control Systems II
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

ITEE-538  Digital Computer Design I
Design of logic circuits using 7400 series TTL gates; a study of TTL flip-flops, one shots and oscillator circuits; design of timing circuits, shift registers and counters. (ITEE-424)
Class 3, Lab 2, Credit 4
ITEE-539 Digital Computer Design II
Registration #0609-539
A continuation of ITEE-538 with application of logic circuits to computer design. Multiplexers, semiconductor memories, ALUs and their applications to computers and microprocessors are considered. The basic operation of computers, and computer systems are examined. Machine language programming, indexing and indirect addressing and interrupt programming are introduced. The student will build a small prototype minicomputer for use in this course. (ITEE-538)
Class 3, Lab 2, Credit 4

ITEE-542 Microprocessors
Registration #0609-542
An introductory course in Microprocessors emphasizing the Motorola 6800 and Intel 8085. The topics covered include the CPU, ROMS, RAMS, programming and interface ICs. Practical applications of microprocessors are also considered. (ITEE-424, ITEE-437)
Class 3, Lab 3, Credit 4

ITEE-543 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 configuration 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 or equivalent)
Class 4, Credit 4

ITEE-552 Power Systems II
Registration #0609-552
The symmetrical component method of three phase circuit analysis is used for fault analysis. 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-580 Senior Project
Registration #0609-580
Selected independent study of design project by electrical technology students with the approval of the department. Approval must be granted first week of fall or winter quarter for spring quarter registration.
Class/Lab as required. Credit 4

Upper Division Mechanical Engineering Technology

ITEM-404 Applied Mechanics of Materials
Registration #0610-404
The basic concepts of strength of materials as applied to mechanical design are reviewed in depth. The course includes the study of the concepts of stress and strain, the stress-strain relationship and combined stress. Fatigue and properties of materials and analysis of mechanical fatigue, theories of failure. Applications of these concepts to the analysis of machine members.
Class 3, Recitation 2, Credit 4

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

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

ITEM-407 Mechanical Engineering Technology Laboratory I
Registration #0610-407
A course in mechanical laboratory techniques and the preparation of laboratory reports; experimental work in materials testing, strength of materials, experimental stress analysis, metallurgy, and metallography; instruction in the preparation of laboratory reports. (Must be taken concurrently with ITEM-414.)
Class 1, Lab 2, Credit 2
ITEM-408  Introduction to Strength of Materials
Registration #0610-408
Elements of statics and strength of materials. Topics include plane equilibrium, friction, stress, strain, torsion, and the bending of beams.
Class 3, Recitation 2, Credit 4

ITEM-409  Mechanical Engineering Technology Laboratory II
Registration #0610-409
A course in mechanical laboratory techniques, the analysis of experimental results and the preparation of laboratory reports. Experimental work in mechanics of materials, materials science and plastics technology will be conducted. Instruction will be provided in several forms of technical communication. (ITEM-404, 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-440  Applied Thermodynamics
Registration #0610-440
The first and second laws of thermodynamics and their applications in mechanical engineering technology. Thermodynamic properties of fluids including ideal gasses and pure substances are studied. Thermodynamic processes and applications of thermodynamic principles to steam cycles and refrigeration cycles.
Class 4, Credit 4

ITEM-442  Heat Transfer
Registration #0610-442
The first course in heat transfer. The theory and application of the fundamentals of heat conduction, convection, and radiation. The design and applications of heat transfer-apparatus. (ITEM-440)
Class 3, Lab 2, Credit 4

ITEM-451  Vibration and Noise
Registration #0610-451
A study of the basic concepts of vibration and noise. Designing equipment for survival in vibration and shock environments. Methods of reducing noise in machinery structures. Environmental tests for vibration and shock. Methods of vibration and noise analysis will be demonstrated. (SMAT-442, 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.
Credit 0

ITEM-506  Machine Design I
Registration #0610-506
The study of the static and dynamic failure of machine elements and the design and analysis of fasteners, springs, and spur gears. (ITEM-405)
Class 3, Recitation 2, Credit 4

ITEM-508  Machine Design II
Registration #0610-508
The study of selected topics such as bearings, clutches, brakes, helical gears, belts, chains, lubrication and computer-aided design. (ITEM-506)
Class 3, Lab 2, Credit 4

ITEM-512  Computer Integrated Mechanical Design
Registration #0610-512
The use of computers in solving mechanical design problems will be emphasized. This will include introduction to data manipulation, plotting, graphics, applications programming, and finite element analysis. (ITEM-432, ITEM-506)
Class 3, Recitation 2, Credit 4
**ITEM-521 Logic Control Systems**  
Registration #0610-521  
The analysis and design of logic control systems using Boolean algebra. Emphasis is placed on the control of machines with fluid and relay logic. Introduction to electronic programmable controls. The concepts of ordinary and timed sequence control and machine protection are covered. Logic control systems will be demonstrated in the lab.  
Class 3, Lab 2, Credit 4

**ITEM-522 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, psychrometrics and combustion processes. (ITEM-440)  
Class 4, Credit 4

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

**ITEM-542 HVAC System Engineering**  
Registration #0610-542  
Principles and applications of refrigeration, air conditioning, comfort heating, and ventilating. Thermodynamics of vapor compression refrigeration cycles, air conditioning, psychrometrics, moisture calculations; also related heat transfer topics.  
Class 4, Credit 4

**ITEM-543 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 furnace efficiency, heat recovery, heat pumps, pumping and piping, and architectural considerations. (ITEM-540)  
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 furnace efficiency, heat recovery, heat pumps, pumping and piping, and architectural considerations. (ITEM-540)  
Class 4, Credit 4

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

**ITEM-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 design of electric lighting is introduced. The thermofluid analysis of pipe flow and air flow in ducts is also covered.  
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, condenser, heat exchangers, nuclear reactors. Relevant analytical tools; cycle calculations, heat balances, gas analysis, fuel analysis. Also, internal combustion power plants and cogeneration plants are covered. (ITEM-440, ITEM-460)  
Class 4, Credit 4

**ITEM-599 Independent Study**  
Registration #0610-599  
A supervised investigation within a mechanical technology area of student interest. (Permission of instructor and departmental approval are required.)  
Credit variable (1-4)

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**Upper Division Manufacturing Engineering Technology**

**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-406 Applied Kinematics
Registration #0617-406
This is an introductory course dealing with the principles of Kinematics as they are applied to manufacturing. Topics included are: displacement, velocity, acceleration, linkages, gears, cams, bearings and lubrication.
Class 3, Credit 3

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. (ITEF-424)
Class 3, Recitation 2, Credit 3

ITEF-426 Engineering Economics
Registration #0617-426
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-440 Plastics Processing
Registration #0617-440
A course dealing with the various methods used to manufacture plastics products. Topics include compression and rotational molding, extrusion, injection molding, blow molding, thermforming, pre- and post-molding operations and economics of plastics processing.
Class 3, Lab 2, Credit 4

ITEF-460 Computer-Aided Design
Registration #0617-460
The course introduces CAD as an integral part of Computer Integrated Manufacturing. It deals with the basic concepts in CAD, the hardware and software related to 2D and 3D interactive graphics, CAD applications, the relationship between CAD and CAM, and the economics of CAD. The course concentrates on the CAD functions involving geometric modeling, finite element analysis, and drafting. Emphasis is placed on the laboratory work involving turn-key systems for 3D wire frame modeling and 3D solids modeling.
Class 2, Lab 3, 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-473 Compact H
Registration #0617-473
This is the second course in computer numerical control. Compact II is one of the most commonly used NC part programming languages in the industry. The students will learn to write Compact II programming language and work with the Manufacturing Data Systems Inc., time-sharing terminals to produce NC tapes. (ITEF-471)
Class 3, Lab 3, 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. Included are the relationships between CAD, CNC, Robotics, MRP and CAM. Emphasis is placed on building mini CAM systems in the laboratory. (ITEF-471, ITEF-485, ITEE-413, ITEM-521)
Class 3, Lab 2, Credit 4

ITEF-481 Work Simplification
Registration #0617-481
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. Lab assignments will concentrate on the integration of robots with CIM elements.
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
Registration #0617-499 Co-op
One quarter of appropriate work experience in industry.
Class 0, Credit 0

ITEF-502 Non-Traditional Manufacturing Processes
Registration #0617-502
A course dealing with non-traditional precision machining processes. Includes such processes as electric discharge machining, electro-chemical machining, chemical milling, laser beam machining, electron beam machining, ultrasonic machining, water jet cutting, abrasive flow machining and plasma arc machining.
Class 3, Credit 3

ITEF-510 Process Design
Registration #0617-510
Project-oriented 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 issues from design of products to providing maintenance services in the field. (Quality control is dealt with from the point of view of the management of the manufacturing operation.) Students are presented with case studies for analysis and problem solving.
Class 3, Credit 3

ITEF-530 Special Topics in Computer Integrated Manufacturing
Registration #0617-530
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. Case studies on FMS are included. (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

ITEF-201 DC Circuits
Registration #0618-201
An introduction to electrical technology, with emphasis on 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 networks requiring Delta-Wye transformations, Kirchoff's Laws, Thévenin's Theorem, Mesh analysis and superposition. (Corequisite SMAM-204)
Class 3, Lab 2, Credit 4

ITEF-202 AC Circuits
Registration #0618-202
AC circuits and devices with topics of phasor algebra, reactance, impedance, AC power and power factor, power factor correction, resonance, maximum power transfer, band-width, and three-phase circuits. The computer will be used to solve matrices with complex numbers. (ITEP-201, corequisite SMAT-420)
Class 3, Lab 3, Credit 4

ITEF-203 Electronic Devices
Registration #0618-203
An introduction to electronic devices and systems. Emphasis on semiconductors diodes, zeners, and transistors. The basic operation and biasing of transistors (BJTs and FETs) is stressed. The operation and design of linear DC power supplies are discussed. (ITEE/ITEP-202, SMAT-420)
Class 3, Lab 3, Credit 4

ITEF-301 Digital Fundamentals
Registration #0618-301
A first course in digital computer fundamentals. Topics include binary arithmetic, Boolean algebra, logic gates, Karnaugh mapping, 2's compliment and hexadecimal arithmetic. (Corequisite ITEP-203)
Class 3, Lab 2, Credit 4

ITEF-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 on biasing, small signal modeling, depiction of amplifier characteristics, direct and capacitor coupled amplifiers, feedback, and frequency response. (ITEP-203)
Class 3, Lab 3, Credit 4

ITEF-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 consideration, and interfacing principles. The laboratory will require programming assignments. (ITEP-203, ICSP-305)
Class 3, Lab 3, Credit 4

ITEF-305 Drafting and Fabrication
Registration #0618-305
A course for the skills that a technician will need in industrial employment. Includes fundamentals of drafting and electrical layout, printed circuit board fabrication and assembly, and computer graphics. (Corequisite ITEP-201)
Class 3, Lab 2, Credit 4

ITEF-403 Advanced Circuit Theory
Registration #0618-403
A course for those who have had an associate degree sequence in circuits. Emphasis on transient circuits, LaPlace Transform applications, Bode and Fourier analysis. (ITEP-302 SMAT-422)
Class 4, Recitation 2, Credit 5

ITEF-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

ITEF-429 Advanced Electronics
Registration #0618-429
A course in the modern application of linear integrated circuits, with emphasis on the operational amplifier. (ITEP-403)
Class 3, Lab 2, Credit 4
ITEP-471  Topics in Computer Engineering Technology
A course for majors in computer technology, with topics as needed for updating in technology. Anticipated offerings include topics in new programming, languages, advanced microprocessor and microcomputer systems, and computer communications systems and techniques. (Fifth-year status in computer technology)
Class 3, Lab 3, Credit 4

ITEP-499  Cooperative Education
Registration #0618-499
One quarter of appropriate work experience in industry. (ITEP-303, ICSP-305, third-year status in computer technology)
Credit 0

ITEP-538  Digital System 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 different SSI/MSI logic families in implementing the designs. The internal structure and function of various logic gates are analyzed. The problems of interfacing various logic families are discussed. (ITEP-303)
Class 3, Lab 3, Credit 4

ITEP-539  Digital System 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. Also 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 m
Registration #0618-540
An introduction to the design of complete digital control systems. AID 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 technology)
Class/Lab as required, Credit 4

ITEP-413  AV Production for Biomedical Communications
Registration #0612-413
Design, creation, and presentation of 35mm slide and 35mm slide + tape productions as applied to medical and scientific needs. Planning, researching, scripting, production, revision, evaluation. Dissolve programming; graphics; combination of music, words, and images. (For biomedical photography majors only)
Class 2, Lab 4, Credit 4

ICIC-421  Producing Audiovisual Presentations I
Registration #0612-421
Students develop slide + tape presentations in order to communicate an idea or to change the attitudes or behavior of the viewer. The development process includes: analyzing the needs of clients and audiences; preparing communications objectives; preparing treatment, storyboard, and script; producing audio track and visual materials; synchronization and presentation preparation. Project required. (Photographic skills required, for nonmajors)
Credit 4

ICIC-422  Producing Audiovisual Presentations II
Registration #0612-422
Basic slide + tape planning and production similar to ICIC-421 but with increased emphasis on scripting and production planning and the unique characteristics of slide + tape as a delivery medium; increased emphasis on synchronization methods and more sophisticated presentation hardware. (ICIC-421, for nonmajors)
Credit 4

ICIC-426  Training and Supervision in the Hospitality Industry
Registration #0612-426
Course includes theory and techniques of training employees in the food, hotel, and tourism management field. The course covers task analysis, job descriptions, recruitment and hiring, training and employee development, supervision, evaluation, and productivity. (Open to FHTM juniors and seniors only, prerequisite to ICIC-519)
Credit 4

ICIC-444  Technical Writing for Computer Scientists
Registration #0612-444
An intensive course in the preparation of technical documents in the field of computer science. Topics include analysis of purpose of a document, and writing effectively for the expertise and interests of the intended audience. Writing assignments will cover reports and user documentation. This course is a prerequisite to the third quarter of cooperative education. (For computer science majors only)
Credit 4
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. (English Composition from the College of Liberal Arts or from transfer institution)
Credit 4

ICIC-489  Audio for Audiovisual
Registration #0612-489
Students record, transfer, edit, and mix sound tracks—with music, narration and sound effects—for audiovisual programs. Course stresses practical approach with hands-on experience. Enrollment for 4 credits requires production of the audio portion of a presentation.
Credit variable 3-4

ICIC-519  Principles and Methods for Dietetics Education
Registration #0612-519
Principles of learning; behavioral objectives, motivation, perception, evaluation, guidance, teaching methods and audiovisual techniques; development of a teaching/learning unit for a specific group. (For dietetics majors only)
Credit 4

Upper Division Major Courses

ICIC-401  Message Design
Registration #0612-401
Reviews media formats as they may be applied to the design of 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 + 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 (offered upon demand)

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-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
One quarter of approved work experience in appropriate audiovisual field. For AVC majors only. Approval of advisor required prior to registration.
Credit 0

ICIC-501  Practicum in Audiovisual Program Design
Registration #0612-501
Allows a student to explore or develop a special competence in audiovisual program design and to work with "clients" in real or simulated work environments. A proposal 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 Management
Registration #0612-502
Allows a student to explore or develop a special competence in audiovisual management and to work with "clients" in real or simulated work environments. A proposal 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 Production
Registration #0612-503
Allows a student to explore or develop a special competence in advanced production and work with "clients" in real or simulated work environments. A proposal 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
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 Programs
Registration #0612-550
Covers organizational strategies, management practices, budgeting and fiscal control, personnel recruitment, selection, training and supervision, resource center operation and organization.
Credit 4 (offered upon demand)
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, and 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 presentations (6-15 projectors) controlled by microprocessor-based programmers using leisure time programming. Basic research and theory of multi-image covered. Projects required. (ICIC-489, and ICIC-580, and ICIC-401 or equivalent)
Credit 4

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

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

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

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

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

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

Graduate Courses

Instructional Technology

ICIT-700  Introduction to Instructional Technology I
Registration #0613-700
An overview of the basic elements of instructional technology including: technology and its application to instruction; instructional development; past, present, and future trends in instructional technology; and, instructional objectives. The course is a mix of self instructional modules and seminars. Course required for graduation.
Credit 2

ICIT-705  Sources of Information in Instructional Technology
Registration #0613-705
Students develop general search techniques and strategies for finding information, evaluating it, and establishing a reference file. Sources of print material include journals and periodicals related to instructional technology, books, research reports and conference proceedings, catalogues and commercial information, and automated information systems. Interpreting recent copyright changes is also covered. Actual search problems are given and an information search project is required.
Credit 3

ICIT-710  Programmed Instruction
Registration #0613-710
Students review principles and techniques of preparing programmed instruction; then design, produce and validate their own programmed instruction materials; includes research and development related to programmed instruction and sources of programmed materials.
Credit 4 (offered upon demand)
ICIT-712 Computer-Assisted Instruction (CAM)  
Students learn the use of the computer for instruction (computer-assisted instruction) and then produce their own computer-assisted instruction programs. Students review research and computer-assisted instruction, various hardware and software configurations, programmed languages, and sources of already developed computer-assisted courses. The course covers some methods of course and lesson development. Project required. (ICIT-755 or with permission of department)  
Credit 4

ICIT-713 Advanced Computer-Assisted Instruction (CAI-2)  
The student develops complex and sophisticated instructional sequences which incorporate advanced CAI programming techniques; enters the sequences on the computer, tests and debugs the sequences; and using the computer, gathers the student response information necessary to validate the sequences. The student also explains and demonstrates CAI and writes proposals for CAI courses and lessons. (ICIT-712) Two projects required.  
Credit 4

ICIT-714 Computer Based Interactive Instructional Systems (CAI-3)  
Students plan and produce segments of a computer-based, highly interactive course which also utilizes a pictorial display medium, preferably video. The student must enter all computer elements and produce the scripts and directions for noncomputer segments, as well as preparing all technical and user documentation. The course incorporates the principles of ICIT-712 (CAI-1) and ICIT-713 (CAI-2). Major project required. (ICIT-712,713,750,755,756, media design skills)  
Credit 4 (offered on demand)

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

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

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

ICIT-722 Research Project  
A variable credit course which allows a student to conduct a research project based on the student's interests and with the advice and consent of a faculty member. A formal research proposal must be submitted before registering for this course (guidelines available from the department). (ICIT-750, 751, and 720 or 721 and 30 hours of course work)  
Credit 4 (offered upon demand)

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

ICIT-736 Interviewing, Counseling and Coaching in Training  
The course distinguishes between counseling, coaching, and training, stressing task-related interpersonal and cognitive skills such as working with a subject matter expert or job counseling. Includes methods of interaction to maintain communications and to shape behavior. (ICIT-735, 770 or concurrently)  
Credit 3

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

ICIT-749 Seminar in Strategy, Technology, and Futuring in Human Resource Development  
Training and development, especially in business and industry, and human resource development exist within the larger context of national and global economics. Trends in business directly affect the development of human resources into an effective work force. This closing seminar examines future directions as they relate to—and may have an impact upon—training and human resource development in various sectors of the economy. After reviewing past, current, and projected economic and societal trends, seminar participants are required to analyze and project various possible developments in an area of their own interest. Required for graduation. (Prerequisites or corequisites: all core courses and 40 hours of course work.)  
Credit 4

ICIT-750 Instructional Development I  
Covers the concepts and principles underlying the development of instructional programs and materials. Instructional development is the systematic solution of instruction and learning problems involving needs assessment, task analysis, specification of objectives, analysis and synthesis of instructional strategies, and methods of evaluation. A limited instructional development project is part of the course. Required for graduation. (Note: ICIT-700 must be taken before or simultaneously with ICIT-750; must be taken before 22 hours of program are completed; ICIT-735 and ICIT-755 are prerequisites)  
Credit 4

ICIT-751 Instructional Development II  
A continuation of Instructional Development (ICIT-750) in which instructional development principles are applied in an actual project selected by the student. More sophisticated means of development, evaluation, and revision are included along with strategies for media selection and development. Literature of the field is also covered. Required for graduation. (ICIT-750)  
Credit 4
ICIT-752 Instructional Development III
Registration #0613-752
Stresses the difference between personnel/faculty development, instructional/program development, and curriculum/organizational development and how the instructional developer or trainer becomes an agent for change. Examines the methods of disseminating and promoting the adoption of innovative methods and materials. Students research special problems related to selected areas of instructional development. (ICIT-750, 751)
Credit 4

ICIT-753 Group Dynamics
Registration #0613-753
Almost without exception, an instructional designer works as part of an instructional development team. This course helps instructional developers develop their abilities to plan, conduct, and evaluate various group processes—especially in relation to course development. Each course participant will review appropriate functions, advantages, and disadvantages of different group dynamic procedures and interventions and will demonstrate appropriate "attending," listening, group guiding, problem solving, and decision making skills needed to plan and moderate task-oriented small group meetings. Required for graduation.
Credit 4

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

ICIT-756 Criterion Referenced Instruction and Technical Training II
Registration #0613-756
A two-course sequence which applies the principles of instructional development specifically to those areas of training in which performance criteria can be precisely stated and accurately measured. Such training usually tends to be in technical skill areas where procedures or product are predetermined or can be clearly specified. The course is largely self-paced and self-instructional and the student must complete a project in the technical training area.
Credit 3

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

ICIT-758 Developing Instructional Modules
Registration #0613-758
The course is designed to follow ICIT-756 to give the student extended practice in the development, evaluation, and revision of self-instructional materials. The course, largely self-instructional and project oriented, emphasizes structuring the module, actual module writing, and tryout and revision procedures. Students must have already selected a content area and developed objectives, a course plan, and criterion tests. (ICIT-755, ICIT-756)
Credit 3

ICIT-759 Technical Writing for Instructional Developers
Registration #0613-759
This course introduces instructional developers to the process of writing technical manuals and reports. Includes an overview of the production process, content and audience analysis, information layout. Two major writing projects and other exercises required. (Writing skills, ICIT-700, 755, 756, 758)
Credit 3

ICIT-762 Management & Budgeting in Instructional Technology
Registration #0613-762
Applies basic theories of management to areas of instructional technology and to management of personnel of those areas. Examines the organizational structure of instructional development units. Covers budgeting and actual financing for services and projects.
Credit 4

ICIT-765 Individual Learning Style Analysis
Registration #0613-765
Examines the ways different individuals learn and relates instructional strategies to learning styles. Covers cognitive style mapping, aptitude treatment interaction, application of norm and criterion referenced tests as each relates to individual learning style. (ICIT-753)
Credit 4

ICIT-770 Interpersonal Communications
Registration #0613-770
Instructional development requires that instructional technologists be able to work well with people. Participants in the course are taught to be sensitive to others as well as to examine their own feelings in a group situation. Required for graduation.
Credit 2

ICIT-772 Group Development and Organizational Change
Registration #0613-772
Similar in format to ICIT-770, the course extends the concept and practice of interpersonal communications to the area of work-and-task-oriented team-building and organizational change. The course stresses actual personal interaction in a training laboratory environment while including some of the theoretical aspects of causing work-oriented, personal and organizational change. Offered on demand. (ICIT-750, 751, 757, 770, IJCC-753, and permission of department)
Credit 3

ICIT-840 Internship
Registration #0613-840
Special opportunities may occur for students to obtain work experience in a job or environment similar or coincident with their career objectives. In fact, students are encouraged to locate such opportunities. This course recognizes this experience. A proposal (guidelines available from the department) must be approved by the department prior to registering for this course. (ICIT-750, ICIT-751 plus 20 hours of course work)
Credit variable 1-3

ICIT-850 Independent Study
Registration #0613-850
An opportunity for a student to explore, with a faculty advisor, an area of interest to the student. A proposal (guidelines available from the department) must be approved by the department prior to registering for this course. (ICIT-750, ICIT-751 plus 20 hours of course work)
Credit variable 1-3
School of Food, Hotel and Tourism Management

Dietetics and Nutritional Care

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

ISMD-402 Dietetics Environment
Registration #0620-402 Coordinated Dietetics Program
Introductory clinical dietetics course. Students interact with a representative sampling of personnel in all areas of dietetics. Supervised observations are planned in food management systems, health care facilities and community nutrition programs. (ISMF-215, ISMD-213)
Class 1, Credit 4, Clinical hours by arrangement.

ISMD-525, 526 Advanced Nutrition and Diet Therapy I & II
Registration #0620-525, 526
Biological metabolism and interrelationships of nutrients, enzymes, and other biochemical substances in humans. Etiology, symptoms, treatment, and prevention of nutritional diseases; evaluation of nutritional status, role of the diet in metabolic, gastrointestinal, renal, musculoskeletal, cardiac, endocrine, febrile, and other diseases. (ISMD-213, SCHG-203, SBIG-212)
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. (ISMD-213, ISMD-526 or ISMD-562)
Class 2, Credit 4, Clinical hours by arrangement.

ISMD-551 Food Systems Management II
Registration #0620-551 (Coordinated Dietetics Program)
Principles of management in organizational structure, supervision and evaluation of employee performance, and use of computers in food management; the functions of an administrative dietitian in planning, organizing, directing, coordinating, and controlling dietetic activities. (ISMD-213, 331)
Class 1, Credit 8, Practicum in hospital by arrangement.

ISMD-554 Nutrition in Life Cycle
Registration #0620-554
This is an applied course in nutritional needs throughout the life cycle. Emphasis will be given to nutrition during pregnancy, infancy, early childhood, adolescence, and in later years. (ISMD-213)
Class 4, Credit 4

ISMD-560, 561 Clinical Dietetics I & II
Registration #0620-560, 561 (Coordinated Dietetics Program)
An intensive integrated study and application of advanced nutrition and diet therapy theories and principles. The course is structured to integrate class lectures (ISMD-560) with clinical experience (ISMD-561) in a hospital setting. Designed for senior students in the Coordinated Dietetics Program. (ISMD-213, SCHG-203, SBIG-212)
ISMD-560 Class 4, Credit 4
ISMD-561 Clinical Hours by Arrangement, Credit 4

ISMD-562, 563 Clinical Dietetics III & IV
Registration #0620-562, 563 (Coordinated Dietetics Program)
A continuation of ISMD-560, 561 in the succeeding quarter with the clinical experience being conducted in the hospital. (ISMD-560, 561)
ISMD-562 Class 4, Credit 4
ISMD-563 Clinical Hours by Arrangement, Credit 6

Food and Beverage Management

ISMF-210 Introduction to Food, Hotel and Tourism Management
Registration #0621-210
An orientation course designed to trace the history, organizational structure, problems, opportunities and the place of the industry in the national and world economy. Trends and developments in the industry today are stressed.
Class 4, Credit 4

ISMF-215 Principles of Food Production
Registration #0621-215
Introduction to foods and basic preparation of high quality food products. Topics include history, kinds, varieties, seasonal availability, sources, and composition of foods and ingredients; essential vocabulary; organization and management of work areas; techniques and methods used for menu planning. Uniform required.
Class 3, Lab 6, Credit 5

ISMF-220 Career Seminar
Registration #0621-220
Seminar designed to define career opportunities in the food, hotel and tourist industries. Students will be aided in developing career objectives. Leading industry executives will participate.
Class 1, Credit 1

ISMF-311 Design & Equipment
Registration #0621-311 Engineering
Recognizing, analyzing and solving equipment and space problems in layouts of existing institutions and in designing new food service plans. Consideration of food service equipment; determination of needs; development of specifications; procedures of maintenance, sanitation, and safety. (ISMF-331)
Class 3, Lab 2, 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
Registration #0621-321 and Merchandising
Recognizing, analyzing, research and solving fundamental merchandising techniques including menus for food and beverages found in the food service industry. (ISMF-215)
Class 4, Credit 4

ISMF-331 Food Systems Management I
Registration #0621-331
Application of standards, preparation, and service of high quality food. Recognizing, analyzing, planning, scheduling, solving and evaluating problems related to all aspects of food production and management based on scientific, technological, economic, and social factors. Students will assume various operational positions found in commercial feeding facilities by operating the department's 80-seat restaurant. Students will be instructed in utilizing the Remanco Computer System. Students in the Coordinated Dietetics program will have hospital practicum arranged. (ISMF-215, 314)
Class 1, Lab 12, Credit 5
ISMF-340  
**Beverage Operations**  
Registration #0621-340  
Practical course dealing with the management of a commercial beverage operation. Class and laboratory includes objectives, procedures, characteristics, regulations, controls and mixology of alcoholic beverages. Students will utilize computerized dispensing equipment. (Open to juniors only, age 19 or older)  
Class 3, Credit 3

ISMF-341  
**Beverage Operations Lab**  
Registration #0621-341  
Course will allow experience in the actual operation of Henry's beverage center. Students will become familiar with Remanco and Bevcon electronic liquor control system. Open to seniors only, age 19 or older. (ISMF-340)  
Lab 4, Credit 2

ISMF-416  
**Product Development**  
Registration #0621-416  
Food Science; sensory and objective evaluation of food quality; chemical and physical properties of foods; interaction of food ingredients; recipe development and presentation; problem solving; experimental design; technical writing. (ISMF-331, science requirement, junior or senior status)  
Class 2, Lab 6, Credit 4

ISMF-424  
**Food and Labor Cost Control**  
Registration #0621-424  
A fundamental course to assist the student in costing of food and labor needed to operate a food service system. Included is analysis of standardized recipes, scheduling, application of internal controls, and computations of operating statements. Analysis of sales activity and current inventory data will be done on the Remanco System. (BBUA-302, ISMF-425, ISMF-331, sophomore or junior status)  
Class 4, Credit 4

ISMF-425  
**Purchasing and Inventory Control**  
Registration #0621-425  
Course covers controls of purchasing systems, including selection, ordering, receiving, storage, issuing, evaluation of food, non-food supplies and services. (ISMF-210, 215, 314, sophomore or junior status)  
Class 3, Credit 3

ISMF-430  
**Restaurant Management**  
Registration #0621-430  
Application of theories and techniques dealing with total restaurant operation including: menu planning, marketing strategies, supervision of purchasing, equipment, production and service operations. Creation and calculation of management reports to evaluate efficiency and effectiveness of restaurant operations. (ISMF-331, 340, 341, 424, 425, ICIC-426) (Senior Standing)  
Class 1, Lab 12, Credit 5

ISMF-447  
**Garde Manger**  
Registration #0621-447  
The course is designed to allow the student to develop techniques specific to Garde Manger work. Students will be exposed to and practice in a hands-on environment: tallow sculpture, aspic, chaudfroid, vegetable carvings, pates, gelatin molds, and butter sculptures. If time permits, the class will also cover the areas of confections such as pastillage, royal icing, pulled sugar, chocolate sculptures, cocoa paintings and marzipan work. (ISMF-210, ISMF-215, ISMF-314, ISMF-331, and instructor's approval)  
Lab 8, Credit 4

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

Credit 0

ISMF-511  
**Banquet and Catering Management**  
Registration #0621-511  
Management experience in planning, organizing, supervising preparation and service of foods for special functions. Emphasis is placed on experiences in organizational behavior, the responsibilities of management in marketing, promotion, sales promotion, sales production, personnel and customer relations and attitudes. Evaluation of management experience by preparation of operations reports. Open to seniors only. (ISMF-331, 340, 341, 424, 426)  
Class 1, Lab 12, Credit 4

ISMF-554  
**Senior Career Seminar**  
Registration #0621-554  
A variety of current topics will be researched and discussed as they pertain to the hospitality industry: e.g., employee stress, employee dishonesty, alcoholism, divorce, management's response to current DWI laws, legal drinking age, casino operations.  
Credit variable 1-4

ISMF-555  
**Research Problems**  
Registration #0621-555  
Independent study of research problems in food and hospitality management. Senior students only with faculty sponsorship.  
Credit variable 1-8

**Hotel and Resort Management**

ISMH-400  
**Resort and Recreation Enterprises**  
Registration #0622-400  
The development, marketing and management of ski resorts will be studied with micro-computer applications. (ISMH-400)  
Class 1, Credit 1

ISMH-401  
**Ski Resort Management**  
Registration #0622-401  
The development, marketing and management of ski resorts will be studied with micro-computer applications. (ISMH-400)  
Class 1, Credit 1

ISMH-402  
**Marina Management**  
Registration #0622-402  
The development, marketing and management of marinas will be studied with micro-computer applications. (ISMH-400)  
Class 1, Credit 1

ISMH-403  
**Golf Course Management**  
Registration #0622-403  
The development, marketing and management of golf courses will be studied with micro-computer applications. (ISMH-400)  
Class 1, Credit 1

ISMH-404  
**Campground Management**  
Registration #0622-404  
The development, marketing and management of campgrounds will be studied with micro-computer applications. (ISMH-400)  
Class 1, Credit 1
ISMH-405  Theme Park Management
Registration #0622-405
The development, marketing and management of theme parks will be studied with micro-computer applications. (ISMH-400)
Class 1, Credit 1

ISMH-406  Resorts and Condominium Management
Registration #0622-406
The development, marketing and management of resorts and condominiums will be studied with micro-computer applications. (ISMH-400)
Class 1, Credit 1

ISMH-410  Tourist Consumption Analysis
Registration #0622-410
A course designed to analyze the consumption of tourist goods and services. The analysis will include economic, recreation and personality theory in order to fully understand tourism consumption. Computer research applications are utilized.
Class 4, Credit 4

ISMH-411  Problem Analysis & Decision-Making for Tourist Industries
Registration #0622-411
The course is designed to assist the student in constructing a problem-solving framework for the analysis of tourism industry management problems. Computer research applications are utilized. (Junior or senior status)
Class 4, Credit 4

ISMH-412  Maintenance and Engineering Systems of Hotel/Resort Properties
Registration #0622-412
A course designed to expose the student to various problems of maintaining a resort property. Maintenance practices, equipment, record keeping, and specific needs of recreational surfaces will be discussed as to proper maintenance for quality resort development. Computer energy monitoring systems are evaluated. (Junior or senior status)
Class 4, Credit 4

ISMH-420  Hotel and Travel Law
Registration #0622-420
Policies, laws, and liabilities are examined as they pertain to the traveling public. The focus will be on current management problems and responsibilities as they entail the legal aspects of the hospitality industry. (Junior or senior status)
Class 4, Credit 4

ISMH-423  Hotel Operations
Registration #0622-423
The course is designed to introduce the student to the distinctive nature of hotel operations. This is accomplished by identifying the standard functions which inter-relate to produce the whole: hotel service. The hotel's principal product, the guest room, will be given detailed study which will include a manual practice problem. Computerized reservation systems, ethics, security and on-the-job application of operational problems are included. (ISMH-210, BBUM-302, junior standing)
Class 5, Credit 5

ISMH-450  Hotel Marketing and Convention Sales
Registration #0622-450
The course is designed to introduce the student to the application of the marketing concept in hotel operations. This will be accomplished by defining the marketing function, situation analysis, marketing organization, sales office work form flow, customer contact methods, and servicing procedures, as generally practiced in the hotel industry. (ISMH-423, BBUM-463)
Class 4, Credit 4

ISMT-201  Travel Lab I
Registration #0623-201
The basics of the domestic air transportation system are examined with the focus on the student achieving proficiency in reservations, itinerary construction, fare calculation, and ticketing procedures. The labs make use of the various air carrier and accommodation tariffs and guides. This course provides the basic understanding needed for the subsequent travel labs.
Class 3, Credit 3

ISMT-202  Travel Lab II
Registration #0623-202
The international air transportation system is surveyed. Emphasis is given to the application of fares, baggage allowances, currency regulations and adjustments, and fare construction principles utilizing the Mileage System. Documentation requirements for international travel are also reviewed. (ISMT-201)
Class 2, Credit 2

ISMT-210  Introduction to A.A. SABRE Reservations
Registration #0623-210
An operational proficiency of American Airlines' SABRE reservation system is acquired by the student. Utilizing SABRE's Training mode, course topics include: PNR retrieval, availability, name and phone fields, ticketing field, remarks field, fare quotes, itinerary pricing, PNR queues, flight information AA/OA. This course is equally divided between lecture and Travel Lab simulations.
Class 4, Credit 4

ISMT-220  Travel Intermediaries
Registration #0623-220
A functional approach is utilized to aid in the understanding of the travel industry through the analysis of the marketing channels of distribution. The channel functions performed by the retail travel agent and the wholesale tour operator are examined in relation to suppliers' (air carriers, hotel, etc.) marketing strategies and operations. Emphasis is placed on channel problems associated with group sales and packaged promotions.
Class 4, Credit 4

ISMT-303  Travel Lab III
Registration #0623-303
Cruise travel and rail travel are examined in considerable detail. Principles of salesmanship are reviewed and students are given the opportunity to practice various techniques through the application of role-playing. Motor coach and auto rentals are also discussed. (ISMT-201, 202)
Class 2, Credit 2

ISMT-310  Intermediate SABRE Applications
Registration #0623-310
Utilization of SABRE for Phase IV faring, pre-paid ticket advice, queue printing, currency conversion/rates, STARS, segments and accounting data entries, invoicing/itineraries. (ISMT-210)
Class 4, Credit 4

ISMT-320  Passenger Transportation Systems
Registration #0623-320
A detailed examination of the economic forces which help determine product configurations and pricing structure of the various modes of passenger transportation. The market structure of the passenger transportation system is surveyed with the emphasis placed upon the analysis of the pricing system's multiple interactions created in part because of the nature of the various demand components and supply consequences. (ISMT-220 or permission of instructor)
Class 4, Credit 4
ISMT-330 Convention Sales and Services
Registration #0623-330
A detailed analysis of the convention industry is conducted as to the planning, cooperating agencies and bureaus, staffing, operations, sales, and management. Emphasis is given jointly in planning convention sales to various market segments, and in providing convention services at the meeting site. Students utilize local facilities to view first hand, convention operation. (BBUM-463)
Class 4, Credit 4

ISMT-350 SABRE Applications to Non-Airline Information Systems
Registration #0623-350
Utilization of SABRE's non-airline information system. Topics include: car sale option fields, hotel index-descriptions, hotel availability, selling from hotel availability, immigration-customs guide.
Class 4, Credit 4

ISMT-370 Passenger Transportation Policy
Registration #0623-370
An examination of the development of transportation policy as it relates to the various modes of passenger transportation. The role of regulatory policy is discussed with emphasis on how it affects the economic and social policies and the physical aspects of passenger transportation. The various passenger transportation regulatory agencies are surveyed with the primary focus being their effect on the development of the present passenger system and to their possible future implications. (ISMT-220 or permission of instructor)
Class 4, Credit 4

ISMT-375 Touristic Geography
Registration #0623-375
People's opinions about what the world is, how it got that way, and what it should be like, are very diverse. Geography's concern with places, spatial analysis, and the relationships between man and land gives it a unique and vital role among all other disciplines. It is a field in which the concerns of both the social and physical sciences converge in the study of specific places.
Touristic Geography shares the geographer's curiosity about place, its spatial expanse, and its man-land interdependence. As an academic discipline, Touristic Geography focuses upon man's leisure proclivities and their spatial manifestations, be they exotic or mundane, esoteric or hedonistic.
Credit 4

ISMT-420 Corporate Travel Planning
Registration #0623-420
This course focuses upon the specific travel goals, accounting policies, and informational requirements of corporate (business) travel. Three major orientations of corporate travel are examined: corporate travel utilizing the retail travel agent, corporate travel operated through the firm's transportation manager, and incentive travel. One of these orientations is emphasized during the quarter, corresponding to the interests of the students enrolled. (ISMT-220 or permission of instructor)
Class 4, Credit 4

ISMT-421 Tour Operations
Registration #0623-421
The operation of a typical tour wholesaler's program is examined. Emphasis is given to escorted and hosted tours, since they usually require direct involvement by representatives of the tour wholesaler. Financial and documentation flows are emphasized. The role of the tour guide/escort is highlighted. (ISMT-220 or permission of instructor)
Class 4, Credit 4

ISMT-422 Travel Product Development
Registration #0623-422
This course examines the planning function associated with the tour operator's development of new service offerings and/or the selection of new travel destination. Initially, a marketing research orientation is utilized with emphasis on tour specifications (packaging), negotiations and pricing of the final package. The methods of marketing to various market segments are subsequently examined. (ISMT-220 or permission of instructor)
Class 4, Credit 4

ISMT-423 Computer Reservation and Accounting Systems
Registration #0623-423
A survey of American Airlines SABRE computer reservation system used in passenger transportation is conducted. Application of the ASTA manual and several computer accounting systems, such as Holiday and ADS Nova IV, are examined. (ISMT-310, permission of instructor)
Class 4, Credit 4

ISMT-538 Tourism Planning and Development
Registration #0623-538
This course is designed to analyze the process of developing a tourist region or municipality. Identification of tourism resources, marketing plans, human resource needs, necessary infrastructures, economic impact, and financing strategies will comprise the basis of the class. (Senior status or permission of instructor)
Credit 4

ISMT-550 Seminar in Travel Management
Registration #0623-550
A survey of the current issues faced by the travel industry. The course is designed as a capstone course for travel management majors, and only to seniors who have completed all of their co-op requirements. Various topics are discussed and different orientations are taken corresponding to the interests of the students and issues of current relevance in the travel industry. (Senior status)
Class 4, Credit 4

Graduate Courses
ISMM-750 The Hospitality-Tourism Industry: A Systems Approach
Registration #0624-750
General systems theory is used to examine the major components of the hospitality-tourism industry. The interactions and interdependencies of these components are discussed with reference to the properties of open systems. Students will become acquainted with systems in terms of a philosophy, a theory and a procedure for decision-making and evaluation.
Credit 4

ISMM-760 Research Methods and Applications in the Hospitality-Tourism Industry
Registration #0624-760
A survey of research methods that are especially applicable to the hospitality-tourism industry. Emphasis on utilization of primary data collection and its application to specific forecasting and modelling techniques used within the industry.
Credit 4

ISMM-770 Employee Relations and Training in Service Industries
Registration #0624-770
An overview and examination of various supervisory/managerial skills. Self-description of the student's management style is conducted using the Laffertry Level I: Life Style Inventory. These are matched to those needed within the hospitality-tourism industry. Students will prepare presentations that are staff development/training oriented and targeted at employee, supervisory, mid-level, and key management personnel.
Credit 2 Credit Variable
Travel marketing systems include the identification of markets, ISMM-846 Travel Marketing Systems patterns are evaluated. Various software and hardware packages are explored in relation to planning and control functions. These include: presale, point-of-sale (production, service and check handling) and postsale (post costing, check statement, menu adjustments, accounting, etc.).
Credit 4

ISMM-824 Organizational Strategies of Hospitality Firms
An analysis of the organizational structure, operational procedures, corporate policies, financial growth, and related factors in specific hospitality firms. Traces the evolution of various selected companies to reveal individual growth strategies.
Credit 4

ISMM-826 Tourism Policy Analysis
Registration #0624-826
An analysis of the goals and objectives for tourism development in geographic areas of different size. Topics include employment, income redistribution, cultural impact, labor supply, and tourism resource base. Specific policies for touristic regions are compared for effectiveness and overall cost benefits. Local, state, national and international examples are included.
Credit 4

ISMM-828 Meeting Planning Management
Registration #0624-828
An examination of the role of professional meeting planners, as they function in the corporate, association, and educational environments. Both corporate and independent meeting planners will be assessed. Methods of planning and programming for meeting will be surveyed and evaluated. A review of the economic impact of conferencing and support service functions will be undertaken. Negotiations skills are examined.
Credit 4

ISMM-842 Food and Beverage Marketing Strategies
Registration #0624-842
Market segmentation; methods in marketing research; creating a menu, environment, theme for a defined market; improving the market share through quality control, innovation, promotions, public relations, menu engineering and community involvement; premarketing; creating a new image; marketing to increase profitability. Case studies and projects.
Credit 4

ISMM-844 Hospitality Resource Management
Registration #0624-844
This course is designed to analyze the inputs associated with the development of hospitality firms. Labor markets, financial instruments, tourism infrastructures, real estate markets, and educational support systems will be assessed in order to determine the development of hospitality firms.
Credit 4

ISMM-846 Travel Marketing Systems
Registration #0624-846
Travel marketing systems includes the identification of markets, product pricing strategies, and mixes of communication as they relate to the tourism distribution system. The efficiencies of various channel configurations and their resultant organizational patterns are evaluated.
Credit 4

ISMM-848 Convention and Exhibition Management
Registration #0624-848
The organization and operation of exhibit/convention space is examined from the meeting planner's perspective. Emphasis is given to use of exhibits to enhance both program and attendance. A detailed review of the factors necessary for successful exhibits and exhibitor relations is conducted with emphasis on the various methods employed to encourage participation. Budget controls and financial reporting systems are analyzed. The decision-making process on use of the exhibit as an income producing segment of conferencing is stressed.
Credit 4

ISMM-862 Product Development and Registration #0624-862
Problem Solving in Food Service
Evaluation of food ingredient interactions and quality standards of food products by sensory (taste) panels and objective measures. Creation of new food products or special dietary products; evaluation of new food ingredients or preparation methods; comparison of time and/or labor-saving products/methods. Emphasis on practical applications, experimental design and communicating the results both orally and in writing.
Credit 4

ISMM-864 Problem Analysis and Decision Registration #0624-864
Making in the Service Economies
Specific hospitality-tourism industry and enterprise problems are analyzed using various problem-solving frameworks. The student will structure individual problems and design an appropriate analytical and decision-making framework for each.
Credit 4

ISMM-866 Tourism Planning and Registration #0624-866
Travel Product Development
Tourism planning defines the frames of reference used in making choices concerning the development of tourism facilities and use of space. Topics include: tourism income and expenditure; pricing policy; taxing authorities; ownership patterns; financing and leakage potentials of the various tourism infrastructures. This course focuses on the planning and development of tourism as it is "packaged" through its distribution channels.
Credit 4

ISMM-868 Legal Issues and Evaluation of Events Registration #0624-868
An examination of the instruments used to confirm meeting arrangements. Focus is placed on informal instruments (letter of agreement) and formal documentation (contract). A survey of legal decisions impacting the liability of the planner and its impact on the meeting function is conducted. The performance of meeting planners and their interrelationships and interdependencies with external support staffs are assessed.
Credit 4

ISMM-880 Seminar: Current Issues Registration #0624-880
A small group examination of contemporary issues and topics chosen by the students and faculty member. Research, oral presentations and class discussions of all issues selected.
Credit 4

ISMM-890 Practicum in Hospitality-Registration #0624-890
Tourism Training
An opportunity for the student to apply skills learned in previous courses in a work or laboratory setting. A proposal must be approved by the director of the program, prior to enrolling in the course.
Credit variable 1-6
### Class 1, Lab 1, Credit 2

ISMM-896  
**Graduate Project**  
Registration #0624-896  
This course number is used to fulfill the graduate paper requirement under the non-thesis option for the MS degree in Hospitality-Tourism Management. The candidate must obtain the approval of the director of the program and, if necessary, an appropriate faculty member to supervise the paper before registering for this course. A formal written paper and an oral presentation of the project results are required.  
Credit variable 1-3

ISMM-898  
**Thesis**  
Registration #0624-898  
This course is designed to give the student an introduction 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.  
Credit variable 1-3

ISMM-899  
**Independent Study**  
Registration #0624-899  
This course provides knowledge and training of basic military skills essential as a junior officer; weapons training, an introduction to military communication equipment and techniques; leadership laboratory.  
Credit variable 1-3

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

**ARMY**

### First Year

MMSM-201  
**Introduction to Military Science**  
Registration #0701-201  
This course is designed to introduce the student to the ROTC program and military map reading techniques. Topics of primary interest will include: the organization and purpose of ROTC program, the organization of the U.S. Army, the National Guard, the Army Reserve, Career branches and the role of a lieutenant; leadership laboratory.  
Class 1, Lab 1, Credit 2

MMSM-202  
**Applied Health Dynamics**  
Registration #0701-202  
This course is designed to give the student a basic understanding of the Army medical system and emergency first aid techniques used in the military. Special emphasis is given to CPR, prevention of injuries, and supervision of preventive medicine activities; leadership lab.  
Class 1, Lab 1, Credit 2

MMSM-203  
**Military Heritage**  
Registration #0701-203  
This course is designed to provide a practical introduction to the basic military organization and rank structure; the historical basis for customs and traditions found in the military, and current discussions on the military and its impact upon society; leadership laboratory.  
Class 1, Lab 1, Credit 2

### Second Year

MMSM-301  
**Military Geography**  
Registration #0701-301  
A study of military land navigation with special emphasis given to navigation using a map and compass. Geographic concepts and realities are studied as they apply to the solution of military problems. Major topics for discussion will include identification of terrain features, determination of location using resection and intersection techniques, and determination of direction. This course stresses practical application rather than theory; leadership lab.  
Class 1, Lab 1, Credit 2

MMSM-302  
**Psychology and Leadership**  
Registration #0701-302  
This course provides the student the basic principles of leadership and management of human resources; motivation, morale and communication. Special emphasis is placed on applying the theories and models of the behavioral sciences and personnel management to leadership as it functions in a military environment; leadership laboratory.  
Class 1, Lab 1, Credit 2

MMSM-303  
**The Military and American Society**  
Registration #0701-303  
This course is designed to give the student an introduction to the principles of war and the study of the application of these principles in recent military history. Emphasis will be placed on the Army's role today as peacekeeper and will include discussions on low intensity conflict, Europe, and NATO. Other topics will include the Army of the future, the Soviet threat, and a contrast of the U.S. and Soviet Union military systems. Leadership laboratory.  
Class 1, Lab 1, Credit 2

### Third Year

MMSM-401  
**Military Tactics**  
Registration #0701-401  
This course stresses practical exercises on basic map reading skills and provides a working knowledge of fundamentals and principles of combat operation as placed for and executed at light infantry squad and platoon level; leadership laboratory.  
Class 2, Lab 1, Credit 3

MMSM-402  
**Military Communications and Weaponry**  
Registration #0701-402  
This course provides knowledge and training of basic military skills essential as a junior officer; weapons training, an introduction to military communication equipment and techniques; leadership laboratory.  
Class 2, Lab 1, Credit 3

MMSM-403  
**Military Operations**  
Registration #0701-403  
A continuation of military skills training with emphasis on military intelligence/security, first aid, operations at the small unit level; leadership laboratory; field training exercise.  
Class 2, Lab 1, Credit 3

### Fourth Year

MMSM-501  
**Combined Arms Operations**  
Registration #0701-501  
The course introduces the student to the mission, organization, and capabilities of the branches of the Army. Discussions on the tactics of the Airland Battle, advanced studies in U.S. and Soviet capabilities and tactics, and practical application of these tactics through war gaming; leadership laboratory.  
Class 2, Lab 1, Credit 3
MMSM-502 Military Administration and Logistic Management
Registration #0701-502
This course includes discussions and seminars on officer extra duties, military justice, supply and property accountability, maintenance management, officer-enlisted personnel management and command and staff responsibilities; leadership laboratory.
Class 2, Lab 1, Credit 3

MMSM-503 Military Ethos
Registration #0701-503
This course examines the ideas and issues that define the role of the military in our larger society. Emphasis is placed on the professional and ethical standards required of the military officer. Other topics include: discussions on the office personnel management system, active duty orientation, preparations for commissioning; leadership laboratory; field training exercise.
Class 2, Lab 1, Credit 3

MMSM-510 Senior Seminar and Project
Registration #0701-510
For military science students who have completed their junior year of military study. The seminar is directly related to military science projects that students are working on and consists of written and/or oral presentations given during the quarter. Students may also be required to present this material to other students in a classroom environment.
Class 2, Credit 2

AIR FORCE

MMSF-201, 202, 203 Leadership Lab I
Registration #0750-201, 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

MMSF-210, 211, 212 The Air Force Today I, II, III
Registration #0750-210, 211, 212
Course series on the basic characteristics of air doctrine; US Air Force mission and organization; functions of US strategic offensive, general purpose, and aerospace support forces; officership; and assessment of written communicative skills.
Credit 1

MMSF-301, 302,303 Leadership Lab II
Registration #0750-301, 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

MMSF-401, 402,403, 404,405,406, Leadership Lab III, IV, V
501, 502, 503
Registration #0750-401, 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

Undergraduate Business Courses

Accounting

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

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

**BBUA-319** Legal Environment of Business
Registration #0101-319
An introduction to legal principles and their relationships to business organizations. This includes a review of the laws that govern their operations. This course will explore the background and origin of the U.S. legal system, its law enforcement agencies, and the legal procedures used by the government to enforce its laws. Representative topics will include torts, bankruptcies, regulatory law. 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: agency, commercial paper, corporations, and torts. Topical cases and examples are used to help the student grasp the business implications of the law and its nomenclature. (BBUA-319)
Credit 4

**BBUA-408, 409** Intermediate Accounting I, II
Registration #0101-408, 409
A study of the concepts, theories and practices used to prepare comprehensive financial statements in accordance with generally accepted accounting principles. The course will explore alternative accounting methods and valuation bases and the impact these have on financial statements. Current pronouncements of the Financial Accounting Standards Board will be studied if they are appropriate to the subjects of the course outline. (BBUA-302, 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 2 Credit Variable

**BBUA-522** Tax Accounting I
Registration #0101-522
A basic course in Federal taxation relating to concepts of income, deductions and credits. The tax structure of business forms including sole proprietorship, partnership, S corporation, and C corporation will be compared. Tax research will be introduced as a component of the decision process. (BBUA-302, 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 standards, procedures and techniques are studied. Audit programs are developed and problems connected with fraud and internal control are examined. The course includes a case study which simulates the conduct of an audit and which requires the preparation of working papers, an audit report, and an internal control memorandum. (BBUA-409, junior status)
Credit 4

**BBUA-540** Advanced Accounting
Registration #0101-540
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-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, junior status)
Credit 4

**BBUA-554** Seminar in Accounting
Registration #0101-554
A seminar series covering selected topics in accounting, including management accounting, taxation, international accounting and accounting for non-profit organizations. Specific course topics to be announced when seminar is offered. (BBUA-302, junior status)
Credit 4

Management

**BBUB-310, 311** Air Force Management
Registration #0102-310, 311
Integrated management and leadership courses emphasize the concepts and skills required by 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.
Credit 5 each

Note: Other Air Force ROTC course listings can be found under the College of Applied Science and Technology.
BBUB-312  Career Seminar  
Registration #0102-312  
Career planning for the college student. Aptitudes, interests and course and major selections while in college. 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  Organizational Behavior  
Registration #0102-430  
Human behavior in organizations. Course emphasis: individual and interpersonal skills; group and intergroup processes; and management of organizational performance and change. Topics include: leadership; communication; motivation; perception and conflict management. (Junior status) 
Credit 4

BBUB-438  Business Ethics  
Registration #0102-438  
This course examines major western society ethical theories and moral traditions and their business applications. Students have an opportunity to bring theories and traditions to bear on specific issues. These issues will be related to case studies: equal opportunity and affirmative action, product liability, introduction of new technologies (such as bioengineering), and also to business practices in other cultures. (BBUB-430, junior status) 
Credit 4

BBUB-455  Human Resources  
Registration #0102-455  
An overview of the personnel and human resource (personnel) function in both large and small organizations. The major topics studied include employee selection, training and development, compensation, safety and health, performance evaluation, compensation systems, the management of ineffective performance, and equal employment opportunity. Emphasis is placed on the legal aspects of managing human resources. (BBUB-430, junior status) 
Credit 4

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

BBUB-475  Human Resources Planning and Selection  
Registration #0102-475  
Course is designed to provide information, insight, and skills about forecasting the demand for managers and individual contributors within a firm and recruiting and selecting employees to meet that demand. The role of computer-generated information in forecasting will be studied. Emphasis is given to matching the demands of individuals and the organization as a byproduct of forecasting. Among the selection methods studied are personnel tests, employment interviews, biographical data, reference checks, and the assessment center method. (BBUB-455, junior status) 
Credit 4

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

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

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

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

BBUB-536  Organization Theory and Performance  
Registration #0102-536  
Organization theory and structure in relation to performance and productivity. Characteristics of highly effective organizations. Interaction of organizations with their external environments. Students may be asked to prepare a strengths/weaknesses analysis of an existing organization. (BBUB-430, junior status) 
Credit 4

BBUB-547  Small Business Administration  
Registration #0102-547  
Students enrolled in this course are provided the opportunity to serve as consultants to a specific small business firm within this geographic area. Under an arrangement with the Small Business Administration, and working under the supervision of a senior faculty member, teams of students provide management consulting about a variety of problems to small businesses. As a practicum this course does not have regularly scheduled class hours. Instead students confer with their faculty member on an as-needed basis. (Senior status) 
Credit 4
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-554 Seminar in Economics
Registration #0102-554
A variety of special interest topics in the field of management, ordinarily treated in more depth than would be possible in a survey course. The topic and instructor for each seminar will be announced in advance, along with any prerequisites or other special requirements. Seminar topics in recent years have included career development, the management of stress, real estate investment, and managerial control systems. (Senior status)
Credit 4

Finance

BBUE-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 financial management; working capital management and long term financing. (BBUQ-330, BBUA-302, GSSE-301, junior status)
Credit 4

BBUE-445 Advanced Corporate Finance
Registration #0104-445
A broad coverage of the analysis of financial statements, corporate financial management, and capital budgeting. (BBUQ-330, BBUA-302, GSSE-301, junior status)
Credit 4

BBUF-441 Corporate Finance
Registration #0104-441
An introduction to the functions of Financial Management and Financial Markets and Institutions. Asset Valuation as it applies to capital budgeting, working capital management and long term financing. (BBUQ-330, BBUA-302, GSSE-301, junior status)
Credit 4

BBUE-450 Mathematics of Finance and Economics
Registration #0104-450
The introduction of mathematics to the study of financial management and economics. Students will be exposed to the use of mathematical techniques in solving problems in financial management and economics. (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 and Markets
Registration #0104-510
Analysis of the different kinds of financial institutions such as commercial banks, savings institutions, insurance companies, pension funds, and others. It will cover their operations and relationships with the economic system. (BBUF-441, 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 statistical foundations of the modern finance theory are studied in detail. (BBUF-445, junior status)
Credit 4

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

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 organizations, organizational concerns, and external environmental variables affecting consumer service industries. (BBUM-463, junior status)
Credit 4

BBUM-525 Marketing Management Problems
Registration #0105-525
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-551, BBUM-505, senior status)
Credit 4

BBUM-533 Marketing Research
Registration #0105-533
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-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)
Normal Credit 4 (maximum 12 hours credit)

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

BBUM-557   Comparative Marketing
Registration #0105-557
A study of marketing in selected foreign countries to acquaint the student with its functional role in various economic environments. Comparisons between geographic regions and cultural settings are explored. (BBUM-555, junior status)
Credit 4 (offered upon demand)

BBUM-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-465, 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 fixtureing, information systems, operating costs, merchandising 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 Market Analysis
Registration #0105-413
A seminar addressing the specific role of the buyer within the retail organization and the retailers' markets, performing the following functions: merchandise management and planning, the buying and selling activity and merchandise resource relationships. Information gathering as it specifically supplements the buyers' knowledge of the field is accomplished through exposure to many periodicals, trade journals, trade associations, retail buying offices, and other market contacts. (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 Management
Registration #0105-501
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 4

BBUM-558   Seminar in Retail Management
Registration #0105-558
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 Data Analysis**

Registration #0106-330

An introduction to the use of data analysis and applied statistics in decision making. Topics include descriptive statistics (graphs, two variable regression and correlation) and a brief overview of probability theory, probability distributions, sampling theory and sampling distributions, the central limit theorem and confidence intervals. Extensive use of Minitab. (SMAM-226, ICSA-200)

Credit 4

**BBUQ-332 Advanced Data Analysis**

Registration #0106-332

A second course in data analysis and statistics emphasizing inference. Topics to be covered include a review of common probability distributions and an introduction to specialized sampling distributions; 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-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: the life cycle of a computer-based system, the role of the systems analyst, systems analysis tools and techniques, system performance analysis and feasibility analysis. (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/tot al 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-401, junior status)

Credit 4

**BBUQ-408 Materials and Operations Planning**

Registration #0106-408

Study of the planning aspects of materials and operations for the product-process life cycle of a selected “thread” product. Includes aspects such as product/process design and start-up, defect/problem prevention, forecasting, scheduling, materials and capacity planning, operations organization and planning/information systems. Operations settings include: project/one-time build; job/lot build; and repetitive/continuous manufacturing. (BBUQ-401, junior status)

Credit 4

**BBUQ-409 Shop Floor Management**

Registration #0106-409

This course emphasizes execution; activities and techniques necessary to successfully manage the shop floor are studied. Topics include: executing the schedule, plant organization, just-in-time concepts and methods, cost management (direct/indirect), throughput and lead time management, 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, junior status)

Credit 4

**BBUQ-412 Inventory Management & Material Control**

Registration #0106-412

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, junior status)

Credit 4

**BBUQ-415 Purchasing in Materials 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, marketing, 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. (BBUQ-401, 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, junior status)

Credit 4

**BBUQ-448 Industrial Structure and Technology**

Registration #0106-448

Study of the history, prominent leaders and firms, products, strategies, market and cost structures, primary equipment and processes, technologies and production structures of a selected industry. (BBUQ-401, junior status) (Not offered in 1987-88.)

Credit 4

**BBUQ-453 Business Forecasting**

Registration #0106-453

An introduction to forecasting methods in business, with an emphasis on data-based, statistical techniques. Students will be required to analyze data sets using computer software packages. (BBUQ-330, 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, expert systems and an automated systems design tool. (BBUQ-363, junior status)
Credit 4

BBUQ-478 Systems Simulation
Registration #010A-478
The development of system models and their manipulation using simulation. Topics include: statistical review, sampling of random events, elementary queueing theory, data collection and analysis for simulation modeling and 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) (Not offered in 1987-88.)
Credit 4

BBUQ-505 Information Systems
Registration #0106-505
The role of information systems in business organizations is discussed. Basic systems concepts and the software components of computer-based information systems are introduced. Hands-on use of personal computer technology is required. (ICSA-200, BBUA-302, BBUB-430, senior status)
Credit 4

BBUQ-540 Microcomputer Hardware and Applications
Registration #0106-540
A survey of current microcomputer hardware and software being used in business. Topics will include the selection of personal computers, peripheral equipment, and applications software and the use of modems, 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 an organization; and the general application of previously learned management principles to the IS function. Case analysis will be utilized. (ICSA-483, 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

Graduate Business Courses

Accounting

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

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

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

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

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

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

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

BBUQ-730 Business Law I
Registration #0101-730
An introduction to law and ethical considerations in the areas of contracts, creditors rights, agency, partnership, corporations, bailments, and international law in a global economy.
Credit 4

BBUQ-731 Business Law II
Registration #0101-731
Topics of business law with ethical considerations intended to help prepare students for the CPA exam. Topics from the Uniform Commercial Code include: sales, commercial paper and secured transactions, and personal and real property. Wills, trusts, and estates, liability of accountants, and international law also are discussed. (BBUQ-730)
Credit 4 (offered upon demand)
BBUB-742 Technology Management
Registration #0102-742
This course examines the technological innovation process in organizations and the factors, both internal and external, which influence the rate, timing and success of industrial innovations. Careful attention is devoted to technological innovation as a strategic tool to be used by managers in confronting competition and as a strategic challenge facing managers. Designed for the graduate student who is now or in the future will be managing in a technology-intensive organization. The course will be most useful to students who have completed the first portion of the MBA program. (BBUB-740)
Credit 4

BBUB-745 Business and Public Policy
Registration #0102-745
The processes and mechanisms whereby public policy issues are generated, negotiated, and resolved with particular attention to business-government relations, corporate governance, public opinion processes, business ethics, and issues involving international trade and multinational corporations. The course includes ongoing discussion of relevant court decisions and legislative actions.
Credit 4

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

BBUB-748 Employee and Labor Relations
Registration #0102-748
A study of labor-management relations as they influence managerial decision making in both union and nonunion organizations. Topics may include collective bargaining, conflicts and agreements between labor and management, sharing of productivity gains between labor and management, and contemporary issues. An analysis is made of how market forces, labor unions, employee associations and labor law influence employee compensation. Employee and labor relations are studied in both private and public sector firms. (BBUB-740, BUUE-711)
Credit 4

BBUB-750 Human Resource Management
Registration #0102-750
A study of personnel systems or the methods of human resource management in organizations. The major personnel topics studied include organizational staffing (selection and recruitment), training and development, compensation, equal employment opportunity, human resource forecasting, and performance appraisal. (BBUB-740, BUUQ-782)
Credit 4

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

Management

BBUB-740 Organizational Behavior
Registration #0102-740
The importance of human behavior in reaching organizational goals. Course emphasis: managing individual and interpersonal relations; group and intergroup dynamics; leadership, communication and motivation skills in managing organizational performance and change.
Credit 4

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

BBUB-742 Advanced Accounting
Registration #0102-742
This course examines the technological innovation process in organizations and the factors, both internal and external, which influence the rate, timing and success of industrial innovations. Careful attention is devoted to technological innovation as a strategic tool to be used by managers in confronting competition and as a strategic challenge facing managers. Designed for the graduate student who is now or in the future will be managing in a technology-intensive organization. The course will be most useful to students who have completed the first portion of the MBA program. (BBUB-740)
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Credit 4
BBUB-755 Compensation and Reward Systems
Credit 4
A comprehensive analysis of compensation (wages and benefits) in contemporary organizations. Among the major topics studied are the role of money, the practical problems of developing and administering compensation programs, motivational factors related to compensation, motivational features of benefits, the role of government, and current trends in benefit packages. Forces shaping the establishment of wage rates in a given firm are also studied. (BBUB-740, BBUB-750)

BBUB-756 Conflict Management and Negotiating Skills for Managers
Credit 4
A study of current theories and techniques related to constructive management of organizational conflicts and negotiations. Current theories on interpersonal, group and intergroup conflict management. (BBUB-740)

BBUB-757 Management and Leadership
Credit 4
Analysis of the characteristics and behaviors of highly effective managers and leaders. Interpersonal skills needed to manage well in both hierarchical and matrix organizations. (BBUB-740)

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

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

BBUB-760 Comparative Management
Credit 4
An analysis of business behavior and organization in Western Europe, the Pacific Basin, and the U.S. with particular emphasis on values, authority, individual and group relations, labor-management ties, and organizational structure. In addition, leadership styles, risk tolerance, and motivational techniques will be studied. In all cases, the differential effect of culture on management will be carefully appraised.

BBUB-768 Advanced Seminar in Management
Credit 4
Study and discussion of strategic issues in management for the advanced student. Topics will vary with the instructor. (BBUB-740, permission of instructor)

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

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

BBUE-713 Advanced Microeconomic Theory
Credit 4
An advanced study of the fundamental economic principles underlying the nature of a business firm. Topics include: theories of demand and revenue; theory of costs and production analysis in the short-run and the long-run; distribution of demand and supply; competition; market structures and their characteristics; pricing and output under perfect competition, pure monopoly, imperfect competition, and oligopoly; resource allocation and product distribution. Business applications are given along with the exposition of the theory. (BBUE-711)

BBUE-714 Advanced Macroeconomic Theory
Credit 4
An advanced study of the fluctuations and growth of economic activity in a modern complex society. Topics include measuring macroeconomic activity: modeling economic activity: microeconomic foundations in macroeconomic theory (the labor, the commodity, the money, and the bond markets); a parallel discussion of the complete classical and Keynesian macroeconomic models; recent criticism of the two models; the general equilibrium; the phenomena of inflation and unemployment and the way business can forecast them; the impact of fiscal and monetary growth; reality and macroeconomic disequilibrium; and wage-price policies. (BBUE-712)
BBUF-721 Financial Management I
Registration #0104-721
An examination of the basic financial theories relating to the valuation of assets and the analysis of risk. The course will concentrate on both the theory and practice of capital budgeting decision making. Topics include: capital budgeting techniques, portfolio risk and diversification, the capital asset pricing model, and practical problems in the selection of long-term assets. (BBUQ-782, BBUA-703, BBUE-711)
Credit 4

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

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

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

BBUF-725 Securities and Investment Analysis
Registration #0104-725
Study of securities and other investment media and their markets. Analysis of investment values based on financial and other data. Considers factors such as return, growth, risk and the impact of various institutional arrangements on value determination. (BBUF-721, BBUF-722)
Credit 4
BBUM-766 International Marketing
Registration #0105-766
A study of the differences in market arrangements as well as in the legal, cultural, and economic factors found in foreign countries. Topics included are planning and organizing for international marketing operations; forecasting and analysis; interrelationships with other functions; and product, pricing, promotion, and channel strategy. (BBUM-761)
Credit 4

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

BBUM-769 Seminar in Marketing
Registration #0105-769
This course will take on different content depending on the instructor and quarter when offered. Topics that may be covered are: marketing models, marketing channels, articulation with top marketing executives, and marketing positioning. Specific content for a particular quarter will be announced prior to course offering. (Permission of instructor and BBUM-761)
Credit 4

Decision Sciences

BBUQ-743 Operations Management
Registration #0106-743
Study of the production of goods and services. Topics include quality assurance, forecasting, resource planning, scheduling, materials and capacity management, inventory management, project management, just-in-time/total quality control (JIT/TQC), international operations, strategic considerations and current topics. (BBUQ-780, BBUQ-782)
Credit 4

BBUQ-744 Project Management
Registration # 0106-744
An introduction to the principles of project management. Topics include: the role of the project management; the identification and definition of the project goal; developing a strategy to accomplish that goal; planning the project; estimating the resources required; selling the project; staffing and team building; implementing the project (managing performance, resources, and schedule); shutting down the project. (This course is for matriculated and non-matriculated graduate students with approval from the graduate business office.)
Credit 4

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

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

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

BBUQ-784 Decision Analysis
Registration #0106-784
An in-depth study of the decision-making process. Emphasis will be on how to structure a complex problem into manageable form, methods for improving creative-problem solving, and the use of decision support systems in decision making. (BBUQ-780)
Credit 4

BBUQ-785 Applied Regression Analysis
Registration #0106-785
The primary objective of this course is to teach the student how to effectively utilize a variety of data analysis techniques commonly referred to as regression analysis. Emphasis will be placed on model formulation and analysis. All students will be required to analyze several large data sets using a standard statistical package. Relevant theory will be introduced to enable the student to pursue further study in data analysis. (BBUQ-782)
Credit 4

BBUQ-788 Survey Design
Registration #0106-788
This course will cover the following topics in survey design and sampling: questionnaire design; types of sampling techniques; determination of sample size; methods for increasing the response rate; and use of appropriate statistics to analyze results. (BBUQ-782) (Not offered in 1987-88.)
Credit 4

BBUQ-789 Simulation
Registration #0106-789
An introductory course in the use of computer simulation in the solution of complex business problems. A simulation language is introduced and applied in the solution of a term project. Particular attention is focused on the types of problems for which computer simulation is a viable solution technique as well as methods for establishing the validity of the simulation. (BBUQ-780, BBUQ-782) (Not offered in 1987-88.)
Credit 4

BBUQ-790 Information Systems
Registration #0106-790
The types of computer applications which are used in business organizations are studied. Basic systems concepts and the responsibilities of the participants in systems development projects are covered. Hands-on application of personal computer software is required. (BBUA-703, BBUF-721, BBUB-740, 741)
Credit 4

BBUQ-793 Business Forecasting Methods
Registration #0106-793
An introduction to quantitative and qualitative forecasting methods and their use in business forecasting. The student will be taught how to recognize which forecasting procedures to use based upon an analysis of problem characteristics. Includes the use of interactive forecasting techniques. (BBUQ-782) (Not offered in 1987-88.)
Credit 4 (offered upon demand)
BBUQ-794  Multivariate Methods in Business
Registration #0106-794
An introduction to the use of multivariate techniques (other than multiple regression analysis) and their use in analyzing business data. The major objective will be to demonstrate the proper use of a variety of multivariate techniques using several large-scale data sets. The student will be required to use a standard statistical package. Students also learn how to interpret the output of a computer package in terms of the decision-making situation underlying the problem being investigated. (BBUQ-785) (Not offered in 1987-88.)
Credit 4

BBUQ-795  Seminar in Decision Sciences
Registration #0106-795
This course will take on different content depending on the instructor and quarter when offered. Specific content for a particular quarter will be announced prior to course offering. (Permission of instructor)
Credit 4
College of Continuing Education

Business and the Arts

Accounting

CBCA-201  Financial Accounting
Registration #0201-201
Emphasis is placed on analyzing and recording business trans-actions, 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.

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-201)
Credit 4/Qtr.

Business Law

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.

CBCC-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

CBCC-302  Business Law II
Registration #0203-302
Continuation of CBCC-301 includes law agency, partnerships, corporations, insurance and bankruptcy. Also presents survey of commercial paper, secured transactions, and bank deposits.
Credit 4

Business Law

CBCC-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

Finance

CBCD-204  Personal Financial Management
Registration #0204-204
The main objectives of this course is to enable you to manage your personal finances more effectively. The course deals with personal budgeting, protection of personal assets, consumer credit, investments, and estate planning.
Credit 4

CBCD-304  Personal Financial Decision Making
Registration #0204-304
The course will focus on the financial decision-making process from an individual planning perspective to include basic tax planning concepts, accumulation, and retirement planning models. This course will expand on the topics presented in Personal Financial Management (CBCD-204), with particular emphasis on planning for decisions related to insurance, investments, and estate transfers. Throughout the course basic mathematical concepts (compounding, discounting, etc.) and the effects of taxation will be applied to each area.
Credit 4

Data Processing and Systems Analysis

CBCC-321  Data Processing Principles
Registration #0203-321
Introduction to computer technology including an examination of the concepts function and techniques associated with modern data processing. While this course does not include any programming, the interrelated areas of operation, programming, and systems analysis are discussed.
Credit 4

CBCC-322  Data Processing Systems
Registration #0203-322
Covers the spectrum of management considerations pertaining to the use of computers in business systems. Provides a methodology for effective planning, development, installation, and management of computer-based business information systems. (CBCC-321 or equivalent)
Credit 4

CBCC-351  BASIC Programming for Business
Registration #0203-351
An introduction to computers and computer programming for business students. After a brief survey of computer systems and terminology, students will learn to utilize a timeshared computer system. The introduction to BASIC programming covers all major functions; problems and examples will be drawn from business applications. NOTE: Not for computer science majors.
Credit 2
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)

Organization Management

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

Credit 4

Management Science

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

Special Topics: Management

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

Credit Variable

New Venture Development

Course presents factors to be considered by those interested in the ownership and management of small business enterprises. Includes who should be an entrepreneur, guidelines for starting a new business, basic legal consideration, and approaches for obtaining capital and credit.

Credit 4

Small Business Management 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

Small Business Marketing and Planning

The planning and execution of successful small business marketing approaches include market determination, distribution and pricing are presented. The regulatory environment facing small business is included along with techniques for planning growth.

Credit 2

Effective Selling

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

Credit 4

Advertising Principles

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

Credit 4

Advertising Evaluation and Techniques

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

Credit 4

Marketing

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

Mathematics for Business

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

Business Statistics

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

Credit 4

Interviewing Techniques

A practical approach to interviewing techniques with emphasis on role plays and case studies. Coverage includes employment, disciplinary, counseling, and performance appraisal interviews.

Credit 4
Production Management and Industrial Engineering

CBCJ-209 Production Management Registration #0210-209
The organization of production functions with emphasis on management responsibilities. All levels of factory operation are discussed and relationship between various aspects of production are presented.
Credit 4

CBCJ-305 Fundamentals of Industrial Engineering Registration #0210-305
An overview of industrial engineering problems and techniques is presented including facilities selection and layout, methods analysis, work measurements, operations planning and control materials handling and an introduction to operations research.
Credit 4

CBCJ-306 Industrial Engineering Economy Registration #0210-306
The economic factors required for rational 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

Transportation, Traffic and Distribution Management

CBCL-234 Traffic and Transportation Management (Principles and Practices) Registration #0212-234
A study of traffic management and its relationship to other corporate functions. Includes a review of the elements of sound shipping practices with emphasis on securing the most economical mode of transportation.
Credit 4

CBCL-239 Traffic and Transportation Management (Rates and Classifications) Registration #0212-239
Discussion and practice in the use of freight rates and classifications, the interpretation and determination of freight rates and charges, and analysis of best as well as most economical means of moving materials; extensive use of tariff materials as applied to actual case situations. (CBCL-234 or equivalent)
Credit 4

Real Estate

CBCM-201 Basic Real Estate Principles Salesperson's Course Registration #0213-201
Comprehensive study of real estate principles including: law of agency, human rights and fair housing, real estate instruments, financing, valuation and listings, 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 475-5594.
Credit 2

CBCM-202 Advanced Real Estate Principles Registration #0213-202
Advanced Real Estate Principles
Broker's Course
A study of topics related to real estate including: operation of a broker's office, construction, general business law, subdivision and development, leases, taxes, assessments, investment property, alienation, property management, condominiums and cooperatives, rent regulations, appraisals, and advertising. Completion of this course and Basic Real Estate Principles satisfies the educational requirement for a real estate broker's license. For licensure, participants must attend all classes and pass the final exam. Individuals interested in licensure only should call 475-5594.
Credit 4

CBCM-203 Real Estate Investment and Finances Registration #0213-203
An introduction to real estate investment with emphasis on the purchase and sale of real estate, the acquisition of financing, the selection of appropriate ownership forms, and the use of statistical data in making real estate decisions.
Credit 4

CBCM-204 Real Estate Evaluation Registration #0213-204
The evaluation of real estate through appraisal and analysis, basic consideration in real estate management, and the advantages of various types of real estate investments are discussed.
Credit 4

Insurance

CBCN-271,272 Principles of Insurance Registration #0214-271, 272
This two quarter sequence course leads to qualification for taking the New York State agents and brokers examination for Casualty and Property insurance licenses. All casualty and property insurance are covered in the class. Emphasis placed on providing students with practical working knowledge of insurance policies and coverages. The course offers practical insight for both insurance professionals and insurance buyers.
Credit 4/Qtr.

Ceramics

CHAC-201 Introduction to Ceramics Registration #0222-201
An introduction to the world of the professional potter. Work will center on advanced forming and decorative techniques ranging from sectional throwing to photo-sensitive emulsion glazing. Special emphasis will be on independent projects which require the potter to master clay and glazing formulation, design, production and firing techniques. Kiln design and construction as well as marketing techniques for finished work will be discussed. (CHAC-211 or equivalent)
Credit 2

CHAC-211 Intermediate Ceramic Wheel Throwing Registration #0222-211
An exploration of Japanese wheel throwing techniques. Students will work with raku stoneware and porcelain clays, 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
A study of Japanese 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

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

CBCL-234 Traffic and Transportation Management (Principles and Practices) Registration #0212-234
An introduction to the world of the professional potter. Work will center on advanced forming and decorative techniques ranging from sectional throwing to photo-sensitive emulsion glazing. Special emphasis will be on independent projects which require the potter to master clay and glazing formulation, design, production and firing techniques. Kiln design and construction as well as marketing techniques for finished work will be discussed. (CHAC-211 or equivalent)
Credit 2

CBCL-239 Traffic and Transportation Management (Rates and Classifications) Registration #0212-239
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
CHAD-227 Business Aspects of Environmental Design
This course will introduce students to the various occupations available to the environmental and interior designer, and instruct them in the use of their artistic and technical skills to obtain employment and establish themselves in the design community. Dealing with clients, vendors, and contractors will also be covered. Assignments will be structured to meet the personal business needs of each student.
Credit 2

CHAD-231 Color Theory in Art
Registration #0223-231
An opportunity to develop an awareness of and sensitivity to the world of color through slide lectures, class discussion and instructor's evaluation. Emphasis on the visual impact of color. (CHAD-220, 221, 222 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-220, 221, 222 or equivalent)
Credit 2

CHAD-241, 242, 243 Model Design
Registration #0223-241, 242, 243
Study of the materials and techniques of model building. Working in scale, drawing, and construction. (CHAD-211, 212, 213)
Credit 2/Qtr.

CHAD-251, 252, 253 Environmental Design
Registration #0223-251, 252, 253
The study of enclosed space, using material and the elements of design, line, form, texture, and color to develop living space. (CHAD-211, 212, 213 or equivalent experience)
Credit 2/Qtr.

CHAD-261, 262, 263 Lettering and Layout
Registration #0223-261, 262, 263
Study of commercial layout procedures from rough layouts to 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. (CHAD-211, 212, 213)
Credit 2/Qtr.

CHAD-270 Graphic Communication for the Non-Artist I
Registration #0223-270
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 to follow previous art training. Lecture/demonstration and studio format; student projects followed by critiques.
Credit 3
CHAD-271  Graphic Communication for the Non-Artist II
Registration #0223-271
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 2/Qtr.

CHAD-301, 302  Advertising
Registration #0223-301, 302
Advertising is planned, created and placed by bright, inquisitive, hard working people in a fast paced, time-conscious business. They work within limits of budgets, marketing objectives, research, media, competitor's actions and a growing list of government regulations. This course examines the world of advertising and what is required to create advertising campaigns by tracing a campaign development step by step.
Credit 4/Qtr.

CHAD-311, 312, 313  Graphic Design
Registration #0223-311, 312, 313
A contemporary approach to design for printed advertising with the emphasis on creative experience. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalents. CHAD-261, 262, 263 recommended)
Credit 2/Qtr.

CHAD-315, 316, 317  Advertising Design
Registration #0223-315, 316, 317
The function and skills of the art director touches on all phases of advertising art from concepts and professional studio procedures to practical approaches in design and production. (Formerly named Advertising Practices) (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience. CHAD-261, 262, 263 and 311, 312, 313 recommended)
Credit 2/Qtr.

CHAD-321, 322, 323  Design Applications
Registration #0223-321, 322, 323
Projects in product, furniture, exhibit, interiors and package design developed through visuals, materials, and processes. This course will be tailored to the abilities and needs of the students enrolled.
Credit 2/Qtr.

CHAD-331, 332, 333  Fashion Graphics
Registration #0223-331, 332, 333
Drawing the fashion figure from live models and photographs, students will study proportions, anatomy, body movement, line variations, fashion details and accessory drawing. Work on preliminary editorial and store layouts for retail advertising. (CHAF-201, 202, 203; CHAD-201, 202, 203; CHAF-207 or equivalents)
Credit 2/Qtr.

CHAD-360  Portfolio Workshop
Registration #0223-360
A workshop designed to help students take what they have learned in art classes (or work situations) and prepare and present a saleable portfolio. Projects will be tailored to the needs of individual students allowing them to compile an accurate representation of their skills in most concise, positive and beneficial manner possible. Visits from prominent people in the field showing their work and sharing their experiences.
Credit 2

CHAD-411, 412, 413  Art and Technology
Registration #0223-411, 412, 413
An inter-media course in researching and comprising the possibilities of applying and coordinating technology to the arts involving transformation of an idea into visible form. (CHAF-201, 202, 203; CHAD-201, 202, 203)
Credit 2/Qtr.

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

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

Drawing

CHAF-201, 202, 203  Basic Drawing and Media
Registration #0224-201, 202, 203
An intensive study of the fundamentals of drawing and application of media, designed to develop a flexible, creative mind capable of interpreting ideas. Specific emphasis is placed on problems confronting the student who has had little or no drawing experience.
Credit 2/Qtr.

CHAF-306  Drawing
Registration #0224-306
Drawing in a variety of media, including an introduction to line, form and color as elements of pictorial expression. Presents organic, inorganic, and imaginative stimuli. May be elected more than once for credit. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalent)
Credit 2

CHAD-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

CHAD-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)
Credit 2

CHAF-210  Interpretive Landscape Drawing
Registration #0224-210
Students will sketch directly from nature on location during field trips. In subsequent studio sessions compositions translating first impressions using various media will then be developed. Special attention will be given to individual approaches and expression.
Credit 2

Painting

CHAF-211  Introduction to Painting
Registration #0224-211
Study of the materials and techniques of painting through use of still-life and nature forms. Basic training and foundation for advanced work. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalents)
Credit 2
CHAF-301  Painting  Credit 2
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)

CHAF-227  Figure Painting  Credit 2
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)

CHAF-337  Portrait Painting  Credit 2
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)

CHAF-341  Watercolor Painting  Credit 2
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)

Sculpture

CHAF-247  Sculpture  Credit 2
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)

CHAF-357  Sculpture Workshop  Credit 2
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)

Illustration

CHAF-361  Illustration  Credit 2
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)

CHAF-362  Airbrush Techniques  Credit 3
Registration #0224-362
This course is designed to provide an opportunity for beginners to develop the basic skills and techniques of painting with an airbrush and allow experienced users to enhance their skills. Graphic artists, fine artist, illustrators, and photographers can benefit from this exposure to airbrush techniques and applications through demonstration and experiential learning. Class will be limited to 10 students. (0223-201, 202, 203, and 0224-201, 202, 203 or equivalent)

CHAF-263  Calligraphy  Credit 2
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.

CHAF-363  Calligraphy Workshop  Credit 2
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)

Printmaking

CHAF-296  Introduction to Printmaking  Credit 2
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)

CHAF-397  Printmaking Workshop  Credit 2
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)

CHAF-293  Creative Papermaking  Credit 2
Registration #0224-293
Students will explore and trace the history of papermaking through ancient devices to modern techniques and trends. Lectures and readings will supplement and expand upon the lab work.

CHAF-295  Independent Study: Fine Arts  Credit Variable
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.

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

CHAM-201 Introduction to Metalcrafts
Registration #0225-201
Emphasis will be placed on basic metalworking 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 holl owedware, 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 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

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

CHAT-298 Special Topics: Weaving/Textiles
Registration #0226-298
Special topics are experimental 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: Woodworking
Registration #0227-295
Independent studies may be developed at the upper division level. Projects must be developed with the instructor, subject to the approval of the program 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: China and the Chinese People  
Registration #0233-211  
This course will introduce basic Chinese culture as well as 100 daily conversational sentences. The emphasis in this quarter will be on Chinese 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  
This course will introduce basic Chinese culture as well as 100 daily conversational sentences. This quarter's emphasis is on the special features of Chinese communism, their trade ideologies and practices, their general relationships with foreign countries, internal developments and conflicts.  
Credit 4

**CHGI-213** Chinese Language and Culture: Contemporary Issues  
Registration #0233-213  
This course introduces 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 Tradition  
Registration #0233-221  
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. To help Westerners understand the Japanese, Dr. Edwin O. Reischauer, scholar and former Ambassador to Japan, authored the text and aided in developing and producing this course. This course may serve as a behavior science elective.  
Credit 4

**Deaf Studies**

**CHGD-211** Sign Language & Manual Communications System I  
Registration #0234-211  
This course is designed to develop fluency at a basic level. This course includes introduction and practice of approximately 300 basic signs, theoretical consideration and practice of grammatical features of sign language, fingerspelling and sociolinguistic information regarding the appropriate application of manual communication skills in communicating with deaf persons.  
Credit 2

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

**CHGD-213** Sign Language & Manual Communications System III  
Registration #0234-213  
The third in a series of basic conversational sign language courses. This course introduces the student to approximately 300 additional signs, continues the practice of the grammatical features of sign language, refines fingerspelling skills, and further develops students' sensitivity to the use of manual communication by deaf and hearing persons. (CHGD-212 (minimum grade of B) or equivalent sign skill)  
Credit 2

**CHGD-311** American Sign Language I  
Registration #0234-311  
This course is designed to continue sign language skill development as the language is used among deaf community members. Students are exposed to many new signed expressions; grammar, syntax and lexical items of A. S. L. Videotapes, dialogues, language games, lecture and readings are used in presentation of this content. (CHGD-213 (minimum grade of B) 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. Culture aspects of the deaf community are considered as they relate to the language of deaf people. (CHGD-311 (minimum grade of B) or equivalent sign skill)  
Credit 2

**CHGD-241** Aspects & Issues of Deafness I  
Registration #0234-241  
This course will develop knowledge and understanding of the effects of hearing impairment, particularly with regard to the audiological, psychological, educational and vocational implications. Class activities include a simulated deafness experience, films, lectures and discussions.  
Credit 3

**CHGD-242** Aspects & Issues of Deafness II  
Registration #0234-242  
This course examines deafness from a cultural perspective, focusing on what constitutes culture, what characterizes deaf culture, dynamics of interaction between the deaf and the larger community, and historical perspectives on deaf heritage. Films, individual case studies, cultural simulation, discussions and lecture will be implemented. (Recommended: CHGD-241)  
Credit 3

**Humanities**

**CHGH-201, 202, 203** Humanities  
Registration #0235-201, 202, 203  
These are three interdisciplinary courses in which literature, art, music, and philosophy are related to the historical, economic, and scientific forces that have shaped modern civilization. 201 studies the culture of modern world; 202 deals with ancient Greece, Rome, and the Middle Ages; and 203 traces the development of the Humanities from the Renaissance through the Romantic age.  
Credit 4/Qtr.

**CHGH-210** Introduction to Art Appreciation  
Registration #0235-210  
A study of the elements involved in the creation of the visual arts (painting, sculpture, architecture) and of the factors which affect an audience's response to them.  
Credit 4
CHGH-220 Introduction to History
Registration #0235-220
This course will broadly survey the major periods of world history and will attempt to define what is unique and distinctive about the historian's approach to reality.
Credit 4

CHGH-230 Introduction to Music Appreciation
Registration #0235-230
A study of the elements of music (such as 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: 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 materials from many periods in history.
Credit 4

CHGH-270 Introduction to Philosophy
Registration #0235-270
By introducing major philosophers and the issues that they have traditionally concerned themselves with, this course is aimed to acquaint students with the methods of philosophical questioning and argumentation.
Credit 4

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

CHGH-323 Modern Europe
Registration #0235-323
An examination of the social, economic, political and intellectual developments of Europe from the 17th through the 20th centuries. Emphasis will be given to theories and concepts of civilization, culture, government, and international relations. Also emphasized: the interrelationships of people, events and moments which gave shape to our contemporary world.
Credit 4

CHGH-325 Modern America
Registration #0235-326-01
An examination of the social, economic, political and intellectual developments of the United States from the time of Reconstruction and on, making special efforts to understand the development of Modern America and to assess its place in foreign relations. Emphasis will be given to major social attitudes (racism, consumerism), events (immigration, the growth of trade unions) and social inventions (the League of Nations and the American Dream) which served to create the United States of the last two decades of the 20th century.
Credit 4

Communications

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

CHGL-120 Basic Communication
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 3 (Diploma)

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, 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.
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-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 Discussion Skills and Leadership
Registration #0236-302
Students will study the theory of leadership in small groups and the dynamics of group behavior. The major exercises of the course are leading and participating as members in conferences which simulate those of civic, business, and industrial settings. Peer critiquing and TV tapings allow students to apply theory as they learn to recognize the elements of successful conferences.
Credit 4

CHGL-307 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 2 Credit Variable
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 2

CHGL-323 Technical Writing and Editing
Registration #0236-323
This course focuses on the editing 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 blueprint reading are included.
Credit 2

CHGL-325 Instructional Design Principles
Registration #0236-325
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-298, 398 Special Topics: Introduction to Public Relations
Registration #0236-298, 398
Special Topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.
Credit Variable

CHGL-360 Introduction to Public Relations
Registration #0236-360
An overview of the public relations function, covering tasks, responsibilities and roles of the PR practitioner in organizations (as researcher, image-developer, designer, editor, coordinator, marketer and advertiser, as advisor to management) and as spokesperson, media manager, and services purchaser and provider) with various publics and clients. Course may be counted as either a business or communication elective. (Consult advisor)
Credit 2

CHGL-365 Writing for the Organization I
Registration #0236-365
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 Organization II
Registration #0236-366
Introduction to writing at the corporate level, including planning the annual report, 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 Speechwriting
Registration #0236-367
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
**Behavioral Studies**

**CHGS-201 Anthropology-Introduction**  
Registration #0237-201  
Anthropology studies the similarities and differences between cultures. This course will explore the influences of environment, technology, work, authority, kin and non-kin groups, enculturation, religion, folklore and art in different societies. It will stress the value of cross-cultural comparisons in understanding American culture and society.  
Credit 4

**CHGS-211 Psychology-Introduction**  
Registration #0237-211  
Psychologists study a broad range of topics to discover more about how people think, feel, and interact with others. In this purvey course students learn how scientific methodology has been used to discover some of the causes and factors involved in sensation, perception, motivation, emotion, stress, learning, development, personality, psychological disorders, and social behavior. Students are encouraged to apply this information to their daily lives.  
Credit 4

**CHGS-221 Principles of Economics I**  
Registration #0237-221  
This course covers the basic principles of macro-economics. It traces the development of economics from an historical perspective, the functioning of the American economic system, and covers such topics as money and banking, economic growth, problems of inflation, unemployment, scarcity of resources, business cycles, international trade, and supply and demand.  
Credit 4

**CHGS-222 Principles of Economics II**  
Registration #0237-222  
This course covers micro-economic problems such as distribution of income, allocation of resources, price determination under competition, monopolies, supply and demand, and their applications to business firms and labor unions. It also deals with the structure of American industry and the roles played by government, business, and individuals viewed in the light of current economic trends.  
Credit 4

**CHGS-231 Sociology: Introduction**  
Registration #0237-231  
Sociology deals, in a scientific way, with human beings and their relationships with one another. Consideration is given to the role of the individual in society, social interaction, social institutions and social change. Objectives are to examine the human condition in the context of social relationships, dispel myths and prejudices, and ascertain practical applications of concepts in sociology.  
Credit 4

**CHGS-261 Political Science: Introduction**  
Registration #0237-261  
This course introduces the discipline of political science. It is designed to acquaint students with the complexities of political issues, political thought and behavior, government structures and processes, public policy, and international affairs.  
Credit 4

**CHGS-316 Psychology: Behavior in Industry**  
Registration #0237-316  
Industry presents one environment for understanding human behavior. This course applies psychological and social concepts to the industrial setting. Topics to be covered are motivation, performance, assessment, quality of work life, group behavior, leadership, organizational structure, communication and decision making. (CHGS-211)  
Credit 2/Qtr.

**CHGS-317 Understanding Stress**  
Registration #0237-317  
Physiological, psychological, and social stress can have serious consequences on one's daily life. This course is designed to familiarize students with the basic concepts of stress, the positive and negative ramifications of stress, and examine strategies for managing stress. (CHGS-211 or equivalent)  
Credit 4

**CHGS-320 Psychology of Persuasion**  
Registration #0237-320  
Course 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. Course may be counted as communication or social/behavioral science elective. (Consult advisor)  
Credit 2

**Photography**

**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 to create expression. Emphasis is on self-criticism and the development of the individual's ability to create meaningful and purposeful photographs. Class time devoted to developing and enlarging, as well as group and individual critique sessions. All shooting assignments are completed outside of class.  
Credit 2

**CHGP-102 Photography Workshop**  
Registration #0231-102  
Continuation of CHGP-101. Students are encouraged to develop in areas of specific interest to them. Excellence in the creative as well as the technical aspects of photography, printing and presentation is stressed. Students should bring examples of past work to first class. This course may be elected more than once for credit.  
Credit 2

**CHGP-104 Color Photography Workshop**  
Registration #0231-104  
The course will acquaint students with skills in color materials handling, from exposure to color printing. Aesthetic and communicative aspects of color photography will be stressed. Small format equipment with color negative and reversal materials will be used. Students should bring examples of the past work to first class. May be elected more than once for credit. (CHGP-102 or equivalent)  
Credit 2
CHGP-201, 202, 203 Basic Professional Photography
Registration #0231-201, 202, 203

An introductory course to photographic principles and practice designed primarily for the inexperienced who aspire to enter photography as a profession, who would find such knowledge useful in a related field or who wish to improve personal knowledge. Both theory and practice are provided in a wide range of picture taking and darkroom techniques. Some background in photography is desirable but not absolutely necessary. This course is a prerequisite to all other courses in the professional photography program.
Credit 4/Qtr.

CHGP-211, 212, 213 Color Photography Registration #0231-211, 212, 213

Color theory and applied problems in color photography, processing and printing. Negative and reversal processing, color balance and correction, internegatives, duplication techniques, elements of masking and optimum reproduction methods.
Credit 4/Qtr.

CHGP-221, 222, 223 Illustrative Photography Registration #0231-221, 222, 223

The application of various specialized photographic techniques to creative image making. Special emphasis on single source studio lighting techniques to achieve desired visual effects. Novel and innovative camera methods and photographic design concepts are stressed. Particular emphasis on advertising photography applications and on the essence of the subject. Topics will include still life, food and consumable products, fashion assignments and some location photography. The principle camera format used will be 4x5. Equipment is available at the studios for use during class hours. Some small format photography will also be required.
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, however, 16mm will be used toward the conclusion of the course. Included will be scripts and story boards, composition, continuity, cutting, editing, sound and presentation. The participants should have a personal Super 8mm camera available for use during the program.
Credit 3/Qtr.

CHGP-321, 322, 323 Commercial Retouching Registration #0231-321, 322, 323

Methods used in retouching commercial negatives and prints: bleaching, lettering, use of etching knife and abrasives. Last quarter includes color retouching and use of airbrush.
Credit 1/Qtr.
CHGP-404, 405, 406  
**Architectural Photography**  
Registration #0231-404, 405, 406  
Photographic interpretation and effective visual presentation of buildings, both as structures for habitation as well as art forms in themselves. Use and application of view camera included. Effective use of small format equipment. Assignments to be completed outside of class time include exteriors, interiors, landscapes, details and individual as well as group buildings. Students must make arrangements for printing outside of class.  
Credit 3/Qtr.

CHGP-411  
**Photography of the Natural World**  
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 H**  
Registration #0231-295, 298  
The Photographic Vision is a video-based two course sequence all about photography, presented in a medium that enhances the power of the photograph. The course covers the basic mechanical skills of camera handling, the nomenclature of the tools and materials, the history of photography, and the technical, artistic and commercial dimensions of this craft. Photography is approached as an art form and as unique means of human communication as well as a technical skill. Students desiring darkroom experience should also register for a Photography Workshop: CHGP-101 or 102. Completion of CHGP-295 and 298, CHGP-101, 102 along with four credits of Photography electives, will satisfy the requirements of Basic Professional Photography: CHGP-201, 202 and 203.  
Credit 3/Qtr.

**Photographic Science**

CHGR-207, 218, 219  
**Fundamentals of 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 (offered upon demand)

CHGR-217, 218, 219 (Lec.)  
**Photographic Chemistry**  
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 to provide a systematic study of the manufacture and properties of silver halide photographic emulsions and processing solutions. Specific topics will be: formation and growth of silver halide crystals; chemical and spectral sensitization; addenda and coating; latent image theory and application of conventional and diffusion transfer processing; comparisons 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. (CHGP-207, 208, 209 and CTAM-210 or equivalent)  
Credit 4/Qtr.

CHGR-237, 238  
**Radiometry**  
Registration #0238-237, 238  
You will become acquainted with the human visual process, light sources, attenuators, receivers and the physical parameters involved in the generation, propagation, composition and measurement of radiant energy particularly as it relates to photographic materials and fundamental optical systems. A background in algebra and trigonometry is recommended. (CHGP-207 and CTAM-210 or equivalent)  
Credit 3/Qtr.

CHGR-307  
**Quality Control of Photographic Solutions**  
Registration #0238-307  
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/Qtr.

CHGR-407, 408, 409  
**Optics**  
Registration #0238-407, 408, 409  
Introduction to geometrical and physical optics applied to photographic systems and optical instruments. (CTAM-251, 252 or equivalents)  
Credit 3/Qtr.

CHGR-414, 415, 416  
**Color Sensitometry**  
Registration #0238-414, 415, 416  
Photometric 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 4 (offered upon demand)
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  
Registration #0238-421  
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  
Registration #0238-520  
The objectives of this course, which is directed towards working engineers, scientists and experienced technicians, are to provide a comprehensive program devoted to the scientific background and practical applications of electro-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 received.  
Credit 3

CHGT-121, 122, 123  Offset Layout and Stripping  
Registration #0239-121, 122, 123  
Examination and treatment of negative and positive films to remove defects; study and application of various methods of assembling film negatives or positives into flats in preparation for platemaking; study of proofing systems and types of impositions.  
Credit 2/Qtr.

CHGT-131, 132  Offset Platemaking  
Registration #0239-131, 132  
A comprehensive course covering all aspects of offset platemaking. Includes all imaging methods for lithographic plates, such as the various forms of presensitized, wipe-on, photopolymer, deep-tech, bi- and tri-metal plates, as well as transfer and direct camera plate systems; basic step and repeat layout and procedures on two machines also are studied.  
Credit 2/Qtr.

CHGR-529  Non-Silver Imaging Systems  
Registration #0238-529  
The purpose of the course is to examine the more promising nonsilver and unconventional silver halide systems in view of the future requirements in cost, sensitivity, image quality, color rendition, ecology (to compare them to present silver imaging systems), and to consider the reasons for the commercial failure and future prospects of other systems.  
The course will emphasize the principles and methods of physics and chemistry which have been developed into non-silver photographic systems, rather than the extensive empiricism which has been characteristic of this field. The student will gain an understanding of the principle non-silver systems and today's research and product trends. Topics include: latent-image theory; exposure effects: mechanism of development and spectral sensitization; sensometry; 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-101, 102, 103  Process Camerawork  
Registration #0239-101, 102, 103  
Fundamentals of photography and photomechanical principles and techniques for black and white reproduction. Emphasis on line and halftone photography. Designed for the individual who wants to do process camerawork or who wants to become more proficient in this area.  
Credit 2/Qtr.

CHGT-111, 112, 113  Color Separation  
Registration #0239-111, 112, 113  
Camerawork Fundamentals of light and color as applied to masking and color separation in offset lithography. Densitometric control of the photographic operations is emphasized; various masking methods are surveyed. Laboratory projects supplement lecture material. (CHGT-101, 102, 103 or equivalent)  
Credit 2/Qtr.
CHGT-151, 152, 153  
**Color Stripping**  
Registration #0239-151, 152, 153  
An advanced study of image assembly to include 4 color process stripping; pin register systems; proofing systems; contacting procedures. Students should have taken prerequisite course of offset layout and stripping. (CHGT-121, 122, 123 or equivalent experience)  
Credit 2/Qt.

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/Qt.

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-211  
**Phototypesetting Procedures**  
Registration #0239-211  
Study and analysis of phototypesetting procedures, emphasizing techniques of phototypography through the medium of contemporary laboratory facilities. One field trip.  
Credit 2

CHGT-215  
**Bookbinding**  
Registration #0239-215  
This course is intended to give the student an introduction to the skills of hand bookbinding. The purpose is to experience bookbinding as an art form. Content will cover history, materials, methods of bookbinding and restoration. Students should bring two books of their own for rebinding.  
Credit 2

CHGT-219  
**Estimating**  
Registration #0239-219  
A basic course in planning production, cost of materials, hour costs, hour rates, estimating time and time standards.  
Credit 4

CHGT-227  
**Copy Preparation**  
Registration #0239-227  
Copy preparation for reproduction; working from layouts; arrangement and handleups for paste-up, separation mechanics, and photographic copy, requirements of reproduction proofs; writing complete specifications for stripping and camera.  
Credit 3

CHGT-231, 232  
**Printing Plates**  
Registration #0239-231, 232  
Credit 2/Qt.

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 4 (offered upon demand)
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
A three-quarter sequence for students whose high-school mathematics background is insufficient to allow them to enroll in degree-level mathematics course. This is an accelerated intermediate high school algebra course with an introduction to trigonometry.
Credit 3/Qt.

CTAM-201,202
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/Qt.

CTAM-203
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
Registration #0240-205
Mathematical Thought and Processes
An examination of mathematical thought and processes through a study of elementary mathematical concepts. This course is designed to acquaint the student with the "mathematical way of thinking," the development of mathematical formulas, the applications of mathematics in today's society on an elementary level.
Credit 4

CTAM-206
Registration #0240-206
Modern Mathematical Methods
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
Registration #0240-210
College Algebra and Trigonometry
A precalculus course covering a study of algebraic and transcendental (trigonometric, logarithmic, and exponential) functions including graphs and equations. (Three years of high school mathematics or equivalent including intermediate algebra)
Credit 4

CTAM-251,252,253
Registration #0240-251, 252, 253
A three-quarter sequence covering the differential and integral calculus of single variables. Course descriptions follow.

CTAM-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/Qt.

CTAM-252
Topics include the indefinite integral; the definite integral; applications; differentiation and integration of transcendental functions. (CTAM-251 or equivalent)
Credit 4

CTAM-253
Topics include methods of integration; plane analytic geometry; polar coordinates; vector algebra with emphasis on applications; sequences and series. (CTAM-252 or equivalent)
Credit 4

CTAM-265
Discrete Mathematics I
Registration #0240-265
An introduction to discrete mathematics with applications in computer science and mathematics, with an emphasis on proof techniques. It covers the basics of combinatorics, sets, functions, the natural numbers, and the integers modulon.
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. Note: This course may not be taken for credit if credit is to be earned in SMAM 467.
Credit 4

CTAM-305
Calculus
Registration #0240-305
Partial differentiation; multiple integrals; solid analytic geometry; vector calculus with emphasis on applications to science and engineering. (CTAM-253 or equivalent)
Credit 4

CTAM-306
Differential Equations
Registration #0240-306
Ordinary differential equations through nth order with emphasis on first and second order linear. Applications; LaPlace Transforms. (CTAM-305 or equivalent)
Credit 4

CTAM-318
Boundary Value Problems
Registration #0240-318
A continuation of CTAM-306, Differential Equations. Topics covered are Fourier Series, and introduction to partial differential equations; series solutions of differential equations; applications of the material covered. (CTAM-306 or equivalent)
Credit 4

CTAM-328
Engineering Mathematics
Registration #0240-328
An introduction to matrix algebra and vector analysis. Topics covered are matrix operations with application; vector algebra, vector calculus, gradient, divergence and curl; linear and surface integrals; independence of path and the divergence theorem; applications. (CTAM-305 or equivalent)
Credit 4

CTAM-341,342
Engineering Statistics
Registration #0240-341, 342
Designed to provide the student with a working understanding of the basic statistical strategies useful in the analysis and interpretation of data generated by problems of variation in the physical and applied sciences, and as such is a study of the concepts and techniques of mathematical probability and statistics and its role as the central core of all statistical strategies. (CTAM-305 or equivalent)
Credit 4/Qt.
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, 402, 403 (Lec.)  Circuit Analysis
CTBE-406, 407, 408 (Lab)
Registration #0241-401,402, 403,406,407,408
Circuit parameters, Ohm's Law, Kirchhoff's Laws, combination of elements, voltage and current division, mesh and nodal analysis, linearity and superposition. Thevenin's and Norton's theorems, dependent sources, transient analysis, sinusoidal steady-state analysis, polyphrase circuits, complex frequency, pole-zero diagrams, resonance, magnetically coupled circuits, two-port theory. Fourier series analysis of circuits. LaPlace transform techniques of circuit solution. (CTCP-303 and CTAM-305 or concurrent with CTAM-306)
Credit 4, Lec. 3, Lab 1

CTBE-411, 412, 413  Electric and Magnetic Fields
Registration #0241-411, 412,413
Electric and magnetic field application in dielectrics and magnetic core component. Wave propagation and the formulation of dynamic field equations and their specific application to radiation problems, waveguides, antennas, shielding, and transmission lines. (CTAM-328 and CTBM-342 or equivalent)
Credit 4/Qtr.

CTBE-421, 422, 423  Electronics
Registration #0241-421, 422,423
An integrated treatment of basic electronic devices and their circuits with emphasis on active circuits and their analysis; biasing, stability, and frequency response consideration, feedback amplifiers and nonlinear circuits. (CTBE-403 and 408 or equivalent)
Credit 4/Qtr.

CTBE-431, 432  Electronics (Advanced)
Registration #0241-431,432
An in-depth study of stability, feedback, temperature and noise effects as applied to operational amplifiers. Application of integrated circuit operational amplifiers as RC filters and in linear and nonlinear modes. (CTBE-423 or equivalent)
Credit 4/Qtr.

CTBE-433  Electronics
Registration #0241-433
Introduction to systems for transmitting information at high frequencies: AM, FM, PM. Digital and sampled data systems including basic information theory and noise. Emphasis is on basic understanding utilizing analysis as a tool to demonstrate application and to further understanding. Topics to include propagation, RF amplification, modulation and detection, basic antenna and transmission line principles, D-A and A-D conversion, signal-to-noise ratio, band-width, sampling theory, and noise sources with their effects on information transmission. (CTBE-412 and CTBE-423 or equivalent)
Credit 4

CTBE-434  Digital Logic Design
Registration #0241-434
Concepts of Boolean algebra and related switching circuit theory, analysis and synthesis of AND/OR, NAND/NOR logic. Use of Karnaugh map techniques for combinational logic. Simplification, analysis, and synthesis of sequential circuits, using transition and state tables, number systems and codes. TTL, ECL, HTL, digital MOS device characteristics. (CTBE-423 or equivalent)
Credit 4

CTBE-461, 462, 463  Electrical Engineering
Electronics 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 or equivalent)
Credit 4/Qtr.

CTBE-501  Electromagnetic Energy Conversion
Registration #0241-501
Theoretical development of magnetic circuit principles as applied to electromechanical energy conversion with emphasis on electromagnetic field and mechanical energies. Electromagnetic devices are discussed with emphasis on the magnetic circuit point of view under steady-state operation conditions. (CTAM-306 and CTBE-412 or equivalent)
Credit 4

CTBE-511, 512  Control Systems
Registration #0241-511, 512
Control systems are analyzed with emphasis on open and closed loop operation. System parameters are discussed including block diagrams, transfer functions, and stability. Nyquist criteria and Bode plots are presented to predict and analyze the operation and design of control systems. (CTBE-501 and CTBE-403 and 408, CTBE-511, or equivalent)
Credit 4/Qtr.

Mechanical (Applied Science)

CTBM-341, 342  Engineering Mechanics
Registration #0242-341, 342
Vector methods in statics and dynamics, force systems, friction, moments, centers of mass and centroids, moments and products of inertia, work, velocity, acceleration, kinetic energy, momentum, rigid body motion, rotation, work, potential energy, conservative forces and impulse. (CTCP-302 and CTAM-305)
Credit 4

CTBM-344  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 I
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, Castiglione's Theorem. (CTBM-344 and 354)
Credit 4

CTBM-347 (Lec.); 357 (Lab)  Engineering Materials
Registration #0242-347, 357
Properties of engineering materials from the standpoint of atomic, and crystalline structure, imperfections, and phase changes. (CTBM-341)
Lec. 3, Lab 1, 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 equivalents)
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 in Synthesis
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

CTBM-554  Linkage Mechanism Synthesis
Registration #0242-554
The combining of linkage mechanisms to perform machine functions. Coordinating of output motion with input motion for four and six-link mechanisms. Combinations and inversions of four-bar and slider-crank linkages. Analyzing coupler-curves. Coupler-cognate mechanism synthesis. Solving problems by graphical and analytic methods with typical applications to machine design. (CTBM-551 or permission of advisor)
Credit 3

Chemistry

CTCC-211, 212, 213  General Chemistry
Registration #0244-211, 212, 213
For chemistry majors and others who desire an in-depth study of general chemistry; atomic structure, chemical bond, properties of elements and compounds, states of matter, solutions, acids and bases, oxidation-reduction reactions, chemicals calculations, qualitative and quantitative analysis. (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  Organic Chemistry
Registration #0244-231
A lecture course serving as an introduction to the science of organic chemistry. A survey of the nomenclature of organic molecules and a discussion of the structure and properties of the various classes of organic compounds is presented. (CTCC-213 or equivalent)
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, stereo-chemistry, 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
CTCC-241, 242, 243 (Lec.)  Engineering Chemistry
CTCC-246, 247, 248 (Lab)
Registration #0244-241, 242, 243, 246, 247, 248

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

CTCC-311 (Lec.) CTCC-316 (Lab)  Analytical Chemistry
Registration #0244-311, 316  Instrumental Analysis
Elementary treatment of instrumental theory and techniques; properties of light; refractive index, ultraviolet, visible and infrared spectrophotometry; emission spectroscopy; flame photometry; electrochemistry; Nernst Law; pH meters and electrodes. A knowledge of organic chemistry is desirable. (CTCC-213, CTCC-218 or equivalents; CTAM-210 required or to be taken concurrently)

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

CTCC-312 (Lec.) CTCC-317 (Lab)  Analytical Chemistry-Separations
Registration #0244-312, 317  Inorganic and organic separations; Raoult and Henry Laws; phase rules; distillation; extraction; absorption and surface effects; electrophoresis; chromatography including gas, liquid, column, paper, thin layer, and ion exchange. (CTCC-213, CTCC-218 or equivalents; CTAM-210 or equivalent)

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

CTCC-313 (Lec.)  Introduction to Physical Chemistry
Registration #0244-313  Properties of gases, kinetic-molecular theory; Boltzman Distribution functions; non-ideal behavior, first law of thermodynamics; heat capacities; Euler's theorem and homogeneous functions; thermochemistry; and introduction to the second law. (CTCC-231, CTCC-233 or equivalents; CTAM-253)

Credit 3

CTCC-401, 402 (Lec.)  Physical Chemistry
CTCC-405, 406 (Lab)
Registration #0244-401, 402, 405, 406  Kinetic-molecular theory of gases, states of matter, atomic and molecular structure, thermodynamics, quantum theory, chemical kinetics, photochemistry, spectroscopy (x-ray, optical, magnetic), chemical kinetics, electrochemistry, absorption and heterogeneous catalysis, and macromolecular structure analysis. (CTCC-313; CTAM-305 or take concurrently)

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

CTCC-403 (Lec.) CTCC-407 (Lab)  Physical Chemistry
Registration #0244-403, 407  A lecture course presenting some of the more mathematical aspects of physical chemistry. Selected topics from the areas of chemical statistics, quantum theory, chemical bonding molecular states and spectra, and the gas, liquid and solid states are discussed. (CTCC-402 and 406 or equivalent)

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

CTCC-417  Chemical Literature and Technical Writing
Registration #0244-417  Organization of technical libraries, classification of scientific literature into original and secondary sources and techniques for making literature searches; use of card catalog, index, abstracts, monographs, handbooks, critical tables, journals, bibliographies, technical catalogs, and patents; preparation of literature research reports. (CTCC-233 and 238, CTCC-313 or equivalent)

Credit 4

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

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

Credit 3

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

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

CTCC-528  Organic Chemistry of Polymers
Registration #0244-528  Introduction to the chemistry of synthetic, high molecular weight polymers and a survey of their diverse structures and properties. Mechanisms of condensation, free radical and ionic polymerization. (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 4
CTCC-561 Surface and Colloid Chemistry
Registration #0244-561
Surface energy of liquids and solids, adsorption, catalysis, preparation and properties of classical colloids, electrical and optical properties of colloids, formation and properties of macromolecules. (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; discussions of references from recent chemical literature. (CTCC-403 or equivalent)
Credit 3

CTCC-598 Topics in Chemistry; Spectrometric Identification of Organic Compounds
Registration #0244-598
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: Chemistry
Registration #0244-599
Faculty-directed study of chemical topics on a tutorial basis. (Consent of instructor)
Credit 1-3

Physics

CTCP-301, 302, 303 (Lec.) College 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. 3, Lab 1, Credit 4

CTCP-457 Modern Physics
Registration #0245-457
An introductory course of 20th century physics. Review of some classical concepts, special relativity, quantum effects, duality of waves and particles, the hydrogen atom. (CTCP-303, CTAM-305)
Credit 4

CTCP-458 Modern Physics
Registration #0245-458
A continuation of CTCP-457. Many electron atoms, molecular physics, solid state physics and devices. (CTCP-457 or equivalent)
Credit 4

CTCP-459 Nuclear Physics
Registration #0245-459
Elementary particles, nuclear structure, nuclear reactions, fission, fusion. Nuclear power, accelerating machines. (CTCP-458 or equivalent)
Credit 4

Contemporary Science

CTCS-221 Contemporary Science
Registration #0246-221 Science-Biology
An introduction to the fundamental principles of biology for nonscience majors and the application of these concepts to areas of interest in our contemporary technological society. Topics to be discussed include the cell as a biological unit. The biogenesis-abiogenesis controversy, genetic coding and introduction to plant and animal biology. The course is presented in a lecture-demonstration format. (CTAM-201 or CTAM-205 or CBCH-201 or equivalent)
Credit 4

CTCS-222 Contemporary Science
Registration #0246-222 Science-Chemistry
An introduction to the fundamental principles of chemistry for nonscience majors and the application of these 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
CTDS-200 Registration #0249-200
This technical course will help you become familiar with small computers, more comfortable with terminology and technology involved and more aware of the computers' significance and potential. You will also learn beginning BASIC. Not for computer system majors.
Credit 4

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

CTDP-208 Registration #0249-208
Fundamentals of programming using the structured programming language PASCAL. Topics include basic problem-solving methods, algorithm development, elementary data types, expression evaluation, use of basic control structures and subprograms. Programming projects will be required. (CTDS-202 or permission of a computer systems advisor)
Credit 4

CTDP-210 Registration #0249-210
Program design, including specification, structured development, advanced data types, procedures and functions, program validation and verification. Programming paradigms, including basic internal sorting and searching algorithms. Programming projects are required. (CTDP-208)
Credit 4

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

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. Pascal) is used to demonstrate modern programming principles. Topics include variables, expressions and assignment, control structures (sequencing, selection and repetition), modularity via procedures and functions, parameter mechanisms, and identifier scope in block structured languages. Programming assignments are an integral part of this course. (CTDS-202)
Credit 4

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

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)
Credit 4

CTDP-305 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-318 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 Registration #0249-320
Computer programming in FORTRAN. Application emphasis is on numerical methods. Programming projects are required. Not for computer systems majors. (CTAM-305)
Credit 4

CTDP-330 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
CTDS-488 Programming Systems
Registration #0249-488 Workshop
A workshop for the mastery of the techniques and concepts of programming systems, design and implementation. Students will work with data modeling, both with and without a data-base management system product. Student 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 & 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)
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-230 Discrete Structure
Registration #0250-230
Foundations of discrete mathematics. Topics include: propositional logic, functions and relations, algebra of sets, Boolean algebra and Boolean functions, permutations and combinations, vectors and matrices, graphs, digraphs, trees and strings. (CTAM-202 or equivalent)
Credit 4

CTDS-315 Digital Computer Organization
Registration #0250-315
Introduction to the logical design of a computer. Topics include a review of arithmetic and Boolean algebra, combinational and sequential circuit design, flip-flops and adders, storage organization, instruction fetch decode and execution in a simple CPU, input/output subsystem, interrupts. (CTDS-202)
Credit 4

CTDS-320 Data Structure Analysis
Registration #0250-320
Information structures: sequential lists, stacks, queues, sequential allocation; linked lists, doubly linked lists, linked allocation; trees, tree traversal; lists, orthogonal lists, multilinked structures; dynamic storage allocation and garbage collection. Programming projects are required. (CTDP-210)
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. (CTDS-320)
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 HIPQ charts, NS charts, etc. and to the structured design methods of Yourdon. (CTDS-325)
Credit 4

CTDS-340 Formal Languages
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-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. (CTEM-421 or equivalent and FORTRAN or BASIC)
Credit 4

CTDS-440 Operating Systems
Registration #0250-440
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlocks, 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-320)
Credit 4

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

CTEDS-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-320)
Credit 4

CTEDS-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

CTEDS-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

CTEDS-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

CTEDS-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-320)
Credit 4

Lower Division Electrical Technology

CTEE-101, 102, 103  Basic Mathematics
Registration #0253-101, 102, 103
Course will begin with a brief review of fundamental arithmetic and algebraic concepts for those whose skills have lessened due to time lapse. The slide rule, powers of ten and units and dimensions applicable to the field of electronics will be emphasized. Ratios, simultaneous equations, exponents, radicals, quadratic equations, and logarithms with specific applications; solution of Ohm’s and Kirchhoff’s Laws, trigonometric functions, right triangles and vector algebra. (One year of high school mathematics or equivalent)
Credit 3

CTEE-105, 106, 107  Electrical Schematics
Registration #0253-105, 106, 107
Electrical symbols, schematics, color codes, specifications and ratings, logic diagrams, block diagrams, wiring and control diagrams. (Concurrent enrollment in CTEE-101)
Credit 4

CTEE-312 (Lec.)  Digital Systems
Registration #0253-312
Introduction to binary and octal number systems, logic components and their functions; truth tables; gates, switches, counters, flipflops, integrators, differentiators and adders; application to mechanical, relay, fluidic, pneumatic and electronic digital logic systems. (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

Lower Division Mechanical Technology

CTEM-301  Applied Mechanics and Strength of Materials
Registration #0254-301
Basic principles of statics, systems of forces, free-body diagrams, equilibrium conditions, friction, centroids, moments of inertia. (CTCP-201 or equivalent)
Credit 4

CTEM-302  Applied Mechanics and Strength of Materials
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  Applied Mechanics and Strength of Materials
Credit 4
Registration #0254-303
Strength of materials, principles of stress and strain, properties of materials, shear and thermal stresses, stress and deflection of beams, column analysis, connections, combined stresses. (CTEM-301 or equivalent)

CTEM-315  Principles of Mechanical Design I
Credit 3
Registration #0254-315
Additional material, with emphasis on applications, on area moments, centers of gravity, beam deflection, end loading, columns, stress and strain, plastic deformation, stress concentrations, torsion. (CTEM-303)

CTEM-316  Principles of Mechanical Design II
Credit 3
Registration #0254-316
Thin-walled tubes, non-circular shafts, springs, screw threads, belts, stress in cylindrical shells. (CTEM-315)

CTEM-320  Calculus for Technologists I
Credit 4
Registration #0254-320
An elementary applied calculus course covering the differential and integral calculus of algebraic functions with emphasis on applications. (CTAM-202 or equivalent)

CTEM-321  Calculus for Technologists II
Credit 4
Registration #0254-321
A continuation of CTEM-320. Topics covered in this course are: application of the integral calculus; differential and integral calculus of the transcendental function; and basic techniques of integration with emphasis on applications to engineering technology problems. (CTEM-420 or equivalent)

CTEM-322  Solutions of Engineering Problems
Credit 4
Registration #0254-322
A continuation of CTEM-321, this course covers selected applied mathematics topics including, differential equations through 2nd order linear, LaPlace Transforms, Taylor's series, and other appropriate topics. Emphasis is on the application of these topics to engineering problems. (CTEM-421 or equivalent)

Lower Division Manufacturing Technology

CTEF-201, 202, 203  Manufacturing Analysis
Credit 3
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)

CTEF-210  Industrial Plastics
Credit 4
Registration #0255-210
An introductory course in industrial plastics with emphasis on the practical aspects such as properties, identification, processing methods, design and suitability for given applications. Classwork will be supplemented with demonstrations, discussions of samples, and several field trips.

CTEF-211,212  Metallurgy
Credit 4
Registration #0255-211, 212
Review of chemical and metallurgical terms; manufacturing process; theory of constitutional diagrams; space-lattices, theory of hardening, heat treatment and general properties of ferrous and non-ferrous metals and alloys; effects of composition and mechanical working upon such properties as grain size, hardenability, machinability and weldability of metals. Some knowledge of chemistry and physics is desirable.

CTEF-314, 315  Materials Technology I, II
Credit 3
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)

Credit 3/Qtr.

CTEF-328  Report Writing
Credit 2
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.

CTEF-360  Introduction to Numerical Control
Credit 4
Registration #0255-360
The philosophy of the use of numerical control in manufacturing. The course will review manual programming, examine different applications of numerical control, and introduce computer-assisted programming techniques. N/C machine tools will be demonstrated.

CTEF-370  Tool Design
Credit 4
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)

CTEF-380  Time Study
Credit 3
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)

CTEF-391  Production Control
Credit 4
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)

Lec. 3, Lab 2, Credit 4
Building Technology (Industrial Technology)

CTIB-101, 102 Architectural & Structural Blueprint Reading (Residential, Commercial)
Reading and interpretation of architectural and structural drawings; use of symbols for materials, drafting conventions, schedules and specifications; freehand sketching, elementary mathematics, and some quantity take-off.
Credit 3/Qtr.

CTIB-201 Architectural Drawing
Introduction to architecture, the role of architectural drawings in the construction process, and basic drafting techniques used in architectural drafting including pencil techniques, freehand sketching and lettering. Introduction to drawings required in the traditional construction drawing set.
Credit 2

CTIB-202 Architectural Drawing
Introduction to the techniques of the architectural design process including preliminary presentation drawings and isometrics. Preparation of drawings required in the design and construction process of different building types. (CTIB-201)
Credit 2

CTIB-203 Architectural Drawing
Advanced study in the complete architectural process required in developing more complex building types. Preparation of design and schematic drawings of different building types. (CTIB-202)
Credit 2

CTIB-204, 205, 206 Architectural Drawing
Design development, presentation and working drawing preparation including: plans, elevation, sections, and details of different building types. Site planning, cost analysis, perspective presentation and related design skills. (CTIB-203)
Credit 2/Qtr.

CTIB-207, 208, 209 Architectural Drawing
Advanced design development, presentation and working drawing preparation including: plans, elevation, sections, and details of different building types. Site planning, cost analysis, perspective presentation and related design skills. (CTIB-206)
Credit 2/Qtr.

CTIB-231 Surveying
Introduction to surveying including measurement of horizontal distances, leveling, theory of error, bearings and azimuths, measurement of angles, tachometry, 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 (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 (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
Construction activities from the contractors' viewpoint. Bidding procedures from bid advertisement to bid opening; bonds, insurance, contracts, subcontracts and bidding documents; construction safety, project planning, scheduling and control. Governmental controls including zoning and building codes.
Credit 3

CTIB-252, 253 Building Estimating
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
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
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
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
The major thrust of this course is to enable the student to visualize machine parts represented on the blueprint as actually needed in practice. This is accomplished by covering such topics as lines, freehand sketching, orthographic projection, auxiliary and sectional views as well as callouts for machine processes. A brief introduction to Geometric Dimensioning and Tolerancing is also included.
Credit 1

CTID-102 Mechanical Blueprint Reading II
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 4
CTDM41, 142, 143
Drafting and design of shop tools. Student makes design drawings under instructor's supervision. Design of various machine cutting tools, gauge design, design of drilling jigs and milling fixtures. Principles and practice of punch and die design. Fundamentals of plastic molding and extruding with emphasis on production of practical designs. Consideration given to importance of tooling costs, redesign for economical production and production processes as they affect the designer. Course designed for tool and die makers, manufacturing managers, quality control managers and engineers. Drafting board and instruments required. (CTID-203 and CTIS-203, CTAM-103 or equivalents)
Credit 2/Qtr.

CTID-151, 152, 153
Machine Design
These courses cover analytically the major topics of machine design. They include properties and behavior of materials, basic principles of statics and dynamics, design of basic machine elements, spring and linkage design, methods of fastening, gear and bearing selection. (CTAM-103, CTID-203, CTIS-203 or equivalent)
Credit 3/Qtr.

CTID-201
Engineering Drawing
This is an introductory course in mechanical drawing. Spatial objects are first drawn by free hand sketching before drawing instruments are used. Topics covered include lettering, orthographic and isometric drawing, auxiliary and section views, and principles of dimensioning and tolerances.
Credit 2

CTID-202
Engineering Drawing
This course is a continuation of CTID-201 which covers in more detail the topics included in CTID-201. In addition, drawings involving flat pattern developments and intersections, threads, fasteners and springs are also taught. (CTID-201 or equivalent)
Credit 2

CTID-203
Engineering Drawing
This course continues the teaching of the fundamentals of drafting as done in CTID-201-2 and includes topics on geometric tolerancing and dimensioning and welding, electrical, and piping drawings. The last half of the course requires the student to prepare a complete set of drawings, including detail, assembly, parts and materials list, as needed to manufacture a complete machine component (CTID-202 or equivalent)
Credit 2

CTID-211
Engineering Graphics
This is an introductory course in drafting addressed to prospective engineering students. Its content is essentially the same as CTID-201 and 202 with emphasis on graphic communication rather than skills development.
Credit 2

CTID-212
Engineering Graphics
This course covers the fundamental principles of descriptive geometry as used to find graphical solutions of spatial engineering problems. Students are taught methods of drawing an object in any view desired and also problems of ordinary point-line-plane are solvable by the same methods. (CTID-211 or CTID-202 or equivalent)
Credit 2

CTID-213
Engineering Graphics
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

Electromechanical (Industrial Technology)

CTIL-201 (Lec.) CTIL-206 (Lab)
Elements of Electricity 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, OHMS law, problems related to various circuit configurations are presented. (CTAM-103 or equivalent)
Lec. 3, Lab 1, Credit 4

CTIL-202 (Lec.) CTIL-207 (Lab)
Elements of Electricity 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, sinuosids, power, etc. Applicable principles necessary to solve problems related to various circuit configurations are presented. (CTAM-103 or equivalent)
Lec. 3, Lab 1, Credit 4

CTIL-203 (Lec.) CTIL-208 (Lab)
Elements of Electricity 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. 1, Lab 3, Credit 4

CTIL-221, 222
Mechanical Components and Mechanisms
Introduction to mechanical elements of electromechanical systems; Study of individual components and mechanisms in terms of functions and operating characteristics. Topics covered are: Torque, inertia, work, power, efficiency, gears, (spur, bevel, helical, worm), gear trains, differentials and integrators, belt drives, chain drives, pins, couplings, cams, linkages, switches. Independent approach to practical problems is stressed. (CTCP-201, 202 and CTID-201, 202, 203 or equivalents)
Credit 4

CTIL-301, 302 (Lec.)
Machines and Power Systems
CTIL-306, 307 (Lab)
This course covers fundamental principles of descriptive geometry as used to find graphical solutions of spatial engineering problems. Problems are solvable by the same methods. (CTID-211 or CTID-202 or equivalent)
Lec. 3, Lab 1, Credit 4
**Credit 1/Qtr.**
Registration #0264-351, 352, 353
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

**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, components and systems; temperature, displacement, force, electro-pneumatic, electrohydraulic transducers, encoders, amplifiers and control elements and their applications to systems. Thermistor, thermocouple, pneumatic temperature transducer. LVDT, proximity sensors, strain gauges, pressure, flow, level transducers, control values, motors, mechanisms and control devices; open loop, closed loop, digital analog, sequential systems. Analysis of systems representative of types found in industrial use today. The laboratory includes analysis and troubleshooting of operational electromechanical systems. (Successful completion of all other technical courses in CTIL curriculum.)
Credit 1/Qtr.

**CTIS-104 to CTIS-109**
Advanced Machine Shop I, II
Registration #0266-104, 105, 106, 107, 108, 109
Advanced work on lathes, milling machines and grinders; explanations and demonstrations on more difficult problems; assemblies and temporary tooling. Some work done entirely in metrics. Must accurately handle tool room layout, machining, and measuring equipment. Special emphasis on skill, neatness and accuracy. (CTIS-203)
Credit 1/Qtr.

**CTIS-111 to CTIS-119**
Instrument Making & Experimental Work I, II, III
Registration #0266-111, 112, 113, 114, 115, 116, 117, 118, 119

Students must operate all tool room equipment. Skillful manipulation of hand tools; make small temporary tooling required to form or bend the finished parts; blank development and precision layout; make small punches, dies, cutters and assemblies to simulate actual industrial model work. (CTIS-203)
Credit 1/Qtr.

**CTIS-121 to CTIS-129**
Tool and Die Making I, II, III
Registration #0266-121, 122, 123, 124, 125, 126, 127, 128, 129
Planning and making accurate complete tool and die assemblies. Emphasis is on accuracy of the individual parts and in the fitting of the assembled tool or die. Samples from the forming and blanking dies are inspected for quality. (CTIS-106)
Credit 1/Qtr.
This course is designed to offer the student the fundamentals and techniques in Numerical Control Part Programming 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 1 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 Numerical Control
Registration #0266-283
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-112 Principles of Blueprint Reading II
Registration #0270-112
This course is a continuation of unit I, 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 and derived from the ANSI Y14.5 government standards.

Class 3, Credit 3

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, horizotal and vertical mills, band saws, and drill presses. Also covered are the basic skills in layout and bench work.

Lab 15, Credit 4

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

Lab 5 hours per week, Credit 2

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

Lab 5 hours per week, Credit 2

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

Lab 5 hours per week, Credit 2

CAIM-210 Materials and Methods Programming and Machining
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.

Class 3, Credit 3

CAIM-214 Numerical Control Programming and Machining
Registration #0270-214
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, CAIG-107 or equivalent)

Class 3, Credit 3

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

Class 3, Credit 3

CAIM-220 Diemaking
Registration #0270-220
Introduction to diemaking and its relation to the production process of stamping sheet and plate materials, both metals and nonmetals.

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

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

Class 3, 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.

Class 3, Lab 3, 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 are stressed. (CAIM-106 or equivalent)

Lab 15, Credit 4
CAIM-232 Intermediate Machine Tool Technology
Registration #0270-232
Complex part and assembly machining involving more advanced techniques on 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)
Lab 15, Credit 4

CAIM-233 Advanced Machine Tool Technology
Registration #0270-233
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.
Lab 15, Credit 4

Drafting Technology

CAID-110 Principles of Blueprint Reading
Registration #0271-110
To aid the student in reading, visualizing and interpreting basic blueprints in the industrial environment.
Class 3, Credit 3

CAID-147 Blueprint Reading (EMT/PKG)
Registration #0271-147
An introductory course which develops the concept of how and why engineering drawings exist. Drawings are sketched and interpreted. Mechanical, electrical, and hydraulic blueprints are studied and include working with tolerances and geometric tolerancing.
Class 1, Lab 2, Credit 2

CAID-208 Introduction to Computers
Registration #0271-208
Presents computer terminology, functions and commands. Programs will be developed.
Class 5, Lab 5, Credit 3

CAID-210 Manufacturing Processes
Registration #0271-210
Manufacturing Processes will acquaint students with methods of fabrication which are commonly used to convert ideas and raw materials into usable products and/or machines.
Class 5, Credit 5

CAID-211 Materials Selection
Registration #0271-211
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.
Class 3, Credit 2

CAID-215 Drafting Mechanics I
Registration #0271-215
Presents the methods and tools to measure and qualify the physical world. Topics will include components, forces, motion and problem solving as it relates to mechanical physics. (CAID-255 is a required lab.)
Class 4, Credit 4

CAID-216 Engineering Drawing for Machinists
Registration #0271-216
The course is intended to aid the student in understanding machine shop drawings. After completing this course the student will have proper knowledge of geometric construction, sketching, multiview projection, sectional views, auxiliary views, and the use of drafting instruments and equipment. (CAID-I 10)
Class 3, Credit 3

CAID-217 Drafting Mechanics II
Registration #0271-217
This course will investigate the operation of different components in a mechanical system. Appropriate component selection related to specific design application also will be studied.
Class 5, Credit 3

CAID-219 Drafting Mechanics III
Registration #0271-219
Will provide a basic working understanding of electricity, current flow and power with applications in simple circuits.
Class 3, Credit 2

CAID-225 Drafting Mechanics Lab
Registration #0271-225
A laboratory course providing hands-on experience with experiments dealing with components, forces and motion.
Lab 3, Credit 1

CAID-238 Technical Drawing I
Registration #0271-238 (Descriptive Geometry)
Technical Descriptive Geometry is a survey of the theories and methods used to graphically represent the solutions to spatial relationship problems dealing with points, lines, and planes. Projections and multiview projection theories, visualization of points, lines, and planes, and solids, size and shape description, auxiliary views, developments, and intersections will be covered. Problems will be solved through sketching and instrument drawings. (This course satisfies the requirements of CTID-211 and 212.)
Lec. 3, Lab 5, Credit 5

CAID-239 Technical Drawing II
Registration #0271-239
Technical Drawing II will present technical information to analyze and prepare accurate mechanical production drawings from verbal instructions and engineers’ sketches. Accuracy and neatness is stressed. Proficiency is developed in both coordinate and geometric dimensioning and tolerancing. Four significant working drawing projects will be accomplished, with consideration given to manufacturing processes and operations. (CAID-238)
Class 2, Lab 8, Credit 5

CAID-240 Technical Drawing m
Registration #0271-240
Technical Drawing m

CAID-241 Technical Drawing IV
Registration #0271-241
This course applies the study of electronic components and graphic symbolism to the practice of drawing schematic, block, and logic diagrams and printed circuit board layouts. A portfolio of drawings will be developed by the completion of the course.
Class 2, Lab 3, Credit 2

CAID-245 Introduction to Computer-Aided Drafting (CAD)
Registration #0271-245
The course includes an overview of the architecture and components of various CAD systems. A CAD system will be used to gain operator skills. (CAID-238 or equivalent)
Class 1, Lab 3, Credit 2
CAID-247 Computer-Aided Drafting (CAD)
Registration #0271-247
The purpose of this course is to develop a set of working drawings with advanced system commands. Flowcharting and file management techniques will be required to support documentation for each project. The course will also include the digitizing board as an electronic input device for existing drawings and/or sketches. (CAID-245)
Class 2, Lab 4, Credit 3

CAID-249 Fundamentals of Designing Printed Circuits
Registration #0271-249
This course will provide practical knowledge and skills of printed circuit board terminology, layout, components, construction techniques, and design parameters. Camera ready (manually taped) board layouts will be generated by interpreting schematic diagrams, parts lists, and engineering and component specifications.
Lecture 3, Lab 3, Credit 4

CAID-251 CAD/CAM Printed Circuit Board Layout
Registration #0271-251
This course is designed to cover all aspects necessary to produce the libraries, artwork, and documentation requirements of a CAD generated printed circuit board layout. To maximize CAD hands-on time, class size will be limited. (CAID-249 or equivalent)
Class 3, Lab 3, Credit 3

CAID-298 Special Studies: CAM
Registration #0271-298
The Computer-Aided Machining (CAM) course combines the fundamentals of CAD and Numerical Control (NC) information primarily for use on milling machines and lathes. Interactive CAM software will be used to emulate the machining process and allow for various output methods. Manual methods will precede the computerized techniques. (CAID-247 and CAIM-121 or equivalent)
Class 3, Lab 3, Credit 4

Automated Equipment Technology

CAIE-101 Applied Physical Principles I
Registration #0271-101
A course designed to give the students tools to measure and qualify the world around them in terms of physical laws. Areas of study to be linear motion, Newton's laws, friction, forces and equilibrium, and rotational motion. Both mathematical and graphical solutions to vector problems will be undertaken.
Class 3, Lab 2.5, Credit 3

CAIE-102 Applied Physical Principles II
Registration #0271-102
An extension of CAIE-101, this course proceeds to examine the properties of solids, liquids, and gaseous states of matter; heat and temperature; and harmonic motion as it applies to sound, light, and other electromagnetic radiations. (CAIE-101)
Class 3, Lab 2.5, Credit 3

CAIE-201 Machine Devices/Systems
Registration #0272-201
The student will learn, through hands on experience and study, the following areas: gears, chain drives, belt drives, pulleys, linkages, universals, differentials, bearings, cams, lubrication and friction, speed changes and braking.
Class 3, Lab 3.5, Credit 3

CAIE-202 Hydraulic/Pneumatic Systems
Registration #0272-202
Basics of fluid mechanics are studied. Primary areas of study are pressure flow, viscosity, turbulence, work, energy and power. Hydraulic and pneumatic components such as pumps, motors, cylinders, flow and pressure control valves are studied along with fluid conditioning. Pneumatic logic and its application is studied.
Class 3.5, Lab 4, Credit 4
A flexible course designed to permit the Automated Equipment Technology student to pursue, in depth, some aspect of the technical field. To be conducted in either the class or independent study mode. The credit will be based on the nature and extent of the study undertaken.

Credit 1-4

Packaging Mechanics

CAIP-201 Introduction to Packaging
Registration #0273-201
Role of the packaging person: conduct, responsibilities, safety, packaging materials. Blueprint Reading.
Class 4, Credit 3

CAIP-206 Packaging Machinery Systems I
Registration #0273-206
Product Filling: Types and methods of container filling. Bottle closing; capping, sealing, can closing; double seaming. (CAIP-201, 202)
Class 3, Lab 2, Credit 2

CAIP-207 Packaging Machinery Systems II
Registration #0273-207
Package labeling, coding, marking, imprinting, case packing, cartoning, wrapping, bundling, and form fill sealing.
Class 5, Lab 2, Credit 4

CAIP-210 Packaging Machines and Related Equipment
Registration #0272-210
Packaging line operations, handling of perishable products, refrigeration, pasteurization, and support equipment.
Class 5, Lab 2, Credit 4

CAIP-215 Package Machinery Troubleshooting and Repair
Registration #0273-215
Problems associated with packaging machinery, cause and correction. (CAIP-206, 207)
Class 4, Lab 2, Credit 4

CAIP-230 Packaging Machinery Set-up and Operation
Registration #0273-230
Changeover procedures, adjustment, start-up, and fine tuning.
Lab 6, Credit 2

Communications

CAIG-104 Communication Skills
Registration #0274-104
A review of basic skills in reading, writing, listening, speaking, study skills and time management.
Class 2, Recitation 1, Lab 1, Credit 2

CAIG-105 Communicating on the Job
Registration #0274-105
An application of communication skills to entry-level jobs. Includes writing business letters and memos, giving and following directions, filling out forms, practicing interpersonal communications in simulated job scenes. (CAIG-104)
Class 3, Recitation 1.5, Credit 3

CAIG-206 Technical Communication
Registration #0274-206
An introduction to the principles of technical writing for the technician. Assignments typically relate to projects in the student's major field of study and include a proposal, short informal reports, instructions, and a formal technical report. An extensive Job Search Module prepares students to explore career options, then search, apply and interview for employment. (CAIG-105, 204)
Class 4.5, Credit 4

CAIG-210 Interpersonal Communications
Registration #0274-210
An opportunity to explore and practice the communication skills that service technicians will use on the job. Emphasis will be focused on ways to work with customers and clients as a representative of the service organization. (CAIG-105)
Class 2, Credit 1

CAIG-220 Composition: Written and Oral
Registration #0274-220
An emphasis on developing the college essay and adapting the writing process to oral presentations. Topics include reasoning and persuasion; planning, organizing, developing and revising the expository essay. Documented library research paper is required. (CAIG-105)
Class 4.5, Credit 4

Mathematics

CAIG-106 Algebra and Trigonometry I
Registration #0274-106
A concentrated review of elementary algebra and trigonometry. Topics include properties of real numbers; order of operations, operations with real numbers and polynomials; factoring and algebraic fractions; linear equations; graphing; exponents and radicals; quadratic equations; solution of right and oblique triangles with applications to numerical control and vectors.
Class 3, Recitation 4.5, Credit 3

CAIG-107 Algebra and Trigonometry II
Registration #0274-107
A standard pre-calculus sequence. 207: Topics include a review of the fundamentals of algebra; relations, functions and their graphs; solution of linear, fractional and radical equations; solution of linear systems; exponents and radicals; vectors. (CAIG-107 or equivalent)
Class 3, Recitation 4.5, Credit 3

CAIG-207, 208 Algebra and Trigonometry II, HI
Registration #0274-207, 208
HI A pre-calculus sequence.
207: Topics include a review of the fundamentals of algebra; relations, functions and their graphs; solution of linear, fractional and radical equations; solution of linear systems; exponents and radicals; vectors. (CAIG-107 or equivalent)
208: Topics include quadratic functions and conic sections; logarithmic and exponential functions; trigonometric functions, equations, identities and graphs; inverse trigonometric functions; polar coordinates and graphs; variation. (CAIG-207 or equivalent)
Class 4, Credit 4

Computer Service

CAIC-201 Fundamentals of Computers
Registration #0275-201
An introduction to electronic data processing. A study of basic computer theory, file storage media, input-output devices, binary and hexadecimal number systems and programming techniques.
Class 3, Recitation 3, Credit 4

CAIC-205 Introductory Programming I
Registration #0275-205
An interactive programming course utilizing the BASIC language. Emphasis is placed on development of skills necessary for the technician to communicate with a computer using the BASIC language.
Class 1, Lab 2, Credit 2
CAIC-212  Electrical/Electronic
Registration #0275-212  Schematic Interpretation
The student will learn to read and interpret various diagrams related to the servicing of computers. Drawings studied will be electrical wiring diagrams, schematics, logic and block diagrams and others found in service manuals.
Class 2, Credit 2

CAIC-202  Computers I
Registration #0275-202
The study of the organization and operation of microcomputers and microprocessors, with emphasis on CPU operation during machine and assembly program execution. Microprocessor instruction sets in regard to data transfer, arithmetic and logic instructions, and control over I/O devices will be studied. (CAIC-201, CAIC-212)
Class 3, Lab 4, Credit 4

CAIC-207  Introductory Programming II
Registration #0275-207
An interactive programming course utilizing the PASCAL language. Emphasis is placed on the development of skills necessary for the technician to communicate with a computer using the PASCAL language.
Class 1, Lab 2, Credit 2

CAIC-215  Special Tool/Equipment Use
Registration #0275-215
The care and use of special tools and testing equipment used to repair computers will be studied. The student will demonstrate proficiency in a lab situation. (CAIE-203, CAIC-212)
Lab/Dem. 2, Credit 1

CAIC-216  Digital Circuits
Registration #0275-216
A study of the logic concepts and circuits used in digital systems including measuring instruments, communications, and computers. Integrated circuits are used to demonstrate the digital techniques of gating, counting, storing, shifting, and converting. (CAIC-205)
Class 3, Lab 4, Credit 4

CAIC-203  Computers II
Registration #0275-203
The analysis of microcomputers with emphasis on system logic, timing and interfacing to I/O devices. Functional and in-depth operation of these components will be studied, with use of diagnostic programs and digital test equipment. (CAIC-202, CAIE-205, CAIC-215)
Class 2, Lab 4, Credit 3

CAIC-209  Introductory Programming III
Registration #0275-209
An interactive programming course utilizing the FORTRAN language. Emphasis is placed on the development of skills necessary for the technician to communicate with a computer using the FORTRAN language.
Class 1, Lab 2, Credit 2

CAIC-218  Linear Circuits
Registration #0275-218
The properties of linear integrated circuits and their applications in power supplies, regulators, amplifiers, oscillators, and multivibrators will be studied. (CAIC-216)
Class 1,5, Lab 3, Credit 2

CAIC-204  Computers III
Registration #0275-204
The study of micro and mini-computer operating systems used in industry today. The student will learn file management, copy, backup, directory, and formatting routines along with various methods of file protection. These commands will be used to communicate with the computer system during systems troubleshooting and preventative maintenance techniques. (CAIC-201)
Class 3, Lab 4, Credit 4

CAIC-211  Introductory Programming IV
Registration #0275-211
An interactive programming course utilizing the COBOL language. Emphasis is placed on the development of skills necessary for the technician to communicate with a computer using the COBOL language.
Class 1, Lab 2, Credit 2

CAIC-220  Computer Systems Troubleshooting
Registration #0275-220
Hands on experience will be given in diagnosing and repairing faults in computers using documentation and test equipment. A specific fault analysis approach will be taught that emphasizes a systematic approach to troubleshooting. (CAIC-203, CAIC-216)
Lab 15, Credit 5

CAIC-295  Independent Research Project
Registration #0275-295
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 members) 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 14

Graduate Courses
Statistics

CQAS-701  Statistical Concepts
Registration #0280-701
A service course designed for non-concentrators which emphasizes statistical thinking instead of mathematical manipulations. This is an intuition-based introduction to the subject. Topics include: exploratory data analysis, methods for collecting data, statistical inference, regression analysis, and analysis of variance. This course does not count as credit for the MS degree in statistics. (None)
Credit 4

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

CQAS-712  Fundamentals of Statistics II
Registration #0280-712
Continuation of CQAS-711. Topics: concepts and strategies of statistical inference for making decisions about populations on the basis of sample evidence; tests for independence and for adequacy of a proposed probability model; learning how to separate total variability of a system into identifiable components through analysis of variance; regression and Correlation models for studying the relationship of a response variable to one or more predictor variables. (Fund, of Statistics I CQAS-711 or Consent of the Department)
Credit 3 or 4
CQAS-721  Statistical Quality Control I  
Registration #0280-721  
A practical course designed to give depth to practicing quality control personnel. Topics: statistical measures; theory, construction, and application of control charts for variables and attributes; computerization procedures for control charts; tolerances, specifications, and process capability studies; basic concepts of total quality control, and the management of the quality control function. (Consent of the Department)  
Credit 3  

CQAS-731  Statistical Quality Control II  
Registration #0280-731  
Investigation of modern acceptance sampling techniques with emphasis on industrial applications. Topics: single, double multiple, and sequential techniques for attributes sampling; variables sampling; techniques for sampling continuous production. The course highlights Dodge-Romig plans, Military Standard plans, and recent contributions from the literature. (Consent of the Department)  
Credit 3  

CQAS-742  Statistical Computing  
Registration #0280-742  
An advanced course in statistical computing using SAS statistical software. The course will cover basic SAS procedures; the creation, manipulation, and analysis of data bases; graphical display techniques; and the development and writing of custom numerical analysis procedures. (Design of Experiments II CQAS-802 and Regression Analysis I CQAS-841)  
Credit 3  

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

CQAS-781  Quality Management  
Registration #0280-781  
A course designed to cover concepts and methods of quality management. Topics include: basic concepts, history of quality control, quality policy, economics of quality, quality costs, organization for quality, design for system effectiveness, manufacturing planning for quality, and quality data systems. (Consent of the Department)  
Credit 3  

CQAS-782  Quality Engineering  
Registration #0280-782  
A course designed to cover important elements of quality engineering. Topics include: specifications, statistical tolerancing, measurement, vendor relations, process control, motivation, customer relations, diagnostic techniques, process improvement studies, and quality planning. (Consent of the Department)  
Credit 3  

CQAS-783  Quality Engineering by Design  
Registration #0280-783  
The Taguchi Method of off-line control including parameter design and tolerance design leading to improved products and processes at lower costs. (Design of Experiments II CQAS-802)  
Credit 3  

CQAS-791  Statistical Methods in Health Sciences  
Registration #0280-791  
A course designed as an introduction to statistical methods for those involved in the health sciences. Topics include: types of biological data, descriptive statistics, tests of significance, experimental design, tests of association, relative risk, diagnostic tests. (Fund, of Statistics II CQAS-712)  
Credit 3  

CQAS-792  Biological Assays  
Registration #0280-792  
An advanced course in biostatistics which deals with the important research concerns of identifying and verifying drug-dose response. Topics include: parallel-line assays, slope-ratio assays, quantal response assays. (Design of Experiments II CQAS-802)  
Credit 3  

CQAS-801  Design of Experiments I  
Registration #0280-801  
How you design and analyze experiments in any subject matter area; what you do and why. Topics: basic statistical concepts, scientific experimentation, completely randomized design, randomized complete block design, nested and split plot design. Practical applications to: civil engineering, pharmacy, aircraft, agronomy, photo-science, genetics, psychology, and advertising. (Fund, of Statistics U CQAS-712)  
Credit 3  

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

CQAS-821  Theory of Statistics I  
Registration #0280-821  
Provides a sound theoretical basis for continuing study and reading in statistics. Topics: constructs and applications of mathematical probability; discrete and continuous distribution functions for a single variable and for the multivariate case; expected value and moment generating functions; special continuous distributions. (Fund, of Statistics II CQAS-712 or Consent of the Department)  
Credit 3  

CQAS-822  Theory of Statistics D  
Registration #0280-822  
Continuation of CQAS-821. Topics: supporting theory for and derivation of sampling distribution models; applications and related material; point estimation theory and applications; the multivariate normal probability model, its properties and applications; interval estimation theory and applications. (Theory of Statistics I CQAS-821)  
Credit 3  

CQAS-824  Probability Models  
Registration #0280-824  
An introduction to probability theory and stochastic processes. Topics include: random variables, conditional probability and expectation, Markov chains, renewal theory, queuing theory, and reliability. (Theory of Statistics I CQAS-821)  
Credit 3
CQAS-830  
**Multivariate Analysis I**  
Registration #0280-830  
This course deals with the summarization, representation, and interpretation of data sampled from populations where more than one characteristic is measured on each sample element. Usually the several measurements made on each individual experimental item are correlated and certainly one should not apply univariate analysis to each measurement separately. This course covers the use of the basic multivariate techniques. Computer problem solving will be emphasized. Topics will include: multivariate t-tests, ANOVA, MANOVA, regression analysis, repeated measures, quality control, and profile analysis. (Design of Experiments II CQAS-802)  
Credit 3  

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

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

CQAS-842  
**Regression Analysis II**  
Registration #0280-842  
A continuation of CQAS-841. Topics: selection of best linear models; regression applied to analysis of variance problems; non-linear estimation; and model building. (Regression Analysis I CQAS-841)  
Credit 3  

CQAS-851  
**Nonparametrics**  
Registration #0280-851  
Distribution-free testing and estimation techniques with emphasis on applications. Topics: sign tests; Kolmogorov-Smirnov statistics; runs tests; Wilcoxon-Mann-Whitney test; chi-square tests; rank correlation; rank order tests; quick tests. (Fund, of Statistics II CQAS-712)  
Credit 3  

CQAS-853  
**Managerial Decision Making**  
Registration #0280-853  
Statistical decision analysis for management. Topics: utilities; how to make the best decision (but not necessarily the right one); normal and beta distributions; Bayesian theory; many action problems; optimal sample size; decision diagrams. Applications to marketing, oil exploration; portfolio selection; quality control; production; and research programs. (Bayesian Statistics CQAS-881)  
Credit 3  

CQAS-856  
**Interpretation of Data**  
Registration #0280-856  
Advanced topics related to use of statistics in investigational analysis, including: narrow limit gauging, practical design of experiments, analysis of small sample data, analysis of means, identifying assignable causes, and other methods for troubleshooting with statistical methods. (Design of Experiments I CQAS-801)  
Credit 3  

CQAS-864  
**Advanced Acceptance Sampling**  
Registration #0280-864  
An advanced course in acceptance control techniques including: basis of acceptance sampling; attributes plans; variables plans for process parameters; variables plans for proportion non-conforming, sampling schemes including MIL-STD-105D and MIL-STD-414; plans for special applications; rectification and continuous procedures; cumulative results plans; compliance sampling; reliability sampling, and administration of sampling plan. (Statistical Quality Control II, CQAS-731)  
Credit 3  

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

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

CQAS-875  
**Empirical Modeling**  
Registration #0280-875  
A course in model building based on the application of empirical data gathered through appropriate experimental design and analysis through regression techniques. Topics: response variable construction, experimental design methods, and related analysis techniques. (Design of Experiments II CQAS-802 and Regression Analysis I CQAS-841)  
Credit 3  

CQAS-881  
**Bayesian Statistics**  
Registration #0280-881  
An introduction to Bayesian statistics and decision making which explores Bayes' Theorem in its relation to classical and Bayesian methodology. Topics: probability, Bayes' Theorem, assessment of prior probabilities and likelihoods, hypothesis testing, and the multivariable case. (Fund, of Statistics II CQAS-712)  
Credit 3  

CQAS-886  
**Sample Size Determination**  
Registration #0280-886  
The question most often asked of an industrial statistician is "What size sample should I take?" This course answers that question for a wide variety of practical investigational projects. Techniques for the full use of the optimal sample evidence are also offered. (Fund, of Statistics II CQAS-712 and Design of Experiments I CQAS-801)  
Credit 3  

CQAS-891, 892, 893  
**Special Topics in Applied Statistics**  
Registration #0280-891, 892, 893  
These courses provide for the presentation of subject matter of important specialized value in the field of applied and mathematical statistics not offered as a regular part of the statistics program. (Consent of the department)  
Credit 3 each course
Department of Career and Human Resource Development

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

CHRD-700 Introduction to Career and Human Resource Development
As a result of this course, students will better understand the CHRD program and its courses/options as well as related RIT and community resources; better understand the general concepts of human resource development, career development and organizational development as they apply to individuals and groups in a wide variety of settings and structures; and better understand the past, present and future significance of social, economic, technological factors influencing organizations and occupational categories as well as the corresponding role and activities of the human resource professional.
Credit 3

CHRD-705 Empirical Methods
This course will enable professionals in the fields of career development, organizational development and human resource development to accurately describe groups of people and their characteristics of interest to career and human resource development (e.g., skills, performance, background, attitudes, etc.). Topics include techniques of empirical investigation, questionnaire and test design, interviewing, and evaluations of training, counseling and development. (Note: following this course, students should take CQAS-701.)
Credit 3

CHRD-710 Theory of Organizational Development
This course introduces the student to organizational development theories and their application in an organization setting. Consideration will be given to the sociological and historical constructs upon which the field is based. Students will become familiar with the philosophical foundations for the key theories, as well as the practical work of the theorists upon which their philosophies are based. This course also will demonstrate how the theories of organizational development can be applied in organizations to foster change, innovation, and the revitalization of the organization.
Credit 3

CHRD-711 Futures Research and Simulation
In this course students will learn to understand the techniques, theories, and advantages/limitations of simulation and futures research methods, and the application of simulation and futures research methods for facilitating individual and organizational decision making. (CHRD-705, CQAS-701, CHRD-710)
Credit 3

CHRD-712 Planning & Evaluation in Organizational Development
In this course students will learn to understand the techniques, theories, and advantages/limitations of systematic planning strategies and the application of methods for strategic and tactical planning, and the decision making that assure accountability. (CHRD-705, CQAS-701, CHRD-710)
Credit 3

CHRD-713 The Practice of Consultation in OD
Students will develop an understanding of the various roles that organizational development practitioners play in applying their knowledge and skill in organizational settings, e.g., serving as internal consultants, process consultants, and change agents. Students will learn those skills and practices that pertain to the field of organizational development including: organizational performance analysis, group dynamics, problem solving, intervention techniques, dealing with resistance to change, implementing change, stress management, and approaches that foster employees' acceptance of change and organizational transformation, revitalization and renewal. (CHRD-705, CQAS-701, CHRD-710)
Credit 3

CHRD-720 Theories of Career Development
Career Development Theories provide mechanisms to examine and define the needs of the work place in relationship to the needs and abilities of the worker. This course will emphasize the structure of selected theories and explore their relationship to the individual's decision-making process.
Credit 3

CHRD-721 Individual Career Counseling Techniques
This course will introduce selected theories and techniques that may be used in individual career counseling situations. Students will practice techniques and develop their own style of career counseling. This course is not meant for individuals seeking to develop clinical therapeutic skills. (CHRD-720)
Credit 3

CHRD-722 Career Counseling Techniques for Groups
This course will introduce students to small group theory and the use of small groups to assist individuals in identifying and implementing their career goals. Students will participate in a small group as they learn and practice group leadership and membership tasks as well as develop career counseling skills. This course is not meant for individuals seeking to develop clinical therapeutic skills. (CHRD-720)
Credit 3

CHRD-723 Information Use in Career Planning
This course will explore the role of information in the educational, work, and leisure aspects of individuals' lifelong career and personal development. Students will be introduced to the following areas that may be useful in the development of career development and planning services: career planning models, selection and use of standardized tests and personal assessment instruments, career information data resources, research issues, and community resources. (CHRD-705, CQAS-701, CHRD-720)
Credit 4 Credit 1-12
CHRD-730  Theories of Human Resource Development  
Registration #0290-730
Professionals in the fields of career counseling, organizational development and human resource development require an organized plan of human learning and development. This course presents recent investigations, both theoretical and empirical, into human learning research, and will emphasize the information-processing model of learning and memory. Students will acquire, through readings and group activities, an intellectually consistent basis for the practical procedures of human resource development.  
Credit 3

CHRD-731  Techniques of Human Resource Development  
Registration #0290-731
This course is designed for future trainers in industrial settings and educators in college and university environments. The course is based on the theory that future trainers and educators must first identify and clarify the value systems within themselves and others prior to organizing a content to be learned. There must be a self-need assessment by exploring what one knows and must know about learning, curriculum design, information delivery and the assessment of that learning. With this data, the future trainer/educator will seek out the resources to satisfy those needs by mastery of the management of learning principles and skills. With these needs satisfied, the next phase is to create a demonstration of this mastery by developing, facilitating, and evaluating a real course or training experience. The course will provide participants with a model experience that can serve as the basis for developing additional learning/training packages in future work and educational settings.  
Credit 3

CHRD-732  Design & Development of Training  
Registration #0290-732
Students will gain practical experience in human resource development by designing, producing, teaching and evaluating a workshop, seminar or training session. Students will select a needed training module from the broad areas of personal and professional development, skills training and career development and carry out the necessary design, production and delivery steps. Students may take this course more than once in order to gain practical HRD experience and to add competencies to their resumes.  
Credit 2

CHRD-733  Problem Solving Techniques for HRD  
Registration #0290-733
Students will learn techniques to foster innovation and problem solving within organizations, through strategies to help themselves and others define problems, state goals, identify solutions and make decisions. Topics considered will include general systems theory, barriers to creativity, strategic plans, intrapreneuring, product development, and technology-driven worker training.  
Credit 3

CHRD-750  Microcomputer Applications in CHRD  
Registration #0290-750
Professionals in the fields of human resource development and career development make frequent use of computer technology to write proposals, track clients, design training, monitor budgets, evaluate services and produce reports. In this course, students will learn to utilize MS-DOS software for word processing, file management, spreadsheets and communications. After completing this course, students will have a general understanding of these classes of software, be moderately competent using such software and be experienced using this software to produce products appropriate to their intended professions.  
Credit 3

CHRD-850  Special Projects  
Registration #0290-850
This course provides for independent study, investigation, or research activity in subject matter areas not included in any existing course in the degree program, but having specialized value to students. Proposals approved by a supervising faculty member and the department director are required prior to registration. This course may be taken more than once, but for no more than a total of 6 credit hours.  
Credit variable

CHRD-891, 892, 893  Selected Topics  
Registration #0290-891, 892, 893
Selected Topics are innovative courses not reflected in the curriculum. Titles will appear in the course listing each quarter. The course may be taken more than once as topics change, but for no more than a total of 6 credit hours.  
Credit

CHRD-895  Internship  
Registration #0290-895
The internship is required of all students. The course consists of two parts: a) at least 20 hours per week of professional experience in appropriate setting, and b) attendance at a seminar that will meet at various times throughout the quarter. Students will work with their advisors to complete all necessary arrangements, and should meet with their advisors at least two months before planning to take the internship. Proposals for the internship must be approved and on file before registration.  
Credit 6
College of Engineering

Computer Engineering

Required Courses

EECC-200 Introduction to Computer Engineering
The purpose of this course is to briefly describe the field of computer engineering and to provide a frame of reference for the sequences of computer engineering, computer science, and electrical engineering courses that appear in the computer engineering curriculum. Topics will include an introduction to computers and computing, basic concepts, nomenclature, historical background, and some elements of data representation.
Class 1, Credit 1 (F)

EECC-341 Introduction to Digital Systems for Computer Engineers
The course covers the specification, analysis, and design of digital systems. The rapid growth of digital computers, 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 263-concurrent)
Class 3, Lab 3, Credit 4 (W)

EECC-452 Linear Control Systems
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. (EEEE-352 and SMAM-306)
Class 4, Credit 4 (S, SR)

EECC-550 Computer Organization
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
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
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
Introduction to some common transducers, transformations from raw measured quantity to transducer output. Instrumentation amplifiers, analog switching for applications in multiplexers and sample and hold circuits. The analog to digital and digital to analog conversions processes. Logic families including TTL, ECL, MOS, and their interfaces to each other. (4th year status in Computer Engineering)
Class 3, Lab 3, Credit 4 (F, W)

EECC-655 Projects in Computer 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 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)
Credit 4, Class 4 (S)
Technical Electives

EECC-605 **Introduction to the 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, SR)

EECC-620 **Design Automation of Digital 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**
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/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**
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 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**
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**
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-756 **Small Systems Workshop**
This course will cover the general guidelines, methodology, and approaches for the design, development, and use of single and multi, micro or minicomputer systems. The 16-bit microprocessors have vast address spaces and virtual memory capability, incorporate complex I/O facilities, and permit rapid execution of cost-saving, high-level languages. The hardware and software support available for 16-bit microprocessors also makes them a cost-effective alternative to minicomputers. Distributed systems based on microcomputer technology will be investigated with emphasis on interconnect structures, intercommunications, software and hardware. The course will include a laboratory workshop in which each student will be required to design, implement, and test one or more parts of a practical system. Emphasis will be placed on engineering ability and management skill to meet proposed technical goals on time and within budget. (Graduate standing in Computer Engineering with at least three core courses completed or permission of instructor)
Class 3, Lab 3, Credit 4 (S)

EECC-758 **Fault-Tolerant Digital Systems**
Formal models and concepts in fault diagnosis. Test generation and minimization. Redundant and self-checking systems. Fault-tolerant hardware- and software-based computer systems. (ICSS-400 or EECE-650 or EECE-750, EECC-550 or ICSS-720)
Class 4, Credit 4 (S)

EECC-759 **Digital Interface Circuits**
Standard bus interface—parallel and serial. LSI interface devices. 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)

Electrical Engineering

EEE-200 **Electrical Engineering 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)

EEE-240 **Introduction to Digital 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)

EEE-310 **Numerical Methods**
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)
EEE-453  
Signals and Systems  
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 inte-
gration of Fourier series. Fourier transforms; evaluation of Fou-
rier transforms, Linear; series; input and output FT. Energy spec-
trum and energy spectral density. Laplace transform; evaluation  
of Laplace transform. Inverse LT through partial fraction expan-
sion; application of LT to circuits and systems. Transfer functions  
(Bode diagram). Doublesided Laplace transform. (EEE-352,  
SMAM-306, SMAM-420)  
Class 4, Credit 4 (S, SR, Ext. day F)  
EEE-461, 462  
Electrical Engineering I, II  
Registration #0301-461, 462  
A course for nonelectrical engineering majors. Circuit analysis,  
electronics, switching circuits, logic and digital systems. (SPSP- 
311, SMAM-306)  
EEE-461: Class 3, Lab 3, Credit 4 (F, W, S)  
EEE-462: Class 3, Lab 3, Credit 4 (F, W)  
EEE-471, 472  
Electromagnetics Fields I, II  
Registration #0301-471,472  
Vector analysis electrostatics and dielectrics, conduction current  
fields, magnetic, time-varying fields. Maxwell's equations and  
wave equations. Concepts of retarded potentials. Electromagnetic  
propogation in waveguides, free space and transmission lines.  
Concepts of reflection, transmission and impedance matching.  
(SMAM-328, SPSP-313)  
EEE-471 Class 4, Credit 4 (S, SR, Ext. day S)  
EEE-472 Class 3, Lab 3, Credit 4 (F, W, Ext. day F)  
EEE-513  
Introduction to Automatic Control  
Registration #0301-513  
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. (EEE- 
453)  
Class 3, Lab 3, Credit 4 (S, SR, Ext. day F)  
EEE-531  
Electromechanical Energy Conversion  
Registration #0301-531  
A development of the basic relationships of field energy, mag-
netic force, torque and generated voltage in an electromechanical  
device. Expansion of these fundamentals into an under-
standing of the operational characteristics of the electrical  
machine. (EEE-352)  
Class 3, Lab 3, Credit 4 (F, W, Ext. day S)  
EEE-534  
Introduction to Communication Systems  
Registration #0301-534  
Review of linear systems as applied to communication signal  
processing. Non-linear devices in communication systems. Intro-
duction 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 fre-
quency 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)
EEE-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 rectifiers and inverter. AC and DC line control and frequency conversion using thyristors. The laboratory is an integral part of the course where the experiments complement the classroom lectures by providing exposure to the device characteristics, testing and measuring techniques and various thyristor systems. (EEE-441, EEEE-531 or concurrent registration for EEEE-531)
Class 3, Lab 3, Credit 4 (offered on sufficient demand)

EEE-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, bipolar transistors, FET and MOSFET. (EEE-442, SPSS-315)
Class 4, Lab 0, Credit 4 (F, W, Ext. day F)

EEE-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. (EEE-240, 544, 472)
Class 3, Lab 3, Credit 4 (S, SR, Ext. day S)

EEE-554 Digital Signal Processing
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, 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, intro to FFT. Quantization, effect: single quantization coefficient quantization, arithmetic quantization, signal scaling and overflow. (EEE-453)
Class 4, Credit 4 (F, W, Ext. day W)

EEE-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

EEE-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, CNTRL-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. (EEE-513, 554)
Class 3, Lab 3, Credit 4 (F)

EEE-621 Microwave Circuits and Devices
Review of basic electromagnetic theory. TEM transmission lines. Microwave waveguides. Microwave passive components. Ferrite components. Microwave solid-state devices. Microwave integrated circuits. (EEE-472)
Class 4, Credit 4 (offered on sufficient demand)

EEE-622 Antenna Theory-Analysis and Design
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. (EEE-472)
Class 4, Credit 4 (offered on sufficient demand)

EEE-623 Piezoelectricity and Pyroelectricity
Piezoelectricity and Pyroelectricity
Practical uses of piezoelectric and pyroelectric materials. Anisotropic materials including crystal symmetry. Tensor analysis. Electric polarization. Stress tensor. Strain tensor. Piezoelectricity. Pyroelectricity and thermodynamics and equilibrium properties of crystals. The course will include a laboratory to find creative new or improved uses for the piezoelectric and pyroelectric material: polyvinylidene fluoride (PVDF) (EEE-472, 442)
Class 3, Lab 2, Credit 4 (offered on sufficient demand)

EEE-645 Special Semiconductor Devices
Registration #0301-645
This course covers devices and applications not normally encountered in the required electronic sequence. Four-layer devices such as the SCR, P'T, and Triac are discussed in some detail along with typical power conversion applications. Auxiliary services like the IJT 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. (EEE-442)
Class 3, Lab 3, Credit 4 (offered on sufficient demand)

EEE-650 Design of Digital Systems
Registration #0301-650
This course deals with top-down design of medium to large digital systems using state diagrams and state machine charts. Design implementations include use of ROMs, PALs, PLAs, etc. Special consideration is given to minimization techniques, hazard elimination, synchronization, and synchronous sequential design. (EEE-240)
Class 4, Credit 4 (W, S)
EEE-665 Microcomputer-Based Systems Design
Registration #0301-665
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. (EEE-365)
Class 3, Lab 3, Credit 4 (F, SR)

EEE-666 16-Bit Microcomputer Systems
Registration #0301-666
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. (EEE-365)
Class 3, Lab 3, Credit 4 (W, S)

EEE-670 Introduction to Microelectronics
Registration #0301-670
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. (EEE-544)
Class 4, Credit 4 (SR, F)

EEE-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)

EEE-674 Fiber Optics: Theory and Application Registration #0301-674
To familiarize the engineer with the basic concepts involved in dealing with an ever-expanding field 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)

EEE-676 Communication Circuit Design
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, photore sist technology, wafer characterization, wafer 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. (EEE-670)
Class 2, Lab 6, Credit 4 (S)

EEE-677 Digital Filters and Signal Processing
Registration #0301-677
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. (EEE-554)
Class 4, Credit 4 (F, S)

EEE-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. (EEE-453)
Class 4, Credit 4 (W)

EEE-693 Digital Data Communications
Registration #0301-693
This course develops and applies the principles of modern communications theory to the design of digital communication systems. The impact of bandwidth, signal power and noise power on system performance is thoroughly discussed and related to PSK, FSK and OOK signal waveforms. The student will apply the concepts learned to the study of satellite communication systems. (EEE-534, 554, 472, SMAM 351)
Class 4, Credit 4 (W, S)

EEE-694 Information Theory and Coding
Registration #0301-694
The course introduces the student to the notion of quantitative measures of source entropy, information, equivocation, and mutual information leading to the topics of efficient source encoding, and communication channel capacities. 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. (EEE-240, 453, 534; SMAM-328, 351)
Credit 4

EEE-695 Introduction to Audio Engineering
Registration #0301-695
A course based on topics from dynamics, acoustics and audio systems. Topics include; electro-mechanical equivalents, plane and spherical acoustic waves, radiators and resonators, loudspeaker systems, equalization in recording and playback, and an introduction to the application of digital techniques to audio. (EEE-453, 442, 472)
Class 4, Credit 4 (S)

EEE-696 Communication Circuit Design
Registration #0301-696
A design course based on circuits used in radio communication systems. Design projects include: directional couplers, broadband matching transformers, phase-locked loops, narrow-band amplifiers, oscillators, and antennas. Computer simulation is used in some tasks. In all cases, circuit or device analysis is used to develop "design-equations" with which to realize operating specifications. Finished circuit, working simulation programs, or computer antenna patterns are generally the end products. (EEE-442, 554, 472)
Class 3, Lab 3, Credit 4 (offered on sufficient demand)
Graduate Courses

EEE-723 Semiconductor Physics
Registration #0301-723
An introductory course in semiconductor physics for engineering students. The emphasis in this course is semiconductor materials rather than semiconductor devices. Topics include: band gap theory, equilibrium carrier concentrations, transport mechanisms, deep and shallow impurities and properties of silicon, GaAs, Ge and other semiconductors.
Credit 4

EEE-724 Physics of Semiconductor Devices I
Registration #0301-724
A basic course dealing with the physics of semiconductor devices. Topics include: evaporation, sputtering, epitaxial growth, diffusion, ion implantation, oxidation of silicon, photolithography, pattern generation, layout of silicon integrated circuits, resistors, MOS capacitors, isolation techniques, and in-process measurement and testing. (EEE-723)
Credit 4

EEE-725 Physics of Semiconductor Devices II
Registration #0301-725
An intermediate level course in semiconductor device physics for engineering students. Limitations of bipolar and field effect transistors are studied. The physics of npn devices, solid-state optical devices, interface devices, and others are also discussed. (EEE-724).
Credit 4

EEE-726 Analog IC Circuits
Registration #0301-726
A course in the analysis and design of bipolar and MOS analog integrated circuits. Topics include: device models, amplifiers, current sources and active loads, output stages, operational amplifiers, and analog circuit design in MOS-LSI. Course will involve circuit design and computer simulation projects.
Credit 4

EEE-727 VLSI Design
Registration #0301-727
Design of very large scale integrated circuits at the level of Mead and Conway's VLSI Design. Topics include MOS devices and circuits, n-channel MOS process, data and control flow in systematic structures, implementing integrated system design, system timing, and examples of LSI computer systems. (EEE-724, 670, and a course in computer architecture)
Credit 4

EEE-730 Advanced Analog I. C. Design
Registration #0301-730
An advanced course in analog integrated circuit design. Students will study bipolar and MOS realization of op amps, analog multipliers, A to D and D to A converters, and more. The students will participate in design projects including circuit design, layout, and SPICE simulation (EEE-726)
Class 4, Lab 0, Credit 4

EEE-742 Advanced Microprocessor Software Design
Registration #0301-742
An introduction to the theory and application of top-down design, structure, abstraction, segmentation, high-level languages, and operating systems to real-time programs for microprocessors. The students will become proficient in a structured high level language. Topics include: Structure diagrams, separate module compilation, data types, data structures, self documenting code, procedures, meaningful variable names, linkage with other languages, object code libraries, operating system calls, multitasking, concurrent and re-entrant programs, and symbolic debugging. (EEE-365 or a high-level programming language)
Credit 4

EEE-744 Advanced Microprocessor Systems Design
Registration #0301-744
The effective application of microprocessors in the design of digital systems requires a knowledge of both hardware and software. This course will develop an understanding of assembly language programming and hardware design techniques. The role of macro-assemblers, editors, linking loaders, and other system software aids used in microcomputer development systems to produce efficient modular code will be covered. Several aspects of hardware/software organization of input/output programs will be considered including interrupts and direct memory access. The use of special LSI interface devices to allow a microcomputer to operate with peripheral devices such as A/D and D/A converters, CRT terminals, floppy disks, etc. will be studied. Laboratory sessions will be used to provide experience in the use of software development systems, and logic analyzers in developing and testing a microcomputer system design. (EEE-365, 742)
Credit 4

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

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

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

EEE-754 Analytical Techniques I
Registration #0301-754
Complex variable theory including conformal mapping; the Laurent expansion; Cauchy's theorem; the evaluation of contour integrals; advanced topics in continuous time Fourier series and transforms; The Laplace transforms, its existence and convergence; inversion integral; branch points; applications.
Credit 4 (F)

EEE-755 Analytical Techniques II
Registration #0301-755
Discrete time signals and systems; The z transform and its applications; solution of difference equations; concepts of stability; Discrete Fourier analysis; DFT, FFT algorithms; topics in Matrix theory: eigen values and eigen vectors; functions of a matrix; transformations; differentiation, integration, and exponentiation of matrices; matrix polynomials; Cayley-Hamilton theorem; concept of state variables; relationship between transfer functions and state variable representation for LTI systems; State Transition Matrix and its determination. (EEE-754)
Credit 4 (W)
EEE-756 Analytical Techniques III
Registration #0301-756
Review of probability theory; conditional probability and Baye's theorem; 1 random variables, distribution and density functions; functions of one and several random variables; sequences of random variables and central limit theorem; elements of statistics: sampling theory, sampling distribution and confidence interval, tests of hypothesis, linear and nonlinear regression; introduction to random processes; response of linear systems to random inputs. (Graduate standing, AT I and AT II are NOT prerequisites)
Credit 4 (S)

EEE-761 Modern Control Theory
Registration #0301-761
Review of state-space formulation of SISO systems; solution of state equations; STM and its properties. Application of state-space concepts; state variable design. Multivariate systems; preliminaries; systems of least order; stability and control. (EEE-754, 755, 513)
Credit 4

EEE-762 Nonlinear Control Systems
Registration #0301-762
An introduction to the physical nature and mathematical theory of nonlinear control systems' behavior using phase plane techniques. Liapunov theory (including Aizerman's method, variable gradient methods, and the Lure forms), perturbation methods, describing function techniques, and Popov's criterion. Analysis of switching and relays. These are applied to both piecewise-linear and analytical nonlinear systems. (EEE-761)
Credit 4

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

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

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

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

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

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

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

EEE-778 Fiber Optics
Registration #0301-778
The objective of this course is to educate the engineer in the applied optics field. Fundamentals of the fiber waveguide are treated using geometrical optics and Maxwell's equations. Other topics include design criteria, practical coupling techniques, discussion of optical sources and detectors used in fiber optical systems. Applications to communications and other areas will be discussed. (EEE-472 or equivalent)
Credit 4
EEE-789 Digital Image Processing
Registration #0301-779
This is an introductory course in digital image processing. The course begins with a study of two-dimensional signal processing and transform methods with applications to images. Image sampling is discussed followed by gray level description of images and methods of contrast manipulation including linear/nonlinear transformations and histogram equalization and specification. Image smoothing methods are considered including spatial and frequency domain low pass filtering. AD-HOC methods of noise removal and median filtering. Following this, methods of image sharpening are studied including derivative methods and high pass filtering. Edge and line detection methods are discussed using masks and hough transforms and methods of image segmentation are degradation and methods of image restoration including deblurring. Several extensive computer assignments are required. (EEE-755, 554 or permission of instructor)
Credit 4

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

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

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

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

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

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

EEE-786 Microwave Devices
Registration #0301-786
Theory of interaction between electron beams and electromagnetic waves. Microwave tubes; klystron, magnetron, traveling-wave tubes. Solid state devices: microwave transistors, tunnel diodes, Gunn diodes. IMPATT diodes LSA diodes.
Credit 4

EEE-787 Radar Engineering
Registration #0301-787
Credit 4

EEE-790 Random Signals and Noise
Registration #0301-790
Functions of two random variables. Mean square estimation. Orthogonality principle. Sequences of random variables. Central limit theorem. Random processes; correlation functions; spectrum of periodic functions and periodic random processes; spectral densities; the Gaussian random process; noise through linear systems. (EEE-755, 756)
Credit 4

EEE-791 Topics in Signal Analysis and Processing
Registration #0301-791
Signal representation of orthogonal functions; analytic signals and Hilbert transforms; optimum filters (matched, maximum fidelity, Wiener); discrete representation of continuous signals (sampling theorems); the discrete Fourier transform; linear discrete filters, introduction to homomorphic signal processing. (EEE-790)
Credit 4

EEE-792 Error Detecting and Error Correction
Registration #0301-793
This course covers linear block codes and convolutional codes. The major linear block codes to be covered are Hamming, BCH, Golay, and Reed-Solomon codes. The fundamentals structure of linear block codes will be developed and applied to performance calculations. The structure of cyclic codes will be developed and applied to encoders and decoders. The major error correction methods, including error trapping, majority logic decoding and the BCH algorithm will be developed and the Viterbi and sequential decoding algorithms will be studied. Questions of system performance, speed, and complexity will be examined. (EEE-756)
Credit 4

EEE-794 Information Theory
Registration #0301-794
An introduction to the fundamental concepts of information theory; entropy, equivocation, transinformation, and redundancy; coding for binary channels; measurement of signal parameters in the presence of noise; bandwidth vs. accuracy. (EEE-756)
Credit 4

EEE-795 Optical Engineering II
Registration #0301-795
This course emphasizes the application of wave optics to optical systems. Interference and interferometers. Thin films, diffraction, partial coherence, Fourier optics. Discussion of holography, optical data processing, imaging and other topics of current interest. (No prerequisites other than graduate standing)
Credit 4
EEE-800 Graduate Paper
Registration #0301-800
This course number is used to fulfill the graduate paper requirement under the non-thesis option for the MS degree in electrical engineering. The student must obtain the approval of an appropriate faculty member to supervise the paper before registering for this course.
Credit 5

EEE-890 Thesis
Registration #0301-890
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 for the thesis. A thesis may be used to earn a minimum of 6 credits and a maximum of 12 credits. The usual is 9 credits.
Credit variable.

Industrial Engineering

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

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

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

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

EIEI-401 Introduction to Operations Research I
Registration #0303-401
An introduction to the methodology of mathematical problem formulation. Investigation of mathematical programming techniques including linear programming and special types of linear programming problems such as the transportation and assignment algorithms. (SMAM-328 or permission of instructor)
Class 4, Credit 4 (F)

EIEI-402 Introduction to Operations Research II
Registration #0303-402
A survey of elementary mathematical models within the field of systems and industrial engineering. Areas of study include queuing theory, network analysis, and inventory theory. (SMAM-351, SMAM-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, S-415)

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

EIEI-481 Management Theory and Practice
Registration #0303-481
Development of the fundamental principles of the industrial enterprise. Internal organization as well as general economic conditions are considered. Emphasis is placed on the role of behavior science. (Permission of instructor)
Class 4, Credit 4 (F, W)

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 (W)

EIEI-560 Project Design
Registration #0303-560
A design course oriented to the solution of on-site industrial engineering problems. Each student group will attempt to define, analyze, design, and implement a solution to actual ongoing problems in the Rochester community. (Permission of instructor)
Class 4, Credit 4 (TBA)
The following courses can be used as professional electives within industrial engineering and are offered subject to sufficient demand. You should consult with your advisor for advice on professional electives outside of the industrial engineering discipline.

EIEI-450 Applied Human Factors Design of Experiments
Registration #0303-450
An applied approach to the problem of how one goes about running a study or experiment in human factors. (EIEI-511 or 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 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 Research
Registration #0303-504
A course intended to provide an integrated view of advanced programming techniques and their applications to industrial problems. Selected topics might include a working knowledge of PGERT, QGERT, etc. (EIEI-401, 402 or permission of instructor)
Class 4, Credit 4

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

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

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

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

Graduate Courses

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

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

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

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

EIEI-620 Engineering Economy
Registration #0303-620
Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting.
Credit 4

EIEI-715, 716 Statistical Analysis for Engineering I & H
Registration #0303-715, 716
A basic two-quarter course in probability and statistics designed to give the student a foundation for further study in areas such as design of experiments, stochastic systems, and simulation.
Credit 4

The following courses can be used as part of the Master of Engineering program in Industrial Engineering and Engineering Management. The courses are generally offered in alternating years and/or as demand dictates.
Credit 4
EIEI-701  Principles of Operations
Registration #0303-701  Research I
Applied linear programming. Computational techniques for solving constrained optimization problems. Linear programming, the Simplex method and variations, duality and sensitivity testing.
Credit 4

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

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

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

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

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

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

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

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

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

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

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

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

Credit 4
EIEI-740  Numerical Control and Manufacturing
Registration #0303-740
Numerical control is the technique of programming a machine (such as a mill) to manufacture a part with minimum operator interaction. Several levels of NC programming will be studied: manual programming, computer assisted programming and interactive graphics. Students will participate in extensive hands-on work using a mill and a lathe. In addition, the role that NC machines play in the Factory of the Past, Present, and Future will be discussed and analyzed.
Credit 4

Credit 4
EIEI-747  Microprocessor Applications
Registration #0303-747
Automated manufacturing processes demand effective computer-microprocessor interfacing. This course will provide the necessary knowledge of assembly language programming and digital hardware interfacing techniques. The role of macro-assembles, high level languages and system software aids to develop efficient modular programs will be discussed. One or more specific manufacturing related applications will be implemented. Microprocessor architectures and interfacing to several hardware elements such as VART, PIA A/D, D/A and other LSI chips will be covered. A greater emphasis will be placed on software aspects such as modularity, data structures, interrupt handling, communication protocols to design efficient hierarchical control systems for Computer Integrated Manufacturing.
Credit 4
Special courses related to a particular student’s interest can be arranged via the following course:

EMEM-322 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 moment, and vibrations. Emphasis is on problem solving (EMEM-331)
Class 4, Credit 4 (S)

EMEM-335 Elements of Statics
Registration #0304-335
This two credit-hour course is intended as an introduction to the principles of statics for non-mechanical engineering students with a view to providing adequate background for a subsequent course in dynamics. This basic course treats the equilibrium of particles and rigid bodies under the action of forces. Topics include forces, couples, equilibrium, centroids, and friction. (Prerequisite: SPSP-311; corequisite: SMAM-253)
Class 2, Credit 2 (W)

EMEM-336 Statics
Registration #0304-336
This basic course treats the equilibrium of particles and rigid bodies under the action of forces. It integrates the mathematical subjects of calculus, vector algebra, and simultaneous algebraic equations with the physical concepts of equilibrium. Topics covered include concepts of force and moment, trusses, frames, machines, shear force and bending moment diagrams and equations, friction, fluid statics, centroids and moments of inertia. (Prerequisite: SPSP-311; corequisite: SMAM-253)
Class 4, Credit 4 (F)

EMEM-337 Strength of Materials I
Registration #0304-337
This basic course in statics of deformable bodies integrates fundamentals of mathematics with those of physics to study the mechanics of deformation of solids in equilibrium. Topics covered include stress-strain relationships, stresses and strains due to axial loads, torsion and bending moments. (EMEM-336)
Class 3, Lab/Rec. 2, Credit 4 (W)

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

EMEM-341 Introduction to FORTRAN Programming
Registration #0304-341
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 is also covered.
Class 2, Credit 2 (TBA)

EMEM-343 Materials Processing
Registration #0304-343
This course involves a study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Topics covered include cutting processes, casting, forming, powder metallurgy, welding, and processing of plastics.
Class 3, Lab 2, Credit 4 (F, W)

Mechanical Engineering
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-210 Introduction to Graphics
Registration #0304-210
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 experience. Students having engineering drawing experience in school or the equivalent may take a qualifying examination for an exemption. From this course. The course work conforms to A.N.S.I. standards.
Class 1, Lab 2, Credit 2 (F, W)

EMEM-310 Advanced Graphics
Registration #0304-340
A continuation of engineering graphics to study intermediate topics. The topics studied are auxiliary views, geometric dimensioning and tolerancing, tolerances of form, mating part fits, shrink processes, working and assembly drawings. Several classes are devoted to an introduction to computer graphics. The course work conforms to A.N.S.I. standards.
Class 2, Lab 4, Credit 4 (TBA)

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-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-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-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 coordinates. Also, the students are introduced to the properties of pure substances, and open systems. (SMAM-306, EMEM-336)
Class 4, Credit 4 (F, W)

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

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)
Class 3, Lab/Rec. 2, Credit 4 (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 (S, SR, 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-338)
Class 4, Credit 4 (F, W)

EMEM-439 Dynamics I
Registration #0304-439
A basic course in the two-dimensional kinematics and kinetics of particles using a vector approach, with an introduction to three-dimensional particle motion. Newton's Laws, the Energy Method, and the Method of Impulse-Momentum are applied to various problems. (EMEM-336, SMAM-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 to interpret and analyze 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-341, or equivalent computer experience, and third-year standing)
Class 4, Credit 4 (S, SR)

EMEM-501 Laboratory
Registration #0304-501
A course in instrumentation and mechanical measurement techniques, with emphasis on laboratory experiments to verify and extend the lecture material. Topics include the general theory of instrumentation systems for mechanical measurements including static and dynamic output characteristics of first and second order measurement systems and theory and methods of processing the output of these transducer elements. Also discussed are methods of determining and handling experimental uncertainty including accuracy and precision of instruments, propagation of error, and statistical evaluation of experimental results. Laboratory work utilizes various types of instrumentation to provide the student with first-hand experience in the calibration of instruments, error analysis, and determining the static and dynamic response characteristics of instrumentation systems. (Fifth-year standing)
Class 3, Lab 2, Credit 4 (F, W)

EMEM-514 Heat Transfer I
Registration #0304-514
This is a basic course in the fundamentals of heat transfer by conduction, convection, and radiation, together with 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)
Class 4, Credit 4 (F, W)

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

**EMEM-543** Dynamics II
Registration #0304-543
This course deals with the dynamics of rigid bodies. Systems of particles are used to introduce the student to the concept of rigid body. Absolute and relative motion analyses are used to investigate kinematics of systems of rigid bodies. Newton's Laws, work-energy principle and the method of impulse and momentum are applied to various problems.

A lab associated with the course introduces the students to ACSL. Students are required to generate ACSL models for various problems and run them for different values of parameters. (EMEM-439)

Class 4, Credit 4 (F, W)

**EMEM-544** Dynamics of Physical Systems
Registration #0304-544
A basic course in the dynamics of mechanical, electrical, thermal and fluid lumped parameter systems. Mathematical models of first and second order systems are defined. Dynamic response of these systems are studied both in natural motion and forced motion. Response due to sinusoidal inputs is studied using the Bode plot. The concept of dynamic stability is studied for higher order systems using the Root-Locus method and Routh's Criterion. Transfer functions are defined and Laplace Transform Method is defined and used. (EMEM-543)

Class 4, Credit 4 (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-601** Alternative Energy Sources
Registration #0304-601
Emphasis is on the technical aspects of solar and wind energy. Wind characteristics and site analysis, aerodynamics of horizontal and vertical axis rotors, and the economics of wind power. Fundamentals of solar radiation, solar hot water heating and solar space heating, and the economics of solar utilizations. Included, but to a lesser extent, are tidal power, wave power, geothermal energy, ocean thermal gradient, and energy from waste. Individual term projects are required. (EMEM-514)

Class 4, Credit 4 (TBA)

**EMEM-605** Applications in Fluid Mechanics
Registration #0304-605
This Group I course deals with specific design-oriented applications of fluid mechanics. The course will cover one of the following topics: (a) hydrodynamics, (b) dispersion and diffusion in the environment, (c) aerodynamics, and (d) two-phase flows. Students are required to design, and sometimes to build a prototype. Use of digital computer is encouraged in the design process. (EMEM-516, EMEM-514)

Class 4, Credit 4 (F, W)

**EMEM-615** Robotics
Registration #0304-615
This is 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. A major emphasis is placed in a term project involving an actual industrial problem. (EMEM-437, 543)

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 (F, W)

**EMEM-635** Heat Transfer
Registration #0304-635
The course considers numerical solution of heat transfer problems requiring the use of digital computer programming. It also investigates forced and natural 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-514)

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

**EMEM-652** Fluid Mechanics of Turbomachinery
Registration #0304-652
This course examines the fundamentals of fluid mechanics 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)

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

Class 3, Lab 2, Credit 4 (S)

**EMEM-660** Refrigeration and Air Conditioning
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, solar radiation, heat transmission in buildings, and thermodynamic design of air conditioning systems. Students are expected to do a design project. (EMEM-414, EMEM-514)

Class 4, Credit 4 (S)

**EMEM-672** Dynamics of Machinery
Registration #0304-672
This course treats the fundamentals of dynamic design of machinery. Topics include dynamic analysis of mechanisms, graphical kinematics, the method of virtual work applied to dynamical systems, cam design and balancing. The digital computer and machine plotting are used. A major emphasis is placed on a term project. (EMEM-543)

Class 4, Credit 4 (S, SR)
Group II Courses

**EMEM-608** Registration #0304-608 Thermal Fluids Design & Engineering Management

The course consists of an open-ended thermal fluids system design project and classroom lectures and discussion of engineering organizational and management practices. (EMEM-414, 516 and either EMEM-635 or 652)

Class 4, Credit 4 (F, W)

**EMEM-610** Registration #0304-610 Thermal Fluids Design & Optimization

The course consists of an open-ended thermal fluid system design project and classroom lectures and discussion of the optimization of thermal fluid systems both from a design and operational viewpoint. (EMEM-414, 516 and either EMEM-635 or 652)

Class 4, Credit 4 (S)

**EMEM-620** Registration #0304-620 Introduction to Optimal Design

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 major design project is required. (EMEM-440, EMEM-543, EMEM-437)

Class 4, Credit 4 (F, W)

**EMEM-625** Registration #0304-625 Mechanical Devices and Assemblies

A study of basic techniques of creative design, and how to stimulate creative action in mechanical design. The course will include presentation of examples from industrial applications. There will be a significant portion devoted to VAVE activities and there will be a project relating to this. Both group and individual activities will be covered. Techniques for establishing design goals will be explored as well as methods for measuring achievement of these goals. A key concept covered by the course is selection of optimum configuration in cases where several viable ideas have been generated. (EMEM-543, EMEM-437)

Class 4, Credit 4 (TBA)

**EMEM-632** Registration #0304-632 Advanced Mechanical Systems Design

Procedures and techniques for designing complex dynamic mechanical systems are presented. Students apply these principles to the design of a specific system while working in small design groups. Each group may be assigned an independent design or a subsystem as part of design project assigned to the class. Determination of functional needs to meet system specifications, conceptual design, value analysis and evaluation of alternatives and computerized design are topics specifically covered for the systems related open-ended design problem. Knowledge from basic mathematics and engineering science is integrated with conceptual reasoning and practical aspects in solving the design problem. The professionalism and ethics of engineering are discussed. (EMEM-437 and a Group I course)

Credit 4 (F, W, S)

Elective Courses

**EMEM-637** Laser Engineering

Laser Engineering studies the applications of lasers as engineering tools. Background physics relevant to the operation of a laser and the interaction of light with matter is given. Safety regulations are discussed and specific applications in industry are covered. (SPSP-314)

Class 4, Credit 4 (TBA)

**EMEM-650** Gas Dynamics


Class 4, Credit 4 (TBA)

**EMEM-651** Viscous Flows


Class 4, Credit 4 (TBA)

**EMEM-669** Introduction to Water Pollution

Hydrologic cycle; water supply and sources; waste water generation volumes and characteristics; chemical and biological treatment processes; waste water transport and hydraulics; thermal discharges; elements of dispersion analysis for rivers, estuaries and lakes. (EMEM-514, 516)

Class 4, Credit 4 (TBA)

**EMEM-680** Advanced Thermodynamics

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

Class 4, Credit 4 (TBA)

**EMEM-685** Advanced Strength of Materials

Statically indeterminate problems for beams; frames; continuous beams; beams of variable cross section, reinforced-concrete beams; beams on elastic foundation; stability of columns; plastic deformation in bending and torsion; limit analysis; energy methods with applications to beams, curved bars, and frames; rotating disks; introduction to composite materials. (EMEM-338)

Class 4, Credit 4 (TBA)

**EMEM-687** Engineering Economy

This elective course deals with a study of cost concepts, nominal and effective interest rates, and selection among alternatives using present, annual, and future worth methods as well as rate of return methods. Depreciation and income taxes are also considered. (Fifth-year standing)

Class 4, Credit 4 (TBA)
EMEM-690  Environment and the
Registration #0304-690  Engineer
This course will study the role of engineers in society and in particular their responsibility in the analysis and solution of the problems facing the environment in an increasingly technological society. Problems to be studied from a "case study" standpoint will include such things as air, water, and noise pollution, thermal pollution, and the effects of population growth. The course will include field trips, outside expert speakers, and each student will be expected to participate in the indepth 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
Partial 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
Registration #0304-698  Project
This is a design-oriented independent study requiring a major design project. (Senior standing)
Credit 4

Graduate Courses

The courses EMEM-870, EMEM-871, EMEM-872, EMEM-874 and EMEM-877 are offered every year. The other courses (except those listed as “offered on sufficient demand”) are typically offered every other year.

EENG-801  Design for Manufacture
Registration #0302-801
This is a required course in the manufacturing option of the master of engineering degree program. The course is offered jointly by the Departments of Industrial and Mechanical Engineering and presents an overview of the factors influencing product design and the manufacturing cycle. Topics include component design and analysis, design for manufacturability as well as function, and design for manual and automated assembly. Students will gain hands-on experience with the Boothroyd-Dewhurst system to quantify design efficiency. This includes a project. The various manufacturing processes as they relate to modern trends in DFM are covered in detail. (Graduate standing)
Class 4, Credit 4 (W)

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

EMEM-811  Theory of Elasticity
Registration #0304-811
Class 4, Credit 4 (TBA)

EMEM-812  Theory of Plates and Shells
Registration #0304-812
Class 4, Credit 4 (S)

EMEM-813  Theory of Plasticity
Registration #0304-813
The analysis of stress and strain. Criteria for yielding. Stress-strain relations of the theory of plasticity. Elastoplastic problems. Different methods will be demonstrated. (EMEM-694 or equivalent)
Class 4, Credit 4 (TBA)

EMEM-815  Experimental Stress Analysis
Registration #0304-815
Experimental methods of analysis of structural machine members, including strain gages and instrumentation, photoelastic methods, brittle coating, Moire fringe method, holographic techniques; and the hydrodynamic, electrical, and membrane analogs. Different methods will be demonstrated. (EMEM-804 or equivalent)
Class 4, Credit 4 (TBA)

EMEM-816  Finite Elements
Registration #0304-816
Boundary value problems in mechanical engineering are discussed and presented through the development of the governing field equations of a continuum in structural mechanics, heat transfer and fluid mechanics. The process of discretization of a continuum by the finite element method is presented using energy principles, and applied to the field equations outlined above. In the course of application, various line, surface, and solid elements are defined and developed. Numerical considerations presented include topics such as solution time, optimization, condensation methods, computer characteristics, etc. Commercial codes such as NASTRAN, ANSYS, GIFTS, and SAP will be discussed. However, the students will solve problems using fundamental approaches that will involve hand calculations and writing some individual computer programs. (EMEM-870, EMEM-871, EMEM-440 or equivalent)
Class 4, Credit 4 (F)

EMEM-820  Advanced Optimal Design
Registration #0304-820
Topics from nonlinear programming as applied to automated optimal design. Use of penalty functions for the transformation of constrained nonlinear optimization problems. Multivariate pattern and gradient based algorithms, such as the method of steepest descent, Newton's method, quasi-Newton methods, and generalized conjugate gradient techniques. Algorithms for the univariate subproblem of the line search. Applications to the solution of practical nonlinear optimization problems using the digital computer. (EMEM-871 and EMEM-874)
Class 4, Credit 4 (TBA)

EMEM-821  Vibration Theory and
Registration #0304-821  Applications
Class 4, Credit 4 (S)
The course emphasizes the current role of computer graphics in computer-assisted design and design analysis. Subjects include: components of CAD systems, methods of geometric modeling, visualization methods, techniques of interactive communication, and design applications utilizing available software packages for multidimensional graphic display, pre- and post-processing mod-  
eders for finite element analyses, and three-dimensional solids modeling. (Graduate standing)  

Class 4, Credit 4 (TBA)  

EMEM-828, 829 Special Topics in Applied I  
Registration #0304-828, 829 Mechanics  
In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of reg- 
ular courses will be presented. These courses will be structured as  
ordinary courses with specified prerequisites, contact hours, and  
examination. A listing of topics for special courses is found at the  
end. (Graduate standing)  

Credit variable (maximum of 4 credits/quarter) (TBA)  

EMEM-833 Heat Exchanger Design  
Registration #0304-833  
This course covers analytical models for forced convection  
through tubes and over surfaces, experimental correlations for  
the Nusselt number and pressure drop, design of single and mul- 
tiple pass shell and tube heat exchangers; compact baffled, direct  
contact, plate, and fluidized bed heat exchangers; radiators, recu- 
perators, and regenerators.  

(GradEMEM-514)  

Class 4, Credit 4 (W)  

EMEM-838 Ideal Flows  
Registration #0304-838  
This graduate course introduces the students to the analysis of  
ideal flows from an advanced mathematical as well as engineering  
viewpoint. Steady acyclic motion, superposition of flows, vorticity  
dynamics; the theory of complex variables; airfoil and wing the- 
ories. (EMEM-871, EMEM-516 or equivalent)  

Class 4, Credit 4 (S)  

EMEM-848, 849 Special Topics in Thermo  
Registration #0304-848, 849 Fluid Systems  
In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of reg- ular courses will be presented. These courses will be structured as  ordinary courses with specified prerequisites, contact hours, and examination. A listing of topics for special courses is found at the end. (Graduate standing)  

Credit variable (maximum of 4 credits/quarter) (TBA)  

EMEM-864 Production Tool Design  
Registration #0304-864  
This is a course in the core group, CAD, of the manufacturing  
eering option in the master of engineering degree pro- 
gram. Design of production tooling, jigs and fixtures for the  
economical manufacture of modern parts is covered in detail. The student must do research in current publications, and complete and present a project. Project selection can usually be arranged to incorporate an assembly of parts from the student's normal work. There will be field trips to local specialty firms. (Graduate standing)  

Class 4, Credit 4 (F)  

EMEM-865 Applications of the Finite  
Element Method Using NA 
Registration #0304-865  
This is a course in the core group, CAD, of the manufacturing  
eering option in the master of engineering degree pro- 
gram. This course emphasizes the application of the finite element method to problems in the area of static and dynamic structural analysis, heat transfer, and analogous solutions. The industrial software package, NA 
STRAN, is used for these applications where the general structure, operating characteristics, and use of this complex program is presented. Topics include: the finite element method; shape factors, element formulations, and the NA 
STRAN element library; NA 
STRAN sequencing; general modeling methods (loads, constraints, material factors, mesh generation, interactive graphics, model conditioning, etc.); convergence, error analysis, and the "patch" test; vibration and heat transfer analysis, and analogous analysis such as acoustics, illumination, etc. (EMEM-816)  

Class 4, Credit 4 (F)  

EMEM-870 Mathematics for Engineers I  
Registration #0304-870  
A concise introduction to the concepts of matrix and linear alge 
bra, including determinants, eigenvalues, systems of linear equa 
tions, vector spaces, linear transformations, diagonalization, or-thogonal subspaces and the Gram-Schmidt orthonormalizing proce 
dure. (Graduate standing)  

Class 4, Credit 4 (F)  

EMEM-871 Mathematics for Engineers II  
Registration #0304-871  
Topics covered are orthogonal functions including Fourier Se 
ries, Fourier Integrals, Bessel functions, Legendre Polynomials,  
Sturm-Liouville problems and eigenfunction expansions; an intro 
duction to calculus of variations, including problems with con 
straints; vector analysis including the directional derivative, the  
gradient, Green's Theorem, the Divergence Theorem and Stokes'  
Theorem. (Graduate standing)  

Class 4, Credit 4 (F, W)  

EMEM-872 Mechanics  
Registration #0304-872  
Variational principles are developed and applied to the area of  
solid mechanics. Exact and approximate solution techniques are  
plied to the solutions of static and dynamic structural prob- 
lems. Although static analysis is emphasized, dynamic problems will be introduced. Topics presented include: Calculus of Variations, Virtual Work, minimum potential energy, Castigliano's method, the Rayleigh-Ritz method, Galerkin's method, Hamilton's principle, and Lagrange's equations. (EMEM-871 and EMEM-543 or equivalent)  

Class 4, Credit 4 (S)  

EMEM-873 Heat Transfer  
Registration #0304-873  
This course deals with mechanisms and applications of forced convection heat transfer. Governing equations are analyzed and applied to practical situations such as single phase heat transfer during flow inside tubes, cooling of electronic components, flow boiling, and augmentation of single phase and two phase heat transfer. (EMEM-877)  

Class 4, Credit 4 (F)
EMEM-874 Numerical Analysis
Registration #0304-874
The course emphasizes both the development of the current numerical methods that are available to solve engineering problems and the use of the digital computer to implement these techniques. The methods are developed for: Algebraic and transcendental equations in single variable; system of linear algebraic equations by both direct and iterative techniques; system of non-linear equations, interpolation and approximation theory; numerical differentiation and integration, initial value problems for ordinary differential equations; boundary value problems for ordinary linear and nonlinear differential equations; and partial differential equations; discussion on convergence and stability of methods, effect of truncation and round off errors. Extensive use of the computer will be required. (Graduate standing; knowledge of FORTRAN, experience in the use of digital computers)
Class 4, Credit 4 (W)

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

EMEM-877 Fluid Dynamics
Registration #0304-877
This is an introductory course at the graduate level in fluid dynamics intended to give the students a broad exposure to incompressible flows. This course lays the foundation, and is a prerequisite for a study of advanced topics in heat transfer, advanced aerodynamics, computational fluid dynamics, wave mechanics, and geophysical fluid dynamics. This course includes conservation laws and boundary conditions, potential flows, highly viscous flows, boundary layer theory, flow stability and transition to turbulence. (EMEM-871, Graduate standing)
Class 4, Credit 4 (W)

EMEM-880 Independent Study
Registration #0304-880
An opportunity for the advanced student to undertake an independent investigation in a special area under the guidance of a faculty member. A written proposal is to be forwarded to the sponsoring faculty member and approved by the department head prior to the commencement of work. (Graduate standing)
Credit variable (maximum of 4 credits/quarter) (TBA)

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

SESM-701 Introduction to Materials Science
Registration #1028-701
The course provides an understanding of the relationship between structure and properties for development of new materials. Topics include: atomic and crystal structure, crystalline defects, diffusion theories, strengthening mechanisms, ferrous alloys, cast irons, structure of ceramic and polymeric materials, and corrosion principles. (SCHG-208 or equivalent)
Class 4, Credit 4 (F, W)

SESM-710 Properties and Selection of Engineering Materials
Registration #1028-710
This course deals with effective material selection which requires that a designer be familiar with many material systems and be acquainted with a nominal number of specific materials in these systems. The course contains theory not found in handbooks and practical information not covered in materials science or metallurgy courses. Emphasis is placed upon the application of materials according to the properties and principles of material behavior. Ferrous, nonferrous and nonmetallic materials are covered. (SESM-701 or equivalent)
Class 4, Credit 4 (TBA)

Special topic courses will be offered in the following areas if there is a sufficient demand:
- Energy Methods in Mechanics
- Advanced Vibration Theory
- Lubrication
- Advanced Heat Transfer
- Advanced Thermodynamics
- Control Systems
- Thermal Stresses
- Aerodynamics
- Wave Mechanics
- Computational Fluid Dynamics
- Geophysical Fluid Dynamics

Microelectronic Engineering

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

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

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

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

EMCR-530 Electromagnetic Fields I
Registration #0305-530
A study of electrostatics and magnetostatics important to the understanding of physics of semiconductor devices and microelectronic processing.
Class 4, Credit 4
EMCR-540 Electromagnetic Fields II
Registration #0305-540
A study of time varying electromagnetic fields important to optical and electrical systems. Topics include Maxwell's equations, wave equations, electromagnetic propagation in free space and guided structures. Concepts of reflection, transmission, and matching.
Class 3, Lab 3, Credit 4

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

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

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

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

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

School of Art and Design

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

FADC-301, 302, 303  Introduction to Graphic Design
Registration #0402-301, 302, 303
An introduction to the field of graphic design through explorations of formal and perceptual understanding and control; deals with point, line, shape, color, pattern, organizational systems, Gestalt principles, dimension interaction and communications. The relationship to typography and photography to graphic design is included. (Foundation program or equivalent)
Recommended course work also includes concentrated work in typography, photography, and art for reproduction methods. No special sequence required. Prerequisite for major in Graphic Design.
Lab 9, Credit 4 (offered each year)

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

FADC-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 topic of design study.
Lab 6, Credit 3 (offered each year), Elective

FADC-520 Professional Design Business
Registration #0402-520
Ethical principles will be discussed along with sound business practices; setting up in business; invoicing and costing, the designer and the law; professional associations.
Class 3, Credit 3 (offered every other year)

FADD-301, 302, 303  Industrial and Interior Design
Registration #0403-301, 302, 303  (Sophomore Core)
An introduction to the fields of industrial and interior design. Emphasis on basic processes for design conceptualization and development.
301—Graphic Visualization
302—Spatial Form
303—Object Form
Lab 6, Credit 4 (offered each year)

FADD-311, 312, 313 Industrial and Interior Design
Registration #0403-311, 312, 313
An elective offering basic instruction and involvement in industrial and interior design projects. Each quarter concentrates on a specific topic of design study.
Lab 6, Credit 3 (offered each year), 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 each year)

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

FADD-411, 412, 413 Design Applications
Registration #0403-411, 412, 413
An elective that provides basic instruction in three dimensional computer graphics applications for designers.
Lab 6, Credit 3, Elective

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

FADF-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.
Class 3, Lab 3, Credit 3 (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)

FADF-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.
Lab 9, Credit 4 (offered each year)

FADF-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. Development of basic 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)

FADF-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)

FADF-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)

FADF-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)

FADF-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)

FADF-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

FADF-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) (offered each year)
Lab 6, Credit 5, (W, S) (offered each year)

Medical Illustration Gross Anatomy
Dissection and study of the human body is presented with such topics as developmental comparative and applied anatomy. Emphasis is directed toward osteology, radiographic anatomy, photography and of the cadaver.
Required of all students in the medical illustration program, offered through the University of Rochester Medical Center, with a tuition surcharge.

FADF-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)

FADF-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)

FADF-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)

FADF-511, 512, 513 Painting Registration #0405-511, 512, 513
An elective that provides further exploration of personal expressive styles through a painting media.
Lab 6, Credit 3 (offered each year), Elective
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FADP-531,532,533</td>
<td>Advanced Medical Illustration</td>
<td>Advanced medical illustration techniques. Graphic design related to illustrative and photographic practice. Lab sessions to be scheduled in operating room facilities. Jointly sponsored between RIT and the University of Rochester. Lab 18, Credit 6 (offered each year)</td>
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<tr>
<td>FADR-401,402,403</td>
<td>Printmaking (Junior Major)</td>
<td>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)</td>
</tr>
<tr>
<td>FADR-404,405,406</td>
<td>Printmaking-Illustration</td>
<td>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)</td>
</tr>
<tr>
<td>FADR-411,412,413</td>
<td>Printmaking</td>
<td>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</td>
</tr>
<tr>
<td>FADR-501,502,503</td>
<td>Printmaking (Senior Major)</td>
<td>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)</td>
</tr>
<tr>
<td>FADR-504,505,506</td>
<td>Printmaking/Illustration</td>
<td>Continuation of third year printmaking and illustration. Printmaking: Expanding the technical involvement with paper making, photo etching and photo litho. The student has the opportunity to specialize in the direction of natural ability and interest. A limited edition portfolio project is developed with the participation of all students. Illustration: Emphasis is on draft 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)</td>
</tr>
<tr>
<td>FADR-511,512,513</td>
<td>Printmaking</td>
<td>An elective that provides further exploration of printmaking with emphasis on personal statement. Lab 6, Credit 3 (offered each year)</td>
</tr>
<tr>
<td>FADS-411,412,413</td>
<td>Sculpture</td>
<td>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. Class 3, Lab 3, Credit 3 (offered each year)</td>
</tr>
<tr>
<td>FADK-301,302,303</td>
<td>Packaging Design</td>
<td>Packaging Design</td>
</tr>
<tr>
<td>FADK-401,402,403</td>
<td>Packaging Design II</td>
<td>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)</td>
</tr>
<tr>
<td>FADK-501,502,503</td>
<td>Packaging Design III</td>
<td>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)</td>
</tr>
</tbody>
</table>

**School for American Craftsmen**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSU-200</td>
<td>Ceramics Materials and Processes</td>
<td>Sequential course for three quarters providing fundamentals of the preparation and use of clay. Methods of fabrication such as hand building, application of glazes. Stacking and firing of kilns. Ceramic Sculpture. The organization of the ceramic shop. Survey of pottery. Lab 15, Credit 5 (offered each year)</td>
</tr>
<tr>
<td>FSU-251,252,253</td>
<td>Ceramics Elective I</td>
<td>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)</td>
</tr>
<tr>
<td>FSU-300</td>
<td>Ceramics Materials and Processes</td>
<td>Sequential course for three quarters providing intensive work on the potters wheel and individual clay and glaze problems. Emphasis on function and decorative techniques, ceramic raw materials, sources of supply, use and maintenance of equipment and glaze chemistry. Lab 15, Credit 5 (offered each year)</td>
</tr>
<tr>
<td>FSU-351,352,353</td>
<td>Ceramics Craft Elective II</td>
<td>An elective course providing an opportunity for more advanced study in ceramics. Wheel and hand built pottery, along with glaze information, will be studied. Lab 6, Credit 3 (offered each year)</td>
</tr>
<tr>
<td>FSU-500</td>
<td>Ceramics Techniques and Processes</td>
<td>Sequential course for three quarters, treating problems related to ceramic production culminating in a research and thesis project. Lab 24, Credit 8 (offered each year)</td>
</tr>
</tbody>
</table>
FSCF-225, 226, 227  Art and Civilization  Registration #0410-225, 226, 227
Survey of the history of art from prehistory to the present, with particular attention given to the social and cultural backgrounds of art production and to the relationship between the arts: architecture, sculpture, painting, and decorative arts and crafts. Lectures, independent study, discussion groups, assigned gallery visits, papers, reports.
Class 3, Credit 3 (offered each year)

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

FSCF-310  History of Crafts  Registration #0410-310
Explores creative thinking and designing in the area of crafts through the ages with special emphasis on clay, fibers, glass, metal and wood. The course highlights the artistic achievements of the craftsmen of the past to enable present students to view their own time in its historical perspective and thereby understand more thoroughly their creative heritage and the efforts of contemporary craftsmen.
Class 3, Credit 3 (offered each year)

FSCF-320  History of Art Criticism  Registration #0410-320
A study of what makes art "good," (philosophical theories of art and the aesthetic experience) and what art criticism is and does (types and principles of art criticism) with direct applications to the life and work of the artist and craftsman/designer.
Class 3, Credit 3 (offered each year)

FSCF-330  Philosophy in Art  Registration #0410-330
Traces the historical changes that art has undergone. Traces the interaction between philosophic thought and artistic styles throughout art history. Explores art as a reflection of human values.
Class 3, Credit 3 (offered each year)

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

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

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

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

FSCF-380  Contemporary Art  Registration #0410-380
A study of the painting, printmaking, sculpture, architecture and crafts from the 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)
A sequential course for three quarters providing fundamentals of glassworking. The function and use of hand and machine glassworking tools. An analysis of glass as a material: its history, chemical make-up, intrinsic qualities and potential. Fundamental techniques of stained glass and glass fabrication. An introduction to the use of coldworking techniques: slump molds, lamination, non-glass surface decoration, etching, sandblasting, grinding, polishing.
Lab 15, Credit 5 (offered each year)

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

FSCG-300  Glass Materials and Processes (Sophomore Major)
A sequential course for three quarters providing an analysis and discussion of glass design and problems of fabrication with emphasis on surface decoration. The formulation and adjustment of various glass batches with in-depth analysis of color. Explores the history of ancient through contemporary glass with studies at the Corning Museum of Glass and its collections. The use and construction of studio equipment, museum visits, papers and reports.
Lab 15, Credit 5 (offered each year)

FSCG-351, 352, 353  Glass Elective II  Registration #0411-351, 352, 353
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 each year)

FSCG-400  Glass Materials and Processes (Junior Major)
A sequential course for three quarters treating the organization and design of the glass studio. The development of production techniques for blowing and forming glass. The development of unique approaches to visual self-expression, papers and reports.
Lab 15, Credit 5 (offered each year)

FSCG-500  Glass Techniques and Thesis (Senior Major)
A sequential course for three quarters providing individual research in technical problems culminating in a thesis. The student will organize and present a senior exhibition of work related to the thesis, papers, lectures and demonstrations.
Lab 24, Credit 8 (offered each year)
A basic course in design and techniques in textiles. Each quarter a different area of study is undertaken in basketry, stitchery and non-loom processes.
Lab 6, Credit 3 (offered each year)

FSCT-200 Textile Materials and Processes (Freshman 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 each year)

FSCT-400 Textile Materials and 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 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 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 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-251, 252, 253 Wood Elective I
Registration #0414-251, 252, 253
An elementary course in design and techniques in woodworking. Hand and power tools will assist in the small scale making of wood objects.
Lab 6, Credit 3 (offered each year)

FSCW-300 Woodworking Materials and Processes (Sophomore Major)
Sequential course for three quarters, covering advanced design, layout and construction. Plywood construction, chairmaking and chest of drawers technique. Limited production of small accessories including jigs, and pricing. Historical development of furniture and interiors, papers, reports.
Lab 15, Credit 5 (offered each year)

FSCW-351,352,353 Wood Elective II
Registration #0414-351, 352, 353
An elective course providing an opportunity for more advanced study in wood. Hand and power tools will assist in the small scale making of wood objects.
Class 3, Lab 3, Credit 3 (offered each year)
School of Art and Design

Graduate Courses

Beginning September 1982, the Communication Design program name has been changed to Graphic Design, and Environmental Design has been changed to Industrial and Interior Design.

Courses for the education concentration of the MST program are offered through the College of Liberal Arts, and course descriptions are given under that heading with a Liberal Arts call number.

Art Education

FADA-701, 702 (MST) Methods and Materials in Art Registration #0401-701, 702 Education (Major)
Intensive study of curriculum in terms of teaching materials for both studio and appreciation aspects of elementary, early secondary and high school art education. Includes studio and elementary school teaching experience.
Class 2, Lab 9, Credit 5 (F, W) (offered every year)

FADA-820 (MST) Seminar in Art Education Registration #0401-820 (Major)
Evaluation and study of the practice teaching experience. Discussion of the professional role of the art teacher in terms of professional associations, supervision, teacher training, and research. A final project on some intensively studied aspect of art education is required.
Lab 25, Credit 3 (offered every year-Spring)

FADA-860 (MST) Practice Teaching in Art Registration #0401-860 (Major)
A seven-week full-time practice teaching experience in secondary school, including professional duties of the art teacher in humanities courses, publication advising, audiovisual work, and supervision. Supplements the studio-theoretical education. Meets the state education requirements.
Credit 9 (offered every year-Spring)

Graphic Design

FADC-780 Graphic Design (Major)
Registration #0402-780
Advanced creative problem-solving experiences relating to graphic design imagery. Formal design values are emphasized and utilized in communications applications. Studio involvement is directed toward the solution of individual, group and assigned graphic design problems. Specification of the program is developed in accordance with the professional goal of the individual student and work leading toward the master's thesis. Media Center facilities are available for application of studio imagery.
Lab 9-27, Credit 3-9 (offered every quarter)

Computer Graphics Design

FADG-780 Introduction to Computer Graphics Design Registration #0432-780
An introduction to programming for the design of computer graphics. Basic familiarity with using the keyboard, CRT, disk drive, tablet, printer, plotter and image digitizer to create imagery. Emphasis on creating shape files, pictures and writing simple programs.
Lab 9, Credit 3 (offered each year)

FADG-781 Two-Dimensional Computer Graphics Design Registration #0432-781 Graphics Design (MFA Major)
Exposure to computer graphics algorithmic, design heuristics, design methodology, language data structures, and program structures for two-dimensional imagery. Projects involve complex programming.
Lab 9, Credit 3 (offered each year)

FADG-782 Three-Dimensional Computer Graphics Design Registration #0432-782 Graphics Design (MFA Major)
Extension of previous experience to include three-dimensional objects, hidden lines and surfaces, solid modelling, perspective. Projects involve complex programming.
Lab 9, Credit 3 (offered each year)

FADG-783 Visual Semiotics/Graphic Design Registration #0432-783 Design (MFA Major)
The application of syntactic, semantic and pragmatic levels of visual design activities. These concepts will be applied to creative projects utilizing the computer as the primary tool.
Lab 9, Credit 3 (offered each year)

FADG-784 Digital Typography (MFA Major)
Registration #0432-784
A study of the evolution of typography, typesetting and typesetting systems from metal type through photo typesetting to today's digital typesetting. Hands-on experiences in production typesetting including photo typesetting, digital typesetting, word processing and prepress planning for accurate typographic reproduction.
Lab 9, Credit 3 (offered each year)

FADG785 Computer-Generated Slide Design Registration #0432-785 Design (MFA Major)
The design of slides for business graphics and audio-visual presentations. Hands-on experience with a sophisticated computer graphics system for the generation of high resolution slides. Emphasis on both commercial production concerns and creative problem solving.
Lab 9, Credit 3 (offered each year)

FADG-786 Computer-Generated Animation (MFA Major)
Registration #0432-786
Extension of computer generated slide design using keyframe animation techniques to automatically create frames for film, video or multi-image slide presentations.
Class 3, Lab 3, Credit 3 (offered each year)
Industrial and Interior Design

FADD-750 Industrial and Interior Design
Registration #0403-750 (Minor, Elective)
The reasoned application of theoretical and practical background to advanced projects in industrial and interior design.
Lab 6, Credit 3 (offered every quarter)

FADD-780 Industrial and Interior Design
Registration #0403-780 (Major)
Selected projects in industrial or interior design which allow individual application of design methodology and technical skills toward professional goals. Selection of the projects is directed at providing an adequate background for development of the master's thesis.
Lab 9-27, Credit 3-9 (offered every quarter)

Painting

FADP-750 Painting (Minor, Elective)
Registration #0405-750
Study of present techniques and concepts in painting and their relation to the tradition of painting. Development of painting skills in a chosen medium.
Lab 6, Credit 3 (offered every quarter)

FADP-750 Illustration
Registration #0405-750 (Painting Minor, Elective)
An elective exploring the art of illustrators, their relation to audience, publishers, and media. Studio problems will develop and expand basic concepts of illustration.
Class 3, Lab 3, Credit 3 (offered each year)

FADP-751 Drawing Problems
Registration #0405-751 (Painting Minor, Elective)
Individual drawing projects related to graduate students' major area of study. Opportunity to refine drawing skills on the graduate level.
Lab 6, Credit 3 (offered each year)

FADP-780 Painting (Major)
Registration #0405-780
Development of mastery of a permanent painting medium and related preparatory study. Examination of ideas and relationships in the field of painting with emphasis upon individual creative solutions.
Lab 9-27, Credit 3-9 (offered every quarter)

Printmaking

FADR-750 Printmaking (Minor, Elective)
Registration #0406-750
Advanced techniques in etching, lithography and woodcutting, as well as in many experimental areas including color processes, phototetching, photo-lithography, paper making and combination printing. Students are expected to develop along independent lines, and direction is offered in contemporary thought and concept. The emphasis is toward developing a complete respect for the printmaking craft and profession.
Lab 6, Credit 3 (offered every quarter)

FADR-780 Printmaking (Major)
Registration #0406-780
Contemporary and historical printmaking concepts are presented as stimulant and provocation for the development of an individual approach to expression. Advanced techniques are demonstrated in intaglio, relief and lithography with resources available in non-silver photo processes, paper making and combinations. A complete understanding of the development and maintenance of the print studio is supportive for the professional artist. The work leads toward the master's thesis.
Lab 9-27, Credit 3-9 (offered every quarter)

Sculpture

FADS-750 Sculpture (Elective)
Registration #0407-750
Sculptural concepts are approached through a variety of processes and materials. The studio work is executed in paper, wood, fabrics, metal, stone, clay and plastics.
Lab 6, Credit 3 (offered each year)

Medical Illustration

FADM-781 Medical Illustration Topics I
Registration #0408-781 (MFA Major)
This is an introductory course, designed to acquaint the illustration student with art techniques commonly used in medical illustration, and with the medical library and audio-visual television supporting milieu in which the medical illustrator works.
Lab 6, Credit 3 (offered each year)

FADM-782 Medical Illustration Graphics and Exhibits (MFA Majors)
A course emphasizing the use of titles, animation, charts and graphs, schematics, and illustrative procedures as vehicles for meeting instructional and communicative needs. Students will learn the various techniques available and will apply those techniques while constructing three dimensional illustrations for in-house presentation or for traveling displays. In addition, students will learn to plan and cost analyze their illustrative exhibits.
Lab 6, Credit 3 (offered each year)

FADM-783 Medical Illustration
Registration #0408-783 (MFA Major)
A study of pathological specimens and human dissection using colored pencil, pen and ink, carbon dust, and airbrush. Emphasis will be on rapid but accurate sketching and observation in the laboratory with a representation of form and structure in living tissue for the preparation of surgical procedures.
Lab 6, Credit 3 (offered each year)

FADM-784 Medical Illustration Topics II
Registration #0408-784 (MFA Major)
A course emphasizing photographic techniques as employed in medical illustration. Students will learn to use the copystand and various films to reproduce continuous tone, black and white, and color artwork. The copystand and other lighting techniques will be introduced for photographing anatomical specimens, models, and surgical instruments. Combining photographic images and processes with illustrative techniques also will be explored.
Lab 6, Credit 3 (offered each quarter)

FADM-785 Medical Illustration Surgical Procedures I (MFA Major)
The application of illustrating and photographing in the operating room. The student will become familiar with the organization of operations and with his or her role as a medical illustrator. Sketches are to be drawn directly from the observation of surgery, consulting with the surgeon for accuracy of detail and development. The final preparation of the art work will be submitted for publication or portfolio.
Lab 6, Credit 3 (offered each quarter)
A continuation of the concepts begun in 785; specifically, combining anatomical knowledge with surgical observation to construct a concise and accurate surgical series. Students will concentrate on communicating essential surgical concepts to a specific audience, as well as ensuring that their artwork will meet the demands of reproduction.

Lab 6, Credit 3 (offered each year)

**Thesis**

FAD (C, D, P, R, M or G)-890  
Research and Thesis  
Registration #0404-890  
(Required for MFA)

The development of a thesis project initiated by the student and approved by a faculty committee and the Special Assistant to the Dean for Graduate Affairs. Primary creative production, the thesis must also include a written report and participation in a graduate thesis show.

Lab 27, Credit 3-14 (offered every quarter)

**FASA-785**  
Forms of Inquiry  
Registration #0420-785  
(Required for MFA)

The exploration and organization of forms of inquiry in the fields of art, craft and design.

Class 2, Credit 2 (offered each year)

**FASA-790**  
Graduate Forum  
Registration #0420-790  
(Required for MFA)

The presentation and discussion of issues in aesthetics, criticism, creativity and perception as they relate to art, design and craft will be undertaken. Points of view will be clarified through critical writing. Required for MFA; to be taken prior to Thesis.

Class 2, Credit 3

**School for American Craftsmen**

**Graduate Courses**

**Ceramics and Ceramic Sculpture**

FSCC-750  
Ceramics and Ceramic Sculpture (Minor, Elective)  
Registration #0409-750

Basic instruction and experience in ceramic design, fabrication and production of ceramic forms is undertaken. This study provides ceramic technology and terminology and gives experience with clays along with fundamental forming techniques. The development of design awareness is encouraged through lectures and critiques.

Lab 6, Credit 3 (offered every quarter)

FSCC-780  
Ceramics and Ceramic Sculpture (Major)  
Registration #0409-780

A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. There will be a strengthening of ceramic techniques, design fundamentals and encouragement of personal ceramic expression. The student will be encouraged to evaluate new techniques, materials and concepts. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.

Lab 9-27, Credit 3-9 (offered every quarter)

**Glass**

FSCG-720  
Stained Glass (Minor, Elective)  
Registration #0411-720

An elective providing exploration of personal approaches to visual expression and techniques in flat glass. Technical processes may incorporate all hot and cold processes used in glass.

Lab 6, Credit 3 (offered each year)

FSCG-750  
Glass (Minor, Elective)  
Registration #0411-750

Collaborative work with the student's major area of study and glass fabrication is encouraged. Various techniques, both hot and cold will be considered: casting, slumping, fusing, blowing, cutting, electroplating, lamp working and sculptural construction. Course emphasis on personal, independent development encouraging contemporary thought and concept.

Lab 6, Credit 3 (offered every quarter)

**Metalcrafts and Jewelry**

FSCM-750  
Metalcrafts and Jewelry  
Registration #0412-750  
(Major)

This is the study and manipulation of metals for hollowware/jewelry. Design sensitivity and concepts are approached through the raising, forming and planishing or casting, forging, and fabricating techniques.

Lab 6, Credit 3 (offered every quarter)

FSCM-780  
Metalcrafts and Jewelry  
Registration #0412-780  
(Major)

A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. Both hollowware and jewelry areas will be explored. It is designed to give the student a broad exposure to metalworking techniques, expand the student's knowledge of applied design, strengthen perceptual and philosophical concepts and develop an individual mode of expression. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.

Lab 9-27, Credit 3-9 (offered every quarter)

**Weaving and Textile Design**

FSCCT-750  
Weaving and Textile Design  
Registration #0413-750  
(Minor, Elective)

This is the study and appreciation of weaving and textile techniques, soft sculpture, off loom weaving and printing. Design approaches are stressed.

Lab 6, Credit 3 (offered every quarter)

FSCCT-750  
Business Practices for the  
Craftsperson (Elective)  
Registration #0413-750,85,86

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)

FSCCT-780  
Weaving and Textile Design  
Registration #0413-780  
(Major)

A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. Techniques offered are combination weaves and pattern design, double weave, embroidery and stitchery, flemish weave, ikat, multiple layer, dyeing, non-loom, pile rug, printed surface, silkscreen, tapestry, and soft sculpture. Design concepts are complements to die techniques. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.

Lab 9-27, Credit 3-9 (offered every quarter)
Woodworking and Furniture Design

FSCW-750 Woodworking and Furniture Design (Minor, Elective)
This is a course in woodworking techniques and procedures. It enables the student to gain design competency through wood and an individual solution to wood projects based on suggested needs.
Lab 6, Credit 3 (offered every quarter)

FSCW-780 Woodworking and Furniture Design (Major)
A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. This provides an opportunity for technical, aesthetic and design competency to grow through the exploration of hand and machine tools; solid wood theory, joinery and practice; veneer theory, and practice; production theory; chair, table, cabinet design and construction. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.
Lab 9-27, Credit 3-9 (offered every quarter)

Thesis

FSC (C, G, M, T, or W)-890 Research and Thesis Guidance (Major MFA only)
Registration #04 (09, 11, 12, 13, or 14)-890
Research and presentation of an acceptable thesis with a focus on technique, design, and/or production. The thesis subject will be chosen by the candidates with the approval of the faculty advisor. The thesis will include a written summation or report of the research and participation in the graduate thesis show.
Lab 27, Credit 3-14 (offered every quarter)
College of Graphic Arts
and Photography

School of Photographic Arts and Sciences

All courses in the School of Photographic Arts and Sciences are offered at least once annually, except as noted.

Fine Art Photography

PPHA-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 is covered. The second and third quarters deal with more advanced techniques and principles of photography. This series of courses is available for students who are not majoring in photography.
Class 1, Lab 6, Credit 3

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 the professor)
Class 1, Lab 6, Credit 3

PPHA-301, 302, 303 History and Aesthetics of Photography
Registration #0921-301, 302, 303
Covering the history and aesthetics of photography from 1839 to the present, with special emphasis on the development of photographic seeing, and its related effect on other media. A survey of the numerous processes and how their development affected the imagemaking of their particular period, i.e., daguerreotypes, collotypes, ambrotypes, etc. Student projects are designed to illuminate phases of photographic history best understood by personal visual exploration.
Class 3, Credit 3

PPHA-313 Introduction to Fine Art Photography
Registration #0921-313
The meaning of fine art photography will be discussed and then explored by doing various fine art assignments which will lead the student to discover personal solutions to personal concerns. The faculty will provide surveys of fine art photographers, their work and the non-silver processes sometimes used. The class will be supplemented with field trips to museums, galleries, and artists' studios.
Class 2, Lab 8, Credit 4

PPHA-323 Photography as a Fine Art
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 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 in Photography
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 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 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
### 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 and 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

### PPHA-538 Photographic Careers Seminar

**Registration #0921-538**

This seminar examines career options available to photography graduates. Students develop skills in resume preparation, interview practices and techniques, and personal goal setting. Students attend three special sessions offered by the Center for Cooperative Education and Career Services. (Third- and fourth-year with visual studies background)

Credit 3, Class 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 Photography

**Registration #0921-560**

An introductory course which emphasizes the application of selected semiotic principles to the practice of photography. Semiotics is the study of signs and symbols and what they signify.

Class 3, Lab 3, 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

### Master of Fine Art Photography

#### PPHG-701, 702 History and Aesthetics of Photography

**Registration #0903-701, 702**

The course will survey the major issues throughout the development of the medium: (first quarter) pre-history up to the 19th century; (second quarter) fin de siecle to present.

Credit 4

#### PPHG-704 Minor White Seminar

**Registration #0903-704**

A study of the photography and philosophy of Minor White and his contribution to photographic publications, photographic education and photography as an art form.

Credit 3

#### PPHG-705, 706 Graduate Seminar

**Registration #0903-705, 706**

The seminar provides an opportunity for all MFA students to develop a sense of community and to openly discuss matters of concern, to discuss each other's photographs, to meet with visiting artists on campus and to participate in a thesis sharing from time to time.

Credit 2

#### PPHG-707, 708, 709 Film History and Aesthetics

**Registration #0903-707, 708, 709**

An extended comparative survey of the history and aesthetics of film that will explore the four basic forms of the medium: Fiction, Documentary, Animated and Experimental. Emphasis is on determining the unique characteristics of the medium and how those characteristics are used as a means of interpretation and expression.

Credit 4

#### PPHG 711-01 The Landscape as Photographs

**Registration #0903-711-01**

A first-year graduate course in the major artistic, mythological, political, and economic issues influencing the development and use of landscape photography in America from 1840s to the 1980s. The student will be introduced to a diverse group of historical and contemporary image makers. (No prerequisite; open as an elective pending enrollment by majors)

Class 3, Credit 3 (F)

#### PPHG-715 Photographic Extensions

**Registration #0903-715**

Strip photography, slit/scan photography and stroboscopy are used to probe and artistically manipulate spacial and temporal dimensions in order to create unseen poetic expressions of a space/time continuum. Perceptual principles and technical problems associated with the production and exhibition of such images are studied.

Credit 4

#### PPHG-719 Preservation Issues with Fine Art and Historical Photographs

**Registration #0903-719**

This is a non-laboratory technical course which surveys the structure and deterioration mechanisms of major historical photographic processes. It examines the technical basis of preservation strategies within a museum or archive, and presents an approach to preservation which is integral with collection management and curatorial functions.

Credit 4

#### PPHG-720, 721, 722 Photographic Workshop

**Registration #0903-720, 721, 722**

Each faculty member offers a different opportunity for students to explore the multiplicity of ways that photography can be used as a vehicle for expression and for communication. Visual research, group critiques, seminars, field trips, studio and laboratory practice are used.

Credit 4

#### PPHG-725, 726, 727 Photography Core

**Registration #0903-725, 726, 727**

Major emphasis is placed on the individual's learning to generate and intensify his or her personal statement through photography. Some of the projects are assigned while others are selected by the candidate. Work is critiqued weekly by the instructor.

Credit 4

#### PPHG-730, 731, 732 Cinematography

**Registration #0903-730, 731, 732**

Filmmaking workshop; individually planned studies in cinematography, as determined by faculty-student consultation, group critiques, seminars, studio and laboratory practice, field trips.

Seminar 2, Lab 26, Credit 3-9
PPHG-733  Animation and Graphic Film Production
Registration #0903-733
An introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a wide variety of approaches to single frame motion picture production. Students produce a number of short film exercises utilizing both existing and original artwork. Some techniques covered in the course are: direct modification of the film surface, cel, ink and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is not required. No prerequisites.
Class 2, Discussion 1, Lab 2; Credit 4 (F, W)

PPHG-734  Animation and Graphic Film Production
Registration #0903-734
A continued introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a number of approaches to single frame film making in addition to those covered in PPHG-733. Some techniques covered in the course are: Three-dimensional animation; optical printing; computer animation; and hand-drawn sound. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is not required. (PPHG-733)
Class 2, Discussion 1, Lab 2; Credit 4 (W, S)

PPHG-735  Animation and Graphic Film Production
Registration #0903-735
This course provides practice in all phases of single-frame film production. Students produce a 16mm 90-second graphic film with sound utilizing one or more techniques learned in the preceding two quarters. (PPHG-734)
Class 2, Discussion 2, Lab 2; Credit 4 (S, F)

PPHG-740, 741, 742  Photographic Museum Practice
Registration #0903-740, 741, 742
Museum internship workshop, still or motion picture; research, assigned projects, seminars in history, function and administration of museums, with emphasis on photographic curatorial duties; practice in exhibition planning and development; field trips. This cannot be selected as a minor concentration. (Graduate status as museum major)
Class 2, Lab 4, Credit 4

PPHG-750, 751, 752  Special Topics Workshop
Registration #0903-750, 751, 752
Advanced topics of current or special interest designed to broaden and intensify the student's ability to use photography as a means of communication and expression.
Credit 3-9

PPHG-753  Photographic Workshop for Teachers
Registration #0903-753
A graduate course in the principles and practices of photography designed especially for the high school or community college teacher, counselor or advisor, who may be involved in instruction or career guidance in photography.
Both black and white and color photography are presented and applied in actual picture-making experiences. Both the aesthetic and the technical aspects of photography are stressed. Teaching methods, course development, and ideas in visual communications are examined. Teaching technique relevant to the instruction of photography will be stressed. Career opportunities in photography will be explored.
Credit 6

PPHG-754  Teaching Photography
Registration #0903-754
A graduate course concerned with the art and craft of teaching photography in a formal and informal setting. Emphasis is on the practice of teaching photography based on accepted learning principles.
Credit 4

PPHG-755  Applied Sensitometry
Registration #0903-755
This course presents relevant sensitometric and photographic theory, principles and practices in a manner sensitive to the background and needs of a fine art photographer.
Credit 4

PPHG-756  Zone System Principles
Registration #0903-756
An applied course of selected sensitometric statistical and perceptual principles to the understanding and practice of the Zone System. The principles are taught so that they can be generalized and transferred to the understanding and practice of other image-forming systems such as film making, video, graphic arts printing, screen printing, etc.
Credit 4

PPHG-760  Perception & Photography
Registration #0903-760
An advanced course which provides an applied psychological framework for the ways we select, code, organize, store, retrieve and interpret visual images and explores how photographs relate to art and perception.
Credit 4

PPHG-762, 763, 764  Alternative Processes
Registration #0903-762, 763, 764
An advanced course in the production and presentation of images using historical and contemporary visual imaging processes. Emphasis is on extending the students' experience in image making by incorporating alternatives to conventional photography into their work. Processes to be covered include various light sensitive emulsions, the production of visual books, and generative systems such as electrostatics and offset lithography.
Credit 4

PPHG-767, 768, 769  Contemporary Issues
Registration #0903-767, 768, 769
A study of current issues relevant to fine art photography, how they relate to broader historical/cultural issues, and how they might suggest future directions.
Credit 2

PPHG-877  Museum Internship
Registration #0903-877
Experiential learning is provided in collections management, cataloguing and classification, exhibition preparation and exhibitions, research and critical writing.
Credit 1-8

PPHG-799  Independent Study
Registration #0903-799
Learning experiences not provided by formal course structure may be obtained through the use of an independent study contract.
Credit 1-9

PPHG-887, 888, 889  Research Seminar
Registration #0903-887, 888, 889
The seminar serves as a planning stage for preparing a research thesis proposal and for an ongoing critique and discussion of the research in progress. Issues related to exhibitions, publications, copyright, and gallery also are covered.
Class 2, Credit 2

PPHG-890  Research and Thesis
Registration #0903-890
The thesis is designed and proposed by the candidate. It is considered his culminating experience in the program, involving research, a creative body of work, an exhibition or suitable presentation, and a written illustrated report.
Credit 1-12
Biomedical Photography
PPHB-201, 202, 203  
Biomedical Photography I  
Registration #0901-201, 202,203  
Basic photography course for biomedical photographers with emphasis on theory, craftsmanship and visual communication. Patient photography, close-up and other photography as a foundation for future biomedical photography.  
Class 4, Lab 4, Studio 4, Credit 6

PPHB-211  
Survey of Biomedical Photography  
Career opportunities, typical biomedical photography settings, types of photography performed. Ethical, professional, and personal relationships with patients, physicians, research and staff personnel.  
Class 1, Credit 1 (S only)

PPHB-301, 302,303  
Biomedical Photography II  
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 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 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-404  
Microcomputer Applications in Biocommunications  
This course is designed to introduce the student to numerous current microcomputer applications in biocommunications including elementary programming, computer graphics, spread sheet formats, word processing, inventory control, hardcopy methods, and modem systems. The course introduces these applications by using a wide variety of microcomputer exercises.  
The course is taught each Fall, Winter, and Spring quarter, enabling every Biomedical Photographic Communications student to enroll. (PPHB 301, 302,331, 332)  
Credit 4, Lecture 1, Lab 6

PPHB-421  
Scanning Photomacrography  
Scanning photomacrography is a technique which provides a universal depth of field in a photomacrograph while producing an isometric projection at the same time. A thin sheet of light is projected onto a three-dimensional subject at a right angle to the optical axis of the camera lens within the depth of field to be photographed. The subject is then precisely moved along this optical axis while the camera shutter is open. Out-of-focus areas remain in darkness and are not recorded during the time the illuminated strip is exposed. Students will learn the principles and applications of this technique, producing images of exceptional clarity in black and white as well as color. The precise and often unique disciplines required to make these images prepare the student for other scientific photographic tasks as well as fulfill an existing need for scanning photomacrographs in the biological sciences. (PPHB 301, 302,331,332,401)  
Class 2, Lab 6, Credit 4

PPHB-501, 502, 503  
Senior Thesis Production  
Registration #0901-501, 502, 503  
An investigation, planning, organization and production of an audiovisual presentation, a learning package or an informational program for a biomedical communications client. (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 Photography  
Registration #0901-551, 552, 553  
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper-level students. Credit variable

PPHB-599  
Independent Study  
Registration #0901-599  
A student proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a CPA of 3.0 or greater. Credit variable

PPHB-781  
Medical Illustration Advanced Photography (MFA Major)  
This study of photography is for the medical illustration major. It involves the study of sophisticated and creative applications of scientific photography used by contemporary medical illustrators. Students review basic photography techniques including film selection, exposure determination and copying. They explore a variety of specialized photographic techniques such as surgical photography, ophthalmic photography and photomicrography. Assignments are performed in the laboratory and studio as well as in hospital environments, including the surgical suite and the morgue. (Undergraduate photography courses in RIT Medical Illustration or equivalent)  
Lab 4, Lec. 2, Credit

Film/Video

PPHF-201  
Introduction to Filmmaking  
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  
Introduction to Filmmaking  
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-203  
Introduction to Fiction and Dramatic Moving Image Production  
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 CPA of 3.0 or greater. Credit variable

PPHF-204  
Microcomputer Applications in Film/Video  
A fundamental course in 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 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 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 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 the Moving Image I
This course is primarily designed to familiarize students with the basic technical concepts of film making. By taking this course, students should gain an understanding of the technical procedures required to commit an image to the medium of film in a professional manner.
Lec. 1, Demo 2, Credit 2 (F)

PPHF-310 Materials and Processes of the 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
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 online and offline insert editing. Viewings and discussion of the works of video artists and documentarians, critiques of student work, application workshops, outside readings and viewings supplement lecture presentations and production work. (PPHF-203, 208)
Class 2, Lab 4, Credit 4 (F)

PPHF-312 Documentary and 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 multicamera unedited productions. 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-313 Electronic Field Production
Lab work examines and applies the professional skills needed to shoot a complex location production, a trip to an affiliate station or production house and experimentation with electronic image manipulation. Lectures include the film/video interface, copyrights, production budgeting, grants, computer interfacing, and the job market. The student's major responsibility is to produce a "year-end project" which is meant to test his/her ability to professionally apply all that has been learned. (PPHF-312)
Class 2, Lab 4, Credit 4 (S)

PPHF-321 Writing for Film and Television
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 and Television II
Continuation of PPHF-321. (PPHF-321 or consent of instructor)
Class 2, Lab 3, Credit 3 (S)

PPHF-324 Introduction to Animation and Graphic Film Production I
An introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a wide variety of approaches to single frame film making in addition to those covered in PPHF-324. 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 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 Production
This course provides practice in all phases of single frame film production. Students produce a 16mm 60-second film without utilizing one or more techniques learned in the preceding two quarters. (PPHF-325)
Class 3, Lab 2, Credit 4 (S)
### PPHF-327  Microcomputer Animation I
Registration #0902-327
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-328  Microcomputer Animation II
Registration #0902-328
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-327)
Class 2, Lab 4, Credit 4 (S)

### PPHF-404  Senior Project Seminar
Registration #0902-404
A required course for 3rd year film/video majors and is the prerequisite for PPHF-541, Senior Project. Students will discuss and generate a written plan for their senior film and/or video projects and will select an advisor from among the film/video faculty. (PPHF-412)
Class 1, Credit 1 (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-406  Solving Directorial Problems
Registration #0902-406
An in-depth penetration into the role of the film/video director. (PPHF-203, 413 or equivalent)
Class 2, Credit 3

### PPHF-410  Materials and Processes of the Moving Image HI
Registration #0902-410
The course introduces the student to 16mm film technology and production systems that apply to other media production as well. (PPHF-203, 310)
Class 1, Lab 2, Credit 2 (F)

### PPHF-411  Visualization and Commercial Film Production
Registration #0902-411
A general review of professional production methods and the theory and practice of visualizing an expressive film continuity. Basic synchronous sound recording is included. (PPHF-203 or permission of the instructor)
Class 2, Lab 6, Credit 5 (F)

### PPHF-412  Film Planning and Studio Operations
Registration #0902-412
Introduction to studio crew work and editing systems for professional film. Budgeting and an elementary view of the economics of production are also included. Film writing is introduced and related to production planning. 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 Synchronous Sound
Registration #0902-413
A short (5-10 min. suggested) film is produced by student teams. Advanced sound editing, sound mixing and A&B roll conforming are included. Cameras, lighting and editing equipment are provided but students are expected to provide sensitized goods and processing.
Class 2, Lab 6, Credit 5 (S)

### PPHF-420  Sound Recording
Registration #0902-420
Specialized information and work in sound. To give information and lab work beyond the regular course. To encourage the beginning of vocational level work in sound. Each student prepares a mixed sound track to professional quality standards.
Lec. 1, Lab 2, Credit 3 (F)

### PPHF-434  Advanced Video
Registration #0902-434
A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing & store, computer imaging and animation are some of the topics covered. (PPHF-203, 310)
Class 3, Credit 3

### PPHF-442  Film/Video Internship
Registration #0902-442
This course is designed to provide the students with on-the-job experience in the field of Film/Video. The student will seek and acquire a school approved internship position in a business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the internship coordinators will assist the student in evaluating the experience. The coordinator should be the faculty member most familiar with the student's internship field. (Permission of internship coordinator) Credits 1-6/Qu. (F, W, S)

### PPHF-511  Motion Picture Workshop I
Registration #0902-511-01
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 in this quarter. (PPHF-413)
Class 1, Lab 6, Credit 6 (F)

### 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 in 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 Film/Video
Registration #0902-551,552,553
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper level students.
Credit variable

PPHF-599  Independent Study
Registration #0902-599
A student proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper level students with a GPA of 3.0 or greater.
Credit variable (F, W, S)

PPHF-704  History of Animation
Registration #0902-704
This course is based upon the belief that a knowledge of the history of animation will enable students to make better informed creative decisions. The four divisions of the subject studied are: origins and early experiments in animation; the industrialization of the process, independent and experimental animation; and computer animation. Students are responsible for writing a paper drawn from an independent investigation of some aspect of the subject, topic to be approved by instructor. The course format is lectures, discussions, and screens of historically significant films.
Credit 4 (F)

PPHF-710  Film/Video Tools for Computer Animation
Registration #0902-710
A hands-on review of the various methods of copying and manipulating computer-generated animation. This includes the transfer of images and sound to 16 mm film or videotape, the skills needed to edit these formats and the technical manipulations available once the images have been transferred.
Credit 3

PPHF-721  Scriptwriting for Animation
Registration #0902-721
This course explores the principles of dramatic structure and storytelling in both fiction and non-fiction animated film and video. Students prepare short scripts suitable for production and prepare finished storyboards from those scripts.
Credit 4

PPHF-724  Introduction to Animation and Graphic Film Production
Registration #0902-724
This course is designed to introduce students to the expressive potential of single frame film and video making. The course does not use computers and does not concentrate on traditional cel and character animation. Students use a professional animation stand to complete several short film or video disc sequences in response to a variety of creative problems and technical challenges. Screenings of numerous professionally produced films accompany and illustrate the lectures.
Credit 4 (F)

PPHF-727  Microcomputer Animation I
Registration #0902-727
Students in this course create animated sequences and projects using a commercial animation software package for a popular microcomputer. In addition to mastering specific software, students learn the principles of digital computer operation and how those principles apply to the problems of animation with computers.
Credit 4 (W)

PPHF-728  Microcomputer Animation II
Registration #0902-728
This course focuses on the integration of computer animation into film and video. Students produce a finished animated project on film or videotape with sound, which can be used as a portfolio piece. 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-727)
Credit 4 (S)

General Photography

PPHG-200  Photography I
Registration #0903-200  (Summer transfer)
An intensive 10-week summer course for students entering the transfer programs, in Professional Photographic Illustration and Imaging and Photographic Technology. This is the minimum photographic education needed to gain entry to second year standing and replaces PPHL- and PPHT-201, 202, 203. Since this course is such an intensive offering, some previous photographic experience is highly advisable.
Class 10, Lab 20, Credit 12

PPHG-290  Introductory Photographic 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-201, 202, 203  Applied Photography I
Registration #0904-201, 202, 203
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 and demonstrations.
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 n, BFA Transfer Registration #0904-300
A concentrated 10-week summer course for students entering the transfer program in photographic illustration. Students must have had previous photography, design and an AAS degree (or its equivalent) from another institution. All selections will be verified by portfolio. This course is designed for exclusive admission into the complete 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
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 feedbacks 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
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 purpose of media will be explored. This course presupposes a basic background in design, as well as in photography.
Class 2, Lab 8*, Credit 4
* Lab hours may not be scheduled and are to be completed in available time.

PPHL-441, 442,443 Contemporary, Illustrative and Registration #0904-441, 442, 443
Commercial Photography I
A course in visual problem solving with photography. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. (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 Photography Registration #0904-453
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. Prerequisite: (PPHL-452 or equivalent)
Lec. 2, Studio 4, Credit 4 (S only)

PPHL-455 Studio Photo/Still Life Registration #0903-455
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)
This is a portfolio preparation course. It concentrates on the
Registration #0904-535, 536
PPHL-535, 536 Advanced Color Seminar
Registration #0904-516, 517, 518 Editorial Photography II
Registration #0904-505 Photography
A chronological investigation into many areas of applied photog-
raphy, including advertising, documentation, illustration, news,
portraiture, scientific, and travel. The works of major photogra-
phers 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/ 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-535, 536  Advanced Color Seminar
Registration #0904-535, 536
This is a portfolio preparation course. It concentrates on the
shooting, structure, and presentation of a body of work. Com-
pletion 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 permis-
sion; PPHL-443, 418 or instructor’s permission)
Class 3, Studio 4, Credit 4 (W, S)
PPHL-541, 542, 543  Contemporary, Illustrative and
Registration #0904-541, 542, 543  Commercial Photography II
A course that brings together the artistic and technical input of
the first three years of the program and directs the student to-
wards the application of the acquired skills through a series of
professionally oriented assignments. (PPHL443 or equivalent)
Class 4, Studio 5, Credit 5
PPHL-551  Special Topics
Registration #0904-551
Advanced topics of current or special interest, varying from quar-
ter to quarter, selected from the field of professional photo-
graphic 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-201,202, 203  Basic Principles of
Registration #0905-201, 202, 203  Photography
The program of study is designed to provide photographic mar-
keting students with a thorough knowledge of the basic photo-
graphic process in order that they may have an understanding of
how photographies products work. The course will include units
of study in film characteristics, lighting, optics, photographic
chemistry, sensitometry and color theory. Each of these will be
related to the actual practice of photography.
Class 2, Lab 6, Credit 4
PPHM-204  Orientation to Production
Registration #0905-204  Photographic Finishing Management
This course is designed to provide the photo management Fresh-
man 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. Prereq-
usite: 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 un-
derstanding of all aspects of production processing and finish-
ing. 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 auto-
mated 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

This is a portfolio preparation course. It concentrates on the
Registration #0904-535, 536
PPHL-535, 536 Advanced Color Seminar
Registration #0904-516, 517, 518 Editorial Photography II
Registration #0904-505 Photography
A chronological investigation into many areas of applied photog-
raphy, including advertising, documentation, illustration, news,
portraiture, scientific, and travel. The works of major photogra-
phers 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/ 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-535, 536  Advanced Color Seminar
Registration #0904-535, 536
This is a portfolio preparation course. It concentrates on the
shooting, structure, and presentation of a body of work. Com-
pletion 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 permis-
sion; PPHL-443, 418 or instructor’s permission)
Class 3, Studio 4, Credit 4 (W, S)
PPHM-302 Automated Printing
Registration #0905-302
Part of a three-quarter sequence of student involvement in automated processing and finishing on a full production basis. This course covers the theory and practice of automated printing. (PPHM-213, PPHS-203, or PPHT-213)
Class 2, Lab 8, Credit 4

PPHM-303 Custom and Professional Finishing
Registration #0905-303
Part of a three-quarter sequence of student involvement in automated processing and finishing on a full production basis. This course covers the theory and practice of custom and professional printing. (PPHM-213, PPHS-203, or PPHT-213)
Class 2, Lab 8, Credit 4

PPHM-310 Survey of Production Processing and Finishing
Registration #0905-310
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-313 Introduction to Color Science and Appearance
Registration #0905-313
A survey course exploring the basic principles of color perception, the interaction of light and objects, the effects of illumination on color appearance, the specification of illuminating sources, colorimetry, and instrumentation used for colorimetry and photographic quality control.
Class 4, Credit 3

PPHM-320,321 Mechanics of Photographic Hardware
Registration #0905-320, 321
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 Photographic Processing and Finishing Laboratory Personnel
Registration #0905-410, 411,412
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-420 Applied Statistical Quality Control
Registration #0905-420
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, attribute 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 6, Credit 4

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 WAX system for text editing and processing.
Class 2, Lab 2, Credit 3

PPHM-501, 502,503 Senior Seminar in Production Management
Registration #0905-501, 502,503
This course is designed to help the photo management student make last minute preparations for entering the world of work. Procedures for obtaining employment, i.e., preparing resumes, taking interviews, plant 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 only be assigned in spring quarter.
Class three times a quarter for three quarters, Credit 1

PPHM-505 Theory of Corrective Color Printing
Registration #0905-505
A study of characteristics of color negatives as they relate to corrective color printing. Theory and methods of color and density correction levels will be discussed. Various approaches to automatic classification will be studied. The students will be introduced to matrix control of color printing as utilized in digital computer controlled printing equipments. (PPHM-303)
Class 2, Credit 2 (S)

PPHM-510 Finishing Lab Operations Management
Registration #0905-510
This course is designed to provide Photographic Processing and Finishing Management students with the background knowledge which is necessary to plan, set up, and operate a finishing laboratory. Included in this course will be a study of production methods, work flow, layout, and equipment complements which lead to efficient operation. Cost analysis of a laboratory operation will be presented and optimization techniques for cost reduction and scheduling will be discussed. (PPHM-211, 213, 301, 302, 303)
Class 4, Credit 4

PPHM-511, 512, 513 Advanced Production Processing and Finishing
Registration #0905-511, 512,513
This course taken during the last year of study provides the student with an opportunity to study in depth, on an independent basis, those areas of processing and finishing which the student finds most interesting. This course may also be used to strengthen those areas of interest in which the student feels a weakness. (PPHM-303 or PPHM-300)
Lab 12, Credit 4

PPHM-520 Operation, Care and Maintenance of Photofinishing Equipment
Registration #0905-520
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
Imaging and Photographic Technology

PPHT-201, 202, 203 Special Topics in Photography I
Registration #0920-201, 202, 203
A study of the fundamentals of photography with emphasis on the development of the necessary creativity, craftsmanship, theory and visual communications to undertake advanced study in the medium. The theory and technical aspects are taught as they relate to solving photographic problems.
Class 4, Studio 4, Lab 4, Credit 7

PPHT-205 Photography For Non-Photo Majors
Registration #0920-205
A course in basic photographic techniques for non-photography students. The material will assist the student in understanding the controls of light and film. Emphasis is placed on the use of photography in the student's career field. A 35mm camera is required.
Class 4, Credit 4

PPHT-210 Materials and Processing of Photography
Registration #0920-210
An intensive 10-week summer course for students entering a transfer program in Biomedical Photographic Communications or 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 Processing of Photography
Registration #0920-211, 212, 213
A 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
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 negative and prints. Projects making use of these techniques, materials and processes will be required.
Class 1, 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 to 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
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. Photographic processing will be presented and programming assignments will be required. (PPHT-321 or equivalent)

Class 2, Lab 4, Credit 4

PPHT-321 Applied Computing for 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 materials 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 2

PPHT-340 Introduction to Scientific and Technical Applications of Photography

Introduction to special or unusual methods particularly useful in technical, scientific, or research photography. Emphasis is on the student’s development of innovative solutions to a set of photographic problems. Topics covered include high-speed photography, strip photography, polarization, time and measurement cameras, astrophotography, and others. Firsthand experience is encouraged by participation in simulated and simplified approaches to more complex specialties.

Class 2, Lab 4, Credit 4 (F)

PPHT-341 Introduction to Photography for Publications

An introduction to the use of photography in specialized publications in science, industry, business and education. Skill-building assignments to improve competence and an introduction to the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHL-313, PPHT-312 or the permission of the instructor)

Class 2, Lab 4, Credit 4

PPHT-395 Photo Electronics Workshop

Introductory hands-on course covering basic electronic devices particularly useful in photographic applications. The emphasis is on learning to read circuits, to understand the basic electronic symbols and principles, to learn to make printed circuit boards. Using assembly techniques such as soldering, wire wrap, and proto board to construct a few projects of the student’s choice from an available list which includes: light meter, flash meter, slave trigger, sound trigger, timer, intervalometer, basic electronic flash, counter and time delay, etc.

Class 1, Lab 4, Credit 3

PPHT-401,402,403 Photoinstrumentation 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 Publications

A survey of this type of photography 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

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 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

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 Photomicrography/Photomicrography

Basic principles of photomicrography and photomicrography with major emphasis on illumination techniques and image formation, with lectures, demonstrations, and projects. (Tech Photo II)

Class 2, Lab 4, Credit 3

PPHT-421 Holography I

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-425, 426,427 Nature Photography

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 have instructor permission)

Class 4, Field 4, Credit 4

PPHT-441 Introduction to Dye Transfer

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
This course is designed to give the student an advanced study in color techniques and theory in relation to quality and creative use of photographic materials. The student may choose a section for intensive study such as the dye transfer process, quality control methods in printing and processing and special masking. (PPHT-312 or equivalent 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, photo-finish, 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-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)

PPHT-501  High-Speed/Time-Lapse Photography
Registration #0920-501
This is a course in the theory and practice of photographic systems designed to permit analysis of events of very short or of extended duration. Included are operational characteristics of time-lapse cameras, sequencing and timing control devices, time magnification relationships. Also, characteristics of intermittent and rotating prism cameras, rotating mirror and drum cameras, synchronization systems and timing controls and high speed flash and spark gap systems. Students gain experience not only in the use of 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 Imaging
Registration #0920-504
A survey of imaging methods and imaging systems not normally encountered in other technical photography courses, including UV, IR, 3D, Holography, Electro-Photography, X-ray, and Non-silver applications. (For upper-division PPHT students. Others with permission of the instructor)
Class 1 1/2, Lab 3, Credit 3

PPHT-511  Co-op Seminar
Registration #0920-511
This course is designed to prepare third-year Imaging and Photographic Technology students for the co-op experience and career decisions. Classroom instruction and outside work will be aimed towards helping the student effectively utilize the co-op experience. Topics such as resume preparation, interviewing techniques, application procedures, career tracking, and co-op evaluation will be addressed in the course. Students completing the course will gain a thorough understanding of the co-op experience and be better prepared for career decisions.
Class 1, Credit 1

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
Center for Imaging Science

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 experimental 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 key board and touchscreen. (PPHV-731)
Class 4, Credit 4

PPHV-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 backgrounds 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 mediated, 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

The two courses, PIMG-200 and PIMG-210, are special intensive summer courses designed for students transferring into the Imaging Science Program at the third-year level, and for others who desire a background in imaging science and instrumentation at an introductory engineering level. Students normally take both courses concurrently.

PPMG-200 Fundamentals of Imaging Science I
Registration #0925-200
An intensive course presenting the subject matter normally taken by imaging science students during their first year. Topics include the basic physics and chemistry of photo-sensitive systems, characteristics of radiation, introduction to sensitometry and tone reproduction, geometrical optics, instrumentation and applied photography.
Credit 9 (SR)

PPMG-201, 202, 203 Introduction to Imaging Science
Registration #0925-201, 202, 203
An introduction to the theory and applications of radiation-sensitive materials and systems. Physical properties of photographic materials, characteristics of radiation, geometrical optics, and photographic instrumentation, sensitometric properties of photo-sensitive materials, tone reproduction, processing chemistry, and fundamentals of black-and-white and color photography.
Class 4, Lab 3, Credit 5

PPMG-205, 207 Imaging Science for Microelectronic Engineers I, II
Registration #0925-205, 207
An introduction to the field of Imaging Science as is relevant to Microelectronic Engineering. Studies in the physical and chemical properties of radiation, photosensitive materials with specific reference to silver-halide, diazo and photoresist systems, sensitometry, tone reproduction, image quality, geometrical optics and photographic instrumentation.
Class 2, Lab 2, Credit 2
PIMG-210  
**Fundamentals of Imaging Science II**

An intensive course presenting the subject matter normally taken by imaging science and instrumentation students during their second year. Topics include the chemistry and physics of black-and-white and color materials and processes as a continuation of topics covered in PIMG-200. (Permission of the department and PIMG-200)

Credit 9 (SR)

PIMG-215  
**Imaging Science for Microelectronic Engineers I**

This course contains the material in PIMG-205 which deals with the physical and chemical properties of radiation and chemistry and photometric behavior of silver-halide, diazo and photoresist imaging materials. For transfer students. (First 7 weeks of the quarter)

Class 3, Lab 3, Credit 2

PIMG-216  
**Imaging Science for Microelectronic Engineers II**

This course contains the material in PIMG-207, specifically, an introduction to geometrical optics, optical instrumentation, tone reproduction and the measure of image quality.

Class 3, Lab 3, Credit 1

PIMG-225  
**Statistics for Microelectronic Engineers (Transfer)**

This course contains the material in PIMG-433 and PIMG-434. For transfer students.

Class 5, Credit 5

PIMG-303  
**Optics and Photographic Instrumentation**

Introduction to the use of photographic recording methods to obtain space and time information from object fields; principles for selection of camera, lens parameters, recording material and recording rate; the use of time and space references to facilitate date retrieval. (PIMG-203)

Class 2, Lab 6, Credit 4

PIMG-312  
**Applied Processing**

Problems in applied processing and the application of analytical chemical techniques to the control of black-and-white and color processing solutions. Processing faults, and image restoration, trouble shooting, archival permanence, ecology and processing machine operation. Statistical techniques application to machine control. (SCHG-206, PIMG-203)

Class 2, Lab 6, Credit 4

PIMG-313  
**Introduction to Colorimetry**

An introduction to how the interaction of light, matter, and the visual system create the sensation of color. Topics include color physics; color measurement including spectrophotometry, and colorimetry; color perception including introductory color vision theory, color mixing principles, and color order systems; the CIE system; and instrumental and visual color difference evaluation. Accompanying laboratory will concentrate on instrumental measurements.

Class 3, Lab 3, Credit 4

PIMG-401  
**Radiometry**

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 7, Credit 4

PIMG-402  
**Image Microstructure**

Introduction to image formation and structure; mathematical models for spread functions of image-forming elements and detectors; superposition and convolution; noise; sinusoidal response functions; figures of merit; characteristics of instruments used for small-scale image measurements. Laboratory work in microdensitometry and subjective image evaluation. (SMAM-305, PIMG-203, SPSP-313)

Class 3, Lab 5, Credit 5

PIMG-404  
**Technical Communications**

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-411  
**Statistical Inference**

An introduction to the theory and application of statistical methods. The course begins with a discussion of events and sample spaces along with fundamental probability concepts. The mathematical foundations of discrete probability functions and continuous probability density functions are developed. The concept of moments is presented along with moment generating functions as a means for studying the properties of probability functions. The concepts of central tendency and dispersion of probability functions are introduced. Fundamental examples of random processes encountered in imaging systems are used to illustrate the mathematical and statistical techniques developed.

FORTRAN programming assignments are required. (SMAM-305, SMAM-306, ICSP-220)

Class 2, Lab 2, Credit 3

PIMG-412  
**Design of Experiments**

Introductory hypothesis testing of means and variances is developed in the context of developing an evaluation of experimental objectives. The concepts and fundamental theoretical background behind linear regression analysis is presented. Techniques of analysis of variance are introduced as a method for evaluating the precision of a regression model. Analysis of variance is then developed as a general experimental tool. Methods of experimental error propagation are developed. Programming assignments are required. Statistical software packages are presented and analysis problems using the BMDP system are assigned. Advance topics such as spline fitting, simplex analysis, and principal components are discussed. (PIMG-411, FORTRAN experience)

Class 3, Credit 3

PIMG-413  
**Statistical Quality Control**

The statistics of process control are introduced using examples from the photographic and imaging industries. Techniques such as control charts are examined from both a theoretical and a practical point of view. Attribute and acceptance sampling techniques are discussed including MILSTD-105D and CSP-1 sampling statistical techniques are developed including techniques to measure subjective image quality. Programming assignments may be required. (PIMG-412)

Class 3, Credit 3

PIMG-421, 422, 423  
**Photographic Chemistry**

The chemistry and photographic properties of photographic emulsions and developer solutions at the intermediate level; topics in physical, organic, and analytical chemistry necessary to the continued study of photographic science. (PIMG-312, SCHG-207)

Class 3, Lab 3, Credit 4
A study of applied statistics involving those areas of direct concern in the design, analysis, and evaluation of integrated circuit processing (with an emphasis on the photolithographic process).

Class 4, Credit 4

**PIMG-441**  
Advanced Microlithography  
Registration #0925-441  
(for microelectronic engineering students)

A study of the characteristics of image-forming and image-recording elements and their matching for optimum performance. Spread and transfer functions. Particle coherence in image systems, limitations imposed by the wave and particle nature of radiation. Interferometric evaluation techniques. Comparison of optical, X-ray and electron beam imaging. Techniques and instruments for the exposing and evaluation of images. (EMCR-540, PIMG-543, 573)

Class 3, Lab 3, Credit 4

**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 Evaluation  
Registration #0925-521, 522, 523  
An analytical approach to analysis and evaluation of photophysical and other images recording systems; objective and subjective evaluation techniques and their correlation. The use of convolution, correlation, autocorrelation, and Fourier methods in the analysis of the image-recording systems. Laboratory work in the design of photo-optical systems. (PIMG-402, SMAM-305, SPSP-313)

Class 2, Lab 6, Credit 4 (F)  
Class 2, Credit 2 (W, S)

**PIMG-531, 532, 533**  
Theory of the Photographic Process  
Registration #0925-531, 532, 533  
An advanced course in photographic theory: sensitivity, emulsions, latent image, and processing of both black-and-white and color materials; chemistry and physics of selected non-silver and other non-conventional processes. (PIMG-423, SPSP-313)

Class 3, Credit 3

**PIMG-541**  
Fundamentals of Optics  
Registration #0925-541  
(for microelectronic engineering students)

An introduction to the principles of optics which form the basis for further study in the field. Topics include one- and twodimensional 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  
(for microelectronic engineering students)

An introduction to the characteristics of optical components and their combination into instrument and imaging systems. Radiation Sources. Refracting and reflecting optical components. Stops, pupils and the propagation of energy through optical systems with both image forming and image recording elements. Radiation measurement techniques and apparatus. Discussion of lenses, cameras, collimators, telescopes, alignment and measurement apparatus, and other instruments. Limitations on system performance. (PIMG-541)

Class 3, Lab 3, Credit 3

**PIMG-551, 552, 553**  
Special Topics in Imaging Science  
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, 563, 565**  
Microelectronic Chemistry I, II, III  
Registration #0925-561, 563, 565  
Selected topics from organic, polymer, physical, and photographic chemistry important to the understanding of silverhalide, diazo and photo resist materials. (EMCR-340, PIMG-207, PIMG-543)

Class 3, Lab 3, Credit 4

**PIMG-571,572**  
Photomicro lithography  
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 photomicro lithography 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

**PIMG-660**  
Seminar/Research  
Registration #0925-660  
An investigation of a problem in microelectronic processing. Seminars by experts from the various phases of the microelectronics industry. (EMCR-650)

Class 1, Lab 3, Credit 2

**Master of Science in Imaging Science**

**PIMG-701, 702**  
Basic Principles and Techniques of Imaging Science  
A rigorous quantitative treatment of the fundamental science underlying the physical, chemical, electro-optical, and biological aspects of imaging science. The mean-level relationships that define the capture, processing, and reproduction of images are treated. The course will be taught in the context of imaging applications with examples from the fields of medical imaging, remote sensing, etc.

Credit 3

**PIMG-703**  
Advanced Principles and Techniques of Imaging Science  
This course incorporates the concepts of variance, noise and information theory as it impacts imaging concepts. It expands these concepts by bridging from simple theories to measurement and system-level studies of particular imaging processes.

Credit 3
PIMG-721, 722  Mathematics and Statistics for Photographic Systems
Registration #0925-721, 722
A special graduate course in mathematics and applied statistics involving those areas of direct concern in design, analysis, and evaluation of photographic systems.
Credit 4

PIMG-731  Geometrical Instrumental Optics
Registration #0925-731
Fundamental laws of geometrical optics, paraxial refraction and reflection through axially centered systems of surfaces, pupils and stops, photometry, the eye, mirror and prism systems, principles of optical instruments.
Class 3, Lab 3, Credit 4

PIMG-732  Physical Optics
Registration #0925-732
Light as a wave: polarization, birefringence, interference and interferometers, spatial and temporal coherence, scalar diffraction theory.
Class 3, Credit 3

PIMG-733  Optical Image Formation
Registration #0925-733
Finite raytracing, geometrical and diffraction theory of aberrations, measures of image quality, optical design concepts, image formation with coherent and partially coherent light. (PIMG-731, 732)
Class 3, Lab 3, Credit 4

PIMG-741, 742, 743  Analysis and Evaluation of Imaging Systems
Registration #0925-741, 742, 743
Complex variables and Fourier analysis with application to the evaluation of imaging systems; properties of optical images, structure of photographic images; methods of photo-optical system evaluation.
Class 2, Lab 6, Credit 4 (W)
Class 3, Credit 3 (F, S)

PIMG-751, 752, 753  Special Topics in Photographic Science
Registration #0925-751, 752, 753
Advanced topics of current or special interest, varying from quarter to quarter, selected from the field of photographic science. Specific topics announced in advance. (Not offered every quarter. Consult coordinator of the Imaging Science graduate program)
Credit variable

PIMG-761  Remote Sensing & Image Analysis (Introduction)
Registration #0925-761
An introduction to radiometric concepts as they relate to remote sensing. The emphasis is on aerial imaging systems, photo interpretation and photogrammetry. Techniques for quantification of air photos are introduced.
Class 3, Lab 4, Credit 4

PIMG-762  Remote Sensing and Image Analysis (Quantitative Analysis)
Registration #0925-762
Techniques for quantification of aerial and satellite images are considered with emphasis on radiometric processing. Thermal infrared image collection, recording and analysis for surface temperature measurement are treated in detail. Atmospheric propagation phenomena in the visible and infrared are treated in terms of their impact on aerial and satellite systems.
Class 3, Lab 4, Credit 4

PIMG-763  Remote Sensing and Image Analysis (Digital Multispectral Techniques)
Registration #0925-763
Analysis of digital remotely sensed images is treated with emphasis in multispectral analysis techniques. This includes consideration of multivariate discriminate analysis and principal components for material identification and analysis. Special topic areas such as radar, Frauenhaffer line discriminator, hierarchical classifiers, etc. will also be treated.
Class 3, Lab 4, Credit 4

PIMG-766, 767, 768  Silver Halide Science
Registration #0925-766, 767, 768
Physical structure and optical properties of silver-halide emulsions and their relations to chemistry and preparation of emulsions; treatment of theory of sensitivity and latent image formation; chemistry and kinetics of processing; chemistry and physics of selected non-silver imaging systems.
Class 3, Credit 3

PIMG-890  Research and Thesis Guidance
Registration #0925-890
Thesis based on experimental evidence obtained by the candidate in an appropriate field as arranged between the candidate and his or her advisor.
Credit 9, minimum for MS

Master of Science in Color Science, Appearance, and Technology

PICS-701  Colorimetry I
Registration #0923-701
For those taking colorimetry for the first time. Covers colorimetric procedures commonly used in industrial quality control and research and development. The emphasis is on the spectral and colorimetric characterization of chromatic stimuli using modern instrumental methods, and deriving the relationships between appearance attributes and instrumental data. Accompanying laboratory stresses instrumental measurements. (Permission of department)
Class 3, Lab 3, Credit 4

PICS-702  Colorimetry II
Registration #0923-702
(A continuation of Colorimetry I) The emphasis is on visual methods to determine industrial color tolerances, characterizing surface properties of objects, visual scaling techniques, observer metamerism, and the effects of viewing and illuminating conditions on color appearance. Accompanying laboratory stresses visual measurements. (PPHC-701)
Class 3, Lab 3, Credit 4

PICS-801  Advanced Colorimetry
Registration #0923-801
A detailed treatment and evaluation of specialized current problems and topics of color science. Topics include current developments in CIE technical committees, luminescent colorimetry, color rendering of light sources, observer metamerism, color differences, self-luminous displays, and color appearance specification. (PPHC-702)
Class 3, Credit 3

PICS-802  Colorimetric Instrumentation and Standardization
Registration #0923-802
This course covers current methods of precisely measuring the spectral properties of object colors and of radiation sources. Proper procedures in calibration, standardization, data analyses, instrument maintenance, and standards selection are discussed. The use of standard reference materials in optical metrology are explored. Various measurement assurance programs are introduced for diagnostic evaluation of current colorimetric instrumentation. (PPHC-702 and Fund, of Stat. II or permission of instructor)
Class 2, Lab 6, Credit 4
PICCS-803 Computer Colorant Formulation
Registration #0923-803
This course explores modern methods of colorant formulation prediction for the coloring of polymers, textiles, paper (impact and nonimpact), and coatings. Emphasis is placed on Kubelka-Munk turbid media theory for opaque and translucent materials. Students will have ample opportunity to familiarize themselves with several commercial computer colorant formulation systems in the accompanying laboratory. (PPHC-702 or permission of instructor)
Class 2, Lab 3, Credit 3

PICCS-890 Thesis
Registration #0923-890
This course is designed to give students basic knowledge of marketing with special emphasis on estimating. Class sessions include lectures, films, etc., as appropriate. Homework includes reading and writing assignments.
Credit 9, minimum for MS

PICCS-899 Independent Study
Registration #0923-899
A student-proposed advanced project sponsored by a graduate faculty member. Approval required by the director of the program.
Class, Credit variable

School of Printing

Management Courses

PPRM-201 Introduction to Technical Writing
Registration #0910-201
Basic approach to fundamentals of modern technical writing; review of English and writing skills; consideration of principles, techniques, form and style.
Class 3, Credit 3

PPRM-210 Financial Controls I
Registration #0910-210
Gives the line manager an understanding of a company's financial accounting system so that he or she can work with the accounting group to use the system effectively. Includes preparation of the Income Statement and the Balance Sheet and discussion of inventory valuation, depreciation, financial ratios, financing considerations, and financial statement analysis. The course requires students to complete a computerized practice set simulating record keeping and analysis of an accounting cycle.
Class 3, Credit 3

PPRM-240 Printing Financial Controls
Registration #0910-240
This course is designed to give students a basic knowledge of the principles of financial and managerial accounting. Class sessions are lectures and discussions of problems. Homework includes reading and writing solutions to problems.
Credit 4

PPRM-260 Printing Management Planning Concepts
Registration #0910-260
This course is designed to give students basic principles of marketing with special emphasis on estimating. Class sessions include lectures, films, etc., as appropriate. Homework includes reading, writing and solving numerical problems.
Credit 4

PPRM-261 Standard Software Packages
Registration #0910-261
The purpose of the course will be to teach students how to use and adapt existing software packages to build models and solve problems relevant to the printing industry.
Credit 2
PPRM-320 Introduction to Magazine Publishing and Management
Registration #0910-320
A survey course designed to give the student insights into the Editorial, Production, Management, Fulfillment and Distribution processes vital to success of any magazine. Leaders from the magazine publishing industry are invited to present 3-hour guest lectures on a major aspect of their profession. Graduates of the printing program who have attained prominence within the industry are often guest speakers, encouraging interaction between current and former students.
Class 3, Credit 3

PPRM-340 Electrostatic Reproduction Methods and Technology
Registration #0910-340
The course will cover printing methods using electrostatic technology as practiced on high speed copier machines. Along with theory of operation, the course will include: how these devices fit in the implant, commercial, and quick print installations, cost factors, quality, and profitability in comparison to offset. Ink jet printing theory, types of basic equipment, limitations, and quality will also be discussed as well as electronic printing using lasers. Each student will have a training session on a modern high-speed, high-quality copier.
Class 3, Credit 3

PPRM-380 Personal Leadership
Registration #0910-380
This course is designed to examine the principles of leadership and the use of leadership skills and their application. The concentration is on communications, motivation, conflict resolution, and the implementation of business policy.
Credit 3

PPRM-401 Estimating I
Registration #0910-401
Introductory course in current estimating practices; calculation of paper and ink costs; using wastage tables; determining production times for one-color offset presswork and flat sheet bindery operations; introduction to flat sheet imposition; completing the main estimating form. (PPRT-311, PPRM-210)
Class 4, Credit 4

PPRM-402 Estimating II
Registration #0910-402
Continuing study of sheet-fed offset lithography estimating, obtaining and interpreting specifications; design and use of estimating forms; pricing for a profit margin; preparing quotations; printing trade customs; multi-color offset presswork and signature-related bindery operations; signature imposition; camera, flat layout, stripping and plate processing production standards; phototypesetting and mechanical artwork costs; the application of the computer to developing machine hour rates and estimating procedures. (PPRM-301, PPRM-401, PPRT-312)
Class 4, Credit 4

PPRM-403 Printing Production Management I
Registration #0910-403
Examines the non-technological functions of production as components of a system, emphasizing organizational alternatives relating to human factors. Includes such topics as organization, systems approach, decision making, production planning and control, purchasing, inventory control, quality control, methods analysis, work measurement. Some simple analytical models based on graphs or elementary algebra are introduced.
Class 3, Credit 3

PPRM-404 Printing Production Management II
Registration #0910-404
Explores certain analytical models which can be used practically in an ordinary printing company. Includes such topics as decision theory, probability concepts, mathematical modeling, break-even and economic-order analysis under conditions of risk, Markov chains, waiting line analysis, game theory, simulation. These topics are considered without emphasis on mathematics beyond college algebra.
Class 4, Credit 4

PPRM-415 Advanced Ink and Color
Registration #0910-415
Further study of ink and color with emphasis on relationship to printing processes and print qualities. Study of inks for special purposes as well as ink-jet and electrostatic printing. New types of inks such as acrylic ink, water based inks, etc. New ideas in inks such as IR drying. Study of materials used in ink manufacturing and the effects on printing processes and print qualities. Study of color with emphasis on color gamut system and problems in process color printing. Study of ink-paper relationship. Further study of ink rheology and other physical properties. The course will deal with inks for all the processes. (PPRT-315 or permission of instructor)
Class 4, Credit 4

PPRM-420 Electronic Communications in the Printing and Publishing Industries
Registration #0910-420
Presentation of an overview of electronic communication theory and its application to the publishing industry. The course provides the student with the background necessary to relate publishing requirements to electronic system parameters. Several practical newspaper systems are discussed. (1016-204 College Algebra & Trigonometry)
Class 4, Credit 4

PPRM-450 Expense & Capital Project Budgeting & Control
Registration #0910-450
Studies plant accounting systems as a tool for improving production management decisions. Topics include inventory, equipment, job cost, standard cost and analysis of variance, budgeting and control techniques, financial analysis of projects, proposal development.
Class 4, Credit 4

PPRM-460 Conference Management and Leadership
Registration #0910-460
Leadership and leadership skills are considered the foundation stones for good management. This course is designed to examine the principles and apply them. There is a concentration of the priority skills of communications, motivation, and conference management. The course is structured as a "Conference on Leadership" with the details of managing a seminar running in parallel. The "Case Method" of study is followed. A review of three books and a short term paper are required.
Class 4, Credit 4 (SR)

PPRM-502 Financial Controls II
Registration #0910-502
Studies plant accounting systems as a tool for improving production management decisions. Topics include inventory equipment, job cost, standard cost and analysis of variance, budgeting and control techniques, financial analysis of projects, proposal development.
Class 4, Credit 4

PPRM-506 Business Law
Registration #0910-506
Elements of the laws of contracts, agency, sales, negotiable instruments, partnerships, corporations, taxes, insurance, libel, copyright, and other laws pertaining to business, printing and publishing.
Class 3, Credit 3
Technical Courses

PPRM-507 Computer Estimating Workshop
Registration #0910-507
The design and implementation of computer estimating systems. The class will work as a systems design team with each student required to research, design, code, debug, and document an algorithm for a specific printing operation that will run within the framework of the overall system design. Classroom lectures will focus on the implementation of 1978 ANSI BASIC on business microcomputers, the MS DOS operating system, data structures, disk file handling techniques, and the creation of good error handling subroutines. (PPRM-402, a working knowledge of BASIC, and willingness to undertake a non-trivial programming project)
Class 4, Open Labs, Credit 4

PPRM-509 Economics of Production Management
Registration #0910-509
Microeconomic study of factors in printing production systems. Supply-and-demand theories are applied to printing system inputs and outputs.
Class 4, Credit 4

PPRM-510 Personnel Relations II
Registration #0910-510
Principles of supervision including discipline, hiring and firing, are studied from the viewpoint of management.
Class 4, Credit 4

PPRM-511 Labor Relations in Graphic Arts
Registration #0910-511
A study of the organization of the United States labor force through the impact of national legislation and the construction of the same and National Labor Relations Board decisions. Study includes rights of employees, their free choice of representation, collective bargaining behavior, settlement of disagreements, right to strike, and future modification of the field.
Class 4, Credit 4

PPRM-513 Sales in the Graphic Arts
Registration #0910-513
Explores economic, psychological and sociological bases of selling, with emphasis on customer and salesman interplay as well as techniques and practices of creative salesmanship in graphic arts companies. This course aims at benefitting both students considering a career in sales and those who will otherwise work with salesmen, either by supporting their company's salesmen in plant action or by buying from outside salesmen.
Class 4, Credit 4

PPRM-514 Newspaper Management
Registration #0910-514
Consideration of personnel, organization, finance, maintenance, advertising, circulation, and other sources of revenue as they pertain to the metropolitan press; problems and practices of plant supervision.
Class 4, Credit 4

PPRM-515 Legal Problems in Publishing
Registration #0910-515
A comprehensive review of United States Law Supreme Court decisions as they relate to the unique rights granted to the graphic arts industry. Cases cover Article I, section 8 of the United States Constitution and the First and other amendments thereto.
Class 4, Credit 4

PPRM-516 Marketing in the Graphic Arts
Registration #0910-516
Emphasizing a printing industry viewpoint, the class explores the marketing concept (finding out what customers want and organizing to produce it profitably). Marketing functions are studied in regard to practical application in the printing industry.
Class 4, Credit 4

PPRM-518 Purchasing in the Graphic Arts
Registration #0910-518
Role of the purchasing agent in the printing plant. Methods of procurement, purchasing policies and sources of supply. Characteristics of graphic arts materials and supplies; quality assurance; inventory control; economic order quantity determination; make or buy decisions; blanket orders; capital investment decisions; the purchase order as a legal document; "just in time" and Japanese Kanban purchasing systems.
Class 3, Credit 3

PPRM-530 Establishing a Graphic Arts Operation
Registration #0910-530
This is an elective course for seniors only with permission of the instructor. The course is a study of the problems to be encountered in the establishment of a graphic arts operation. Students will organize their own printing-related operation as they study general planning, financing, physical requirements for operation, sales and merchandising, general management and operational problems. The purpose of the offering is to coordinate student's activities with a focus on the benefits and burdens of the responsibility of establishing a graphic arts business.
Credit 3

PPRM-551 Special Topics-Printing
Registration #0910-551
A management, or management-related course used to present and investigate on a "one-time" basis special topics not normally covered in the curriculum. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Subject to be covered is announced in advance.
Credit variable

PPRM-590 Senior Seminar
Registration #0910-590
A lecture series in which industry executives and high-level technical personnel present points of view about related topics of information not normally found in the required course work. The students' interaction with the speakers provides insight into possible developments in the industry relating to technology, management, and application of scientific principles to the production of printed materials.
Class 2, Credit 2

PPRM-599 Independent Study
Registration #0910-599
Student selects and develops, with approval from a faculty sponsor, an independent study project of his or her own design. Project and amount of credit assigned must have final approval from the director of the School of Printing. (Generally seniors with qualifying GPA)
Credit 1-5

Technical Courses
PPRT-203 Layout and Printing Design I
Registration #0911-203
This required course provides a foundation for those students who wish to concentrate in the design area. In addition, it provides a practical awareness of technology for the general printing student. Design, typographic and communication concepts are used to translate ideas into visual images. Traditional rendering techniques and computer-aided technology are introduced as tools for illustrating words, ornamentation, color, format, and pictures in printing design. Emphasis is placed on problem solving through first research, then creating images to be translated into printing literature. Included is an overview of copy preparation and reproduction concerns as they are affected by the layout design.
Class 2, Lab 3, Credit 3

PPRT-204 Flexography
Registration #0911-204
A basic course in the principles and practices of the flexographic printing process. Emphasis is placed on the elements of flexographic technology from artwork through plates, platemaking, inks and presswork. Lab work centers on plate mounting, ink formulation, platemaking and presswork. Students print on a variety of presses and substrates.
Class 2, Lab 3, Credit 3

PPRT-205 Gravure
Registration #0911-205
Introductory laboratory and technical course embracing the theories and practices of gravure printing including cylinder imaging and gravure presswork. Study of related information regarding techniques, equipment, materials and supplies. The course is conducted by means of lectures, class discussions, demonstrations and laboratory exercises involving chemical etching of cylinders, Helio engraving of cylinders, and 4-color printing on a 4-unit web press.
Class 2, Lab 3, Credit 3

PPRT-206 Reproduction Photography
Registration #0911-206
Reproduction Photography is the basic course in image conversion which is presented as a problem-solving model against which all new and emerging image conversion systems can be evaluated. Photo chemistry, optics, sensitometry, halftone theory and tone reproduction are examined as systems components on a basic (math/science) level. This system's overview prepares the student to make sound business decisions regarding technologies to be used for the purpose of image conversion.
Class 2, Lab 3, Credit 3

PPRT-208 Lithographic Press
Registration #0911-208
A first course in sheet fed offset press technology covering: role of sheet fed presses in the industry, basic design of press divisions and comparisons, comparison of sheet fed offset with web offset and other printing processes. Lab work consists of hands-on instruction of proper press operation on small offset presses.
Class 2, Lab 3, Credit 3

PPRT-209 Screen Printing I
Registration #0911-209
Theory and practice of screen printing covering areas such as frames, fabrics, stretching of fabrics, stencil methods, fillers, squeezees, inks, presses, and driers; a study of some of the economic aspects of screen printing and its place in the total concept of graphic arts.
Class 2, Lab 3, Credit 3

PPRT-210 Newspaper Presses
Registration #0910-210
An introduction to major presses used to produce both weekly and daily newspapers. Letterpress and offset presses will be considered, along with gravure presses used for the production of newspaper supplements.
Class 2, Lab 3, Credit 3

PPRT-213 Principles of Copy Preparation
Registration #0911-213
A basic course involving fundamental methods and techniques of copy preparation. It stresses the assembly of copy for various printing specialty areas and compares their likenesses and differences. Lectures cover all aspects of copy as used in making the "mechanical" and how the "mechanical" relates to the entire production system.
Class 2, Lab 3, Credit 3

PPRT-230 Printing Processes Concepts
Registration #0911-230
This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to both the printing processes and press systems. Class sessions will consist of lectures, including films and videotape presentations. Outside assignments will consist of reading assigned portions of textbooks, vendor literature and journal articles relative to the lecture topics.
Class 4, Credit 4

PPRT-232 Ink and Substrates
Registration #0911-232
This course is an introductory course designed to acquaint students with a basic understanding of ink and substrates. It also will introduce the student to basic principles of paper-making and how they affect paper properties that are important to the printer. Although the emphasis will be on paper, other substrates will be included. General introduction to printing inks; logic of ink formulation with respect to printing processes and end uses of printed copies; description of essential components of ink; performance of inks with respect to drying, trapping and tack changes.
Credit 3

PPRT-234 Print-Finishing and Distribution
Registration #0911-234
Most printed products require that they are finished into a marketable form and are distributed by various means. Print-finishing may be done in-line on web presses or in a conventional bindery. Planning for such post-press operations requires extensive knowledge from design to the finished product. This course is designed as an introduction to pre-press planning for print-finishing and distribution.

The emphasis is on cost-effective planning and management, a familiarization of the mechanical limitations in print-production and as an introduction to modern tools and methods in distribution technologies.
Credit 3

PPRT-250 Concepts of Design and Typography
Registration #0911-250
This course is an introductory course designed to acquaint students with the principles of two areas: (1) Printing Design; (2) Typography. Extensive use of slides, overhead materials, handouts and where appropriate, movies and videotapes will be shown.
Class 4, Credit 4

PPRT-270 Pre-press Imaging Concepts
Registration #0911-270
This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to image generation, capture, processing, storage, display and transfer technologies used in the graphic arts industry. Class sessions will consist of lectures interspersed with films and videotaped lab demonstrations. Homework assignments will consist of reading assigned portions of textbooks, vendor literature, and journal articles related to the lecture topics. In addition, four written assignments consisting of paraphrasing of relevant technical articles will be required.
Class 15, Credit 5 (available any quarter)
PPRT-290 Communications Electronics I
Registration #0911-290
A study of basic electronic theory to include data transmission and reception. Class sessions will include lectures and demonstrations with appropriate films and slides.
Credit 3

PPRT-301 Typography II
Registration #0911-301
The student is expected to be able to design and produce finished typographic projects. Only the requirements and restrictions for each program are given to the student, who can interpret them any way, as long as it is within the prescribed limitations. Critiques will be held when each project is completed. Topics included in the lectures are: Typographers, and a look at their work; Typographic Style; Typographic Trends; review of Design Concepts; Typographic Movements; and Private Presses. The serious student of Typography will find this a challenging course.
Class 2, Lab 6, Credit 4

PPRT-302 Composition Systems II
Registration #0911-302
A detailed study of photocomposition with emphasis on the systems approach. Format planning and development plus coding structures are utilized for typographic problems. Specialized computer typesetting hardware and software are analyzed for composition systems with digital storage.
Class 2, Lab 3, Credit 3

PPRT-303 Layout and Printing Design II
Registration #0911-303
Typical printing design problems with emphasis on typographic arrangements, pictorial arrangement with consideration of production follow through. Includes design of complete booklet dummy and other commercial items for black-and-white color reproduction from roughs to comprehensive layout.
Class 2, Lab 6, Credit 4

PPRT-306 Tone Reproduction and Halftone Analysis
Registration #0911-306
A comprehensive treatment of monotone graphic arts photography to an advanced level. Human visual perception, halftone sensistometry, and process control are emphasized as important factors for the aesthetic and consistency of printed pictorial reproduction. Topics include contact screens, flare, reciprocity law failure, two-point and three-point halftone exposure controls, electronic screening, film contacting and processing control, plate/press characteristics, dot gain, criteria for subjective tone reproduction, and the Jones diagram for objective tone reproduction analysis.
Class 2, Lab 3, Credit 3

PPRT-308 Lithographic Press Problems
Registration #0911-308
An advanced course in the theory, practice, and problems of offset presswork. Further development of technical knowledge of materials and equipment. Practice in running process color work.
Class 2, Lab 6, Credit 4

PPRT-309 Screen Printing II
Registration #0911-309
Further study of the theory and practice of screen printing covering areas such as experiments with fabrics or screens; stencil forming materials and the effects these have on finished product. Further study into the inks and substrates that are common to the screen printer. Introduction to and running of screen printing presses, including automatic cylinder screen printing press, container press capable of printing cylindrical, conical and flat objects, and making positives and stencils with GSP Graphix 2.
Class 2, Lab 3, Credit 3

PPRT-311 Planning and Finishing
Registration #0911-311
The course is designed to understand printing production planning from design to finish. Topics include preparing production specifications for image assembly, printing and finishing. Laboratory experiments cover the operation of modern, including some computerized, bindery equipment to provide real world experiences. Problem solving projects are followed through with economical and quality considerations. Students learn how to implement modern tools, evaluate materials and test the physical structure of bound products.
Class 2, Lab 3, Credit 3

PPRT-312 Image Assembly
Registration #0911-312
An introductory course in black and white as well as color image assembly. Lab projects are assigned with the purpose of covering a wide variety of layouts requiring different techniques and often the creation of necessary contact or duplicating films of the roomlight variety. In addition to standard practices the student also works with the latest model line-up tables, a Micromodifier for spreads & chokes and receives basic instruction in electronic page make-up (Autoprep 5000). Other automated prepess imposition systems are covered in form of slide-lectures.
Class 2, Lab 3, Credit 3

PPRT-313 Copy Preparation
Registration #0911-313
Preparation of copy for camera, working from layouts, making analysis of requirements; pasteup techniques, methods of pre-separation mechanicals, "keyline" mechanicals, use of photographic and typographic copy. Relation to production is stressed by shooting copy on camera, stripping and proofing; proper instructional specification writing. Design and production of individual 4-color process pre-separation. (PPRT- 203)
Class 2, Lab 6, Credit 4

PPRT-314 Advanced Flexography
Registration #0911-314
An advanced course in the principles and practices of the flexographic printing process. Expanded lab time allows students to get into greater depth in all phases of flexographic technology. Students perform all operations necessary to print a large variety of substrates on all lab presses. (PPRT-204)
Class 2, Lab 6, Credit 4

PPRT-315 Ink and Color
Registration #0911-315
Theory of light and color; basic theory of process color and correction; use of color comparator and spectrophotometer, the study of color systems and color matching systems; theory and application of various ink systems; practice in standard ink mixing and color matching emphasizing offset and letterpress processes; correlation of ink properties with applications; emphasis on relationship of ink to paper and press; study of ink problems and their correction.
Class 2, Lab 3, Credit 4

PPRT-317 Calligraphic Forms
Registration #0911-317
An introduction to the basics of calligraphy, exercises in use of broadedge pen to develop primary forms of Italic, Roman Capitals, and Uncial letter styles. Evolution of letter forms. Consideration of historical origins of letters, use of basic tools, understanding of methods and disciplines stressed.
Class 3, Credit 3
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-335 The Printed Book in America from 1640
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 own times and their relevance for today. Classes are held in the Melbert B. Cary, Jr., Graphic Arts Collection.

Class 3, Credit 3

PPRT-337 Art of the Printed Book 1455-1955
Registration #0911-337
A course which presents masterpieces of the printer's art from the past five centuries. The lives and works of great European printers from Gutenberg to Mardersteig are examined, and their historical impact on Western civilization discussed with a view toward determining new perspectives for today's graphic artisan and book printer. Classes are held in the Melbert B. Cary, Jr., Graphic Arts Collection.

Class 3, Lab 3, Credit 3

PPRT-401 Typographic Workshop
Registration #0911-401
Allows students to create and solve typographic problems of their own choice. Complete freedom is given and experimentation is encouraged, giving the student opportunities to meet their own objectives and satisfaction.

Class 2, Lab 6, Credit 4

PPRT-402 Application of Electronics to Graphic Arts
Registration #0911-402
A basic course in the fundamentals of electricity and electronics covering DC, AC and semiconductors. Theory will be applied in lab experiments as well as to graphic arts machines and devices. Students will perform laboratory experiments using basic electronic components and instruments.

Class 2, Lab 3, Credit 3

PPRT-403 Layout and Printing Design III
Registration #0911-403
A project course with design problems which involves students in converting their designs into the actual camera copy, trying various media, learning to identify art techniques and printing processes; more individualized approaches emphasized, more advanced principles applied. Less structured class sessions—more individual initiative required. (PPRT-313 or 213 and 303 and instructor permission)

Class 2, Lab 6, Credit 4

PPRT-406 Color Separation Systems
Registration #0911-406
A study of the basic color theory, materials and methods used in the graphic arts for the reproduction of good quality color. Topics include color separation systems, color quality control, productivity, scanners, and electronic image manipulation systems.

Class 2, Lab 3, Credit 3
PPRT-410 Properties of Paper
Registration #0911-410
This course begins with a discussion of papermaking fibers, pulping procedures, papermaking machines, and proceeds to show how they affect paper properties and printing characteristics. Laboratory experiences include stock preparation, making paper and paperboard, sizing and coating paper, physical and optical testing of paper and paper identification.
Class 3, Lab 2, Credit 3

PPRT-415 Techniques in Hand Papermaking
Registration #0911-415
This course offers a practical introduction to many techniques used in hand papermaking. The class will begin by collecting natural raw materials that can be used in papermaking, and then proceed thru 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-500 Quality Control in the Graphic Arts
Registration # 0911-500
A study of what is quality and quality control in printing. Emphasis will be placed on how elementary statistics, management participation, and graphic arts "know-how" offer sensible approaches to quality control in printing. Topics include the conceptual aspect of quality and quality printing, establishment of the process capability via sampling and elementary statistics, the use of control chart in process monitoring, management role in quality control, densitometry, ANSI standards on color viewing, industry standards such as SWOP, FOGRA, and FIPP on color printing, use of quality control devices, and case studies on implementing quality improvement programs in various printing environments.
Class 3, Credit 3

PPRT-501 Development of Printing Types
Registration #0911-501
Historical Development, Identification, and Classification. A lecture course that looks at the historical development of the typefaces that we use every day. Classification methods are discussed and analyzed. With slides we look at representative typefaces, learn their visual characteristics for identification. Who the designers are and the foundries, etc., that created them.
Class 3, Credit 3

PPRT-506 Electronic Color Imaging and Color Control
Registration #0911-506
An analytical study of color reproduction systems will give data to produce good quality color reproductions consistently. Requirements and capabilities of electronic pre-press integrated color systems will be studied to help in the design and management of a color system whether it be in-house or part of a network. (PPRT-406)
Class 2, Lab 3, Credit 3

PPRT-551 Special Topics-Printing
Registration #0911-551
This course presents and investigates technological topics which normally are not covered in the regular curriculum on a one-time basis. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Topics to be covered are announced in advance.
Credit variable

PPRT-560 Chemistry Preparation for Printing Graduate Study
Registration #0911-560
Basic principles of chemistry intended for students who have had no previous chemistry and who are making up deficiencies prior to entering the MS program. Not for credit for undergraduates of School of Printing.
Credit 4

PPRT-591 Reproduction Photography
Registration #0911-591
An intensive course designed for the photography major with the emphasis placed on the problems involved in achieving optimum tone and color reproduction from their photographs. A general understanding of the printing industry, basic printing processes, line and halftone photography, tone reproduction and color separation techniques are covered through lecture and laboratory experiences.
Class 2, Lab 3, Credit 3

Master of Science in Printing Technology

PPRM-702 Computers in Management
Registration #0910-702
An applications workshop which covers printing requirements in relation to computer systems configurations; applications of computers to management and production control problems; investigation of computer-oriented production control techniques. (PPRM-301)
Credit 4

PPRT-701 Research Methods in the Graphic Arts
Registration #0911-701
Theory and application of principles of laboratory oriented research in the graphic arts. Analysis of research techniques, interdisciplinary relationships, conditions for technology transfer and synergism; status of research and organization of literature including patents, illustrations of techniques and research programs and methods followed in various research situations; systematic study theory of scientific methods including induction, deduction, hypothetico-deduction, hypothesis formation, theory development, etc.
Credit 4

PPRT-702 Graphic Reproduction Theory
Registration #0911-702
Analysis of the basic theories of graphic reproduction and study of the principles underlying prevalent and proposed printing processes; special topics such as classification and description of the various light-sensitive systems as applied to the graphic arts, ink transfer theory, present and proposed systems of printing based on electrostatics; electrolysis, magnetism and lasers; study of hybrid systems and the significance and application of interdisciplinary methods. The Neugebauer and color correction equations.
Credit 4

PPRT-703 Statistical Inference
Registration #0911-703
Descriptive statistics, patterns of variability, measures of variability, working with the normal curve, tests of hypotheses for means, tests of hypotheses for variance, internal estimates for means, internal estimates for variance, sample size for variables, introduction to analysis of variance, and applications of applied statistics to graphic arts.
Credit 4

PPRT-708 Introduction to Systems Analysis
Registration #0911-708
Problems of systems analysis in printing operations for the highest quality product at the minimal cost including optimal floor designs and methods of study. (PPRM-301)
Credit 4
PPRT-709  Trends in Printing Technology
Registration #0911-709
A study of the forces which have influenced the development of printing with emphasis upon the technological factors involved; examinations of the relationships of aesthetics and craft concepts to modern industrial techniques. Projection of future industry trends are developed.
Credit 4

PPRT-711  Tone and Color Analysis
Registration #0911-711
A study of the methods and instrumentation necessary for the evaluation of printed materials for product quality assurance. The ultimate objective being the optimization of the production processes and the control of those processes.
Credit 4

PPRT-713  Phototypography Procedures
Registration #0911-713
Utilizing phototypesetting equipment, the student shall learn to develop typographic skills necessary to plan and mark-up typesetting jobs so that the end results will closely match the original concept. Coding, format planning and development shall be taught so that the student will feel at ease in the creation and completion of the projects. The lectures include the aesthetics and the technical information on phototypesetting equipment. Mark-up; system analysis of equipment; and front end systems.
Credit 4

PPRT-722  Ink, Color and Substrates
Registration #0911-722
A study of the physics of light and color basic color theory, color measurements and color systems. Included are applications of color theory to the graphic arts. The chemistry and physics of ink and substrates, and their interaction, are covered. Emphasis is given to the problem of ink, color and substrates in each printing process.
Credit 4

PPRT-850  Research Projects
Registration #0911-850
Individual research projects in which independent data is collected by the student, followed by analysis and evaluation. A comprehensive written report is required. Consent of advisor is required.
Credit variable 1-4

PPRT-890  Research and Thesis Guidance
Registration #0911-890
An experimental survey of a problem area in the graphic arts.
Credit 8
College of Liberal Arts

Criminal Justice

GCJC-201 The Criminal Justice System
Registration #0501-201
The principles of the criminal justice system; administration and management within various agencies, including the relationship of the police to the courts; the courts to the probation, correction and parole functions. Consideration will also be given to specific problems within the branches of the criminal justice system.
Class 3, Credit 4 (offered annually)

GCJC-203 Criminology
Registration #0501-203
A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, theories of criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime.
Class 3, Credit 4 (offered annually)

GCJC-204 Public Administration
Registration #0501-204
This course presents the principles of management and organizational theory as they relate to public agencies in general and criminal justice agencies in particular. Case studies, as well as descriptive information concerning the classic issues involved in the administering of public institutions, will be offered to the student.
(GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-206 Administrative Concepts in Law Enforcement
Registration #0501-206
The course is intended to provide the student with an overview of the fundamental concepts of organization and administration, and to provide also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively.
(GCJC-203, 303)
Class 3, Credit 4 (offered annually)

GCJC-207 Corrections
Registration #0501-207
The course is designed to introduce the student to the basic organizations of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, will be discussed within the context of historical and contemporary philosophy. Attention will also be focused on decision making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness will be surveyed.
(GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-301 Concepts in Criminal Law
Registration #0501-301
The subject matter of this course consists of an introduction to the fundamental principles upon which substantive criminal law is based. The basic characteristics and requirements of criminal conduct are examined. Included in the scope of this course are the following topics: the nature of criminal conduct, the meaning of criminal mental state, the requirement of concurrence between action and intent, and the requirement of legal causation. The elements of the principal defenses to criminal liability, such as insanity, entrapment, and self-defense, are also discussed.
(GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-302 Organized Crime
Registration #0501-302
This course provides a critical assessment of the structures of organized crime, its historical development, and the areas in which organized crime operates. Special emphasis will be placed upon how the character of organized crime has changed during the last thirty years, including the movement of organized crime into a variety of legitimate business enterprises. In addition current enforcement strategies will be studied and evaluated.
(GCJC-201, 203)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-303 Law Enforcement in Society
Registration #0501-303
The social and historical origins of the various police systems, police culture, role and career, police in the legal system, social and legal restraints on police practices, police discretion in practice, police and the community, police organization and community control mechanisms.
(GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-304 The Judicial Process
Registration #0501-304
Judicial process is designed to provide the student with an 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 the deducting hypotheses from theoretical frameworks, identification of the relationships among variables, establishment models, creation of null hypothesis, quantitative methods of data collection and analysis using both parametric and nonparametric methods. Research methods presented range from traditional questionnaires to computer based information and techniques.
Class 3, Credit 4 (offered annually)
This course is an internship practicum for all pre-service criminal justice students. The course is designed to give the student firsthand experience in the field of criminal justice in an appropriate organization which meets the needs of the student's career objectives. Students will be closely supervised at selected organizations developing their pre-professional skills while learning the organization's programs and methods. The student also will be required to attend a seminar which will run concurrently with field work.

Class variable, Credit 4 each (offered annually)

**GCJC-405 Major Issues in the Criminal 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 diversity, 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 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-407 Constitutional Law**

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-408 Legal Rights of Convicted Offenders**

This course is designed to present an in-depth study of the substantive and procedural law as it affects convicted offenders. Considerable attention is devoted to the study of constitutional rights and privileges, how they apply to convicted offenders, and the methods employed to secure these rights. Conviction and its consequences are explored, as is the sentencing process. The rights of prisoners, probationers, and parolees are reviewed. In addition, the various remedies for enforcement of these rights are discussed, including direct appeals, collateral attacks, and a variety of post-conviction remedies. The course is intended for students who wish to pursue a career in law enforcement, corrections, probation, parole or law. However, students interested in some other aspect of criminal justice, which deals with convicted offenders, may find this course useful.

Class 3, Credit 4 (offered on sufficient demand)

**GCJC-409 Corrections Administration**

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-410, 411 Seminar in Corrections**

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 diversity, 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-412 Social Control of Deviant Behavior**

Designed as a professional elective for criminal justice majors interested in studying the major themes explaining the phenomena of deviance; how it is created and labeled through the process of definition and social sanction. Emphasis will be on that type of behavior which elicits societal response in the form of criminal or civil action and on deviance from the perspective of the deviant who may be placed under some form of legalized social control. (GCJC-201, 203)

Class 3, Credit 4 (offered on sufficient demand)

**GCJC-413 Civil Disobedience and Criminal Justice**

A survey of the philosophy and history of civil disobedience, civil disobedience as a political tactic, differentiation between civil disobedience and "ordinary crime," civil disobedience and "non-criminals," civil disobedience within the criminal justice system, and the role of riot commissions. (GCJC-201, 203)

Class 3, Credit 4 (offered on sufficient demand)

**GCJC-414 Domestic Violence**

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-415 Forensic Photographic 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-416 White Collar Crime**

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)
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)

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.

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)

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)

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.

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 intensively scrutinize the prospective shape of the criminal justice system. (GCJC-204)

This 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)

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.

This 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.

This 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.

This course focuses on the outbreak and increase of violent crime and its criminal trends in the United States as one of the more serious realities of this century. In addition to an historical overview, 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.

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.

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.
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 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-536 Seminar in Security
Registration #0501-536
This course, designed for seniors completing criminal justice degree requirements with a concentration in security, will focus on critical issues, problems, and concerns in the area of security that are not otherwise covered directly or in depth in established security courses. Topics are expected to vary from offering to offering.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-537 Legal Aspects of Security
Registration #0501-537
An examination of the federal and state case law and statutory provisions that regulate the private security field. The distinction between public and private enforcement; as well as the possible criminal and civil liabilities of private security personnel under the law of Willful Torts including: false arrest and imprisonment; nuisance; defamation; and invasion of privacy.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-541 Field Research
Registration #0501-541
Through lecture, discussion, and activities associated with a field research project, the techniques and methods of data collection and analysis are presented. Students will acquire the skills necessary to conduct criminal justice research in field settings and the ability to prepare a formal research/evaluation report. The required research projects typically include data gathering and coding procedures, entry and the data to a file on the VAX/VMS, the use of application software (e.g., SPSS, MINITAB, DATAPLOT), and preparation of a final report. (GCJC-401)
Class variable, Credit 4 (offered annually)

GCJC-542 Field Research Techniques
Registration #0501-542
The course combines the use of both qualitative and quantitative research methods and applies them to the collection and analysis of data from field settings. Emphasis is placed on the use of multiple samples and the techniques of multivariate analysis. Students will draw upon social science theory to develop a research design, analyze data and prepare a report on a topic from Human Services, Criminal Justice or Public Policy. (GCJC-401)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-599 Independent Study
Registration #0501-599
A combined student/faculty member effort on a chosen topic beyond the normal sequence of course selections. It provides the qualified self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.
Class variable, Credit variable (offered annually)

Social Work

Core Courses

GSWS-210 The Professional Role
Registration #0516-210
This course explores social work as a profession, the various fields in which social workers practice and the differing philosophies of human services and social work approaches. Also covered are strategies for developing self-awareness and professional self-assessment.
Class 3, Credit 4 (F)

GSWS-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)
The course is designed to give the social work student basic generalist helping skills and to introduce them to social agencies through observation.

Students will become more aware of their current skills in attending, responding and personalizing. They will further develop these skills during the beginning part of the course 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. These skills will later be developed in the course Interviewing and the Helping Relationship.

During the second part of the course students will add to their knowledge of the social work role and introduction to social work agencies which they have had during the previous quarter in the course The Professional Social Work Role. Representatives from five different types of social work settings will discuss their agencies and services with the class. Students will then observe the agencies at work to view the role of social workers there. Students will use this knowledge and experience in the following quarter in Community Services II, when they will actually work as volunteers in these same agencies. (GSWS-210)

Class 3, Credit 4 (W)

GSWS-217 Community Services D
Registration #0516-217
This beginning social work practice course is designed to introduce students to basic helping skills, 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 of a particular 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 of Social Welfare
Registration #0516-305
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 Work Perspective
Registration #0516-405
The course is designed to give the social work student a basic understanding of the family as client. Students will look at the family from the perspective of an outside observer whose purpose is to analyze family interaction to assess problems and plan interventions. Emphasis will be on the contemporary American family including its structure, functions and roles of family members and the family's role in society. (GSSP-210, 440, GSSS-210)

Class 3, Credit 4 (F)

GSWS-435 Computer Applications to Social Work Research
Registration #0516-435
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)

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-course sequence offered concurrently with laboratory or field instruction dealing with generalist social work practice. All three courses emphasize the differential use of social work techniques (e.g., interviewing skills, assessment, data-collection and problem-solving) and interventive skills in a variety of client systems.

Through lectures, discussions, reading, lab simulations and case analysis, it is the overall objective of the sequence to provide the student with the knowledge, skill and self-awareness for beginning professional social work practice. The development of this knowledge, skill and awareness is seen as a progressive process underlying the three-course sequence. (GSWS-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, 553)

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, 553)

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 Computer Applications to 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
For social work students who are in their first quarter of field instruction. Building upon the first social work research course and upon knowledge of statistical analysis, this course considers the integration of practice and research, especially in relation to the evaluation of one's own professional practice and agency programs. The continued use of the computer as a research tool is explored, in particular the statistical packages MINITAB and SPSS-X. Specialized analytic techniques, common to social work (e.g., quantitative: Chi-Square, Pearson's Correlation, Spearman's Rho, t-test) and qualitative: research (field), are studied in relation to actual data collected by students in their concurrent field placement. Grant writing, ethics of research, and the relationship of research and minority populations also are covered. (GSWS-435, 465, 475; SMAM-309; corequisite with GSWS-505, 506, 527)
Class 3,  Credit 4 (F)

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, and Social Intervention. 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 this field education sequence successfully integrate course content and objectives. (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 chosen target population-at-risk and underserved population. (GSWS-550, 551, 560)
Class 3, Credit 4 (S)

Professional Elective Courses

GSWS-214 Drug Abuse
Registration #0516-214
This course is designed to familiarize the social work student with the many varieties of drugs, drug abuse, and the drug subculture. Emphasis is placed on a variety of treatment modalities used by the social worker when working with drug abusers.
Class 3, Credit 4 (offered on sufficient demand)

GSWS-313 Sexism and Sexual Identity in Social Work Practice
Registration #0516-313
This course is designed to sensitize social work students to sexism as it occurs in contemporary culture. The course will focus on gender identity and specific problems and issues related to the worker/client relationship.
Class 3, Credit 4 (offered on sufficient demand)

GSWS-314 The Social Worker as Advocate
Registration #0516-314
This course will examine the role of social workers in advocating on 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-547, GSSP-210,440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 2 or 4 (W, every other year)

GSWS-321 Alcoholism: Interventive Skills and Techniques
Registration #0516-321
Teaches a variety of interventive skills used by those giving care to alcohol abusers, their families and communities. Emphasis is on the method of use of these skills. Role play, videotaping and case study will be included. (GSWS-302, GSHH-547, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 2 or 4 (every other year)
The purpose of this course is to build skills in applying the knowledge base developed in the prerequisite course to case situations. Students demonstrate collection and recognition of pertinent information, and development and implementation of appropriate intervention plans. Legal and political issues, as well as methods of assessing local resource networks, are considered. Professional roles and intervention goals are discussed as they relate to interfacing systems, including individual, family, school, medical, mental health, rehabilitation and employment. (GSWS-340)
Class 3, Credit 4 (every other year)

GSWS-357 Mental Health and Mental Illness from a Social Work Perspective
Registration #0516-357
This course is designed to give social work students a basic understanding of mental health, mental illness and mental retardation from a social work perspective. The role of the social worker in working with individuals and their families will be included. Students will be given a general understanding of our current mental health systems. The medical model and alternative systems of diagnosis are considered. (GSWS-302, GSHH-547, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 4 (S)

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 his/her needs. Interventive strategies and critical times for intervention by the social worker are examined. (GSWS-302, GSHH-547, 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 provides the student with the opportunity to develop a workable vocabulary and understanding of some of the basic legislative processes and laws that effect the practice of social work. Focus centers around significant issues and points of law that have affected the delivery of services. (GSWS-302, GSHH-547, GSSP-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 focuses on the knowledge, attitudes and skills required for the management of social welfare agencies. These include traditional management skills, their relationship to the not-for-profit sector and its unique management requirements. (GSWS-302, GSHH-547, GSSP-210,440, GSSS-210,526,527, SBIG-211, 212)
Class 3, Credit 4 (offered on sufficient demand)

GSWS-431 Social Work Management
Registration #0516-431
This course identifies and teaches the supervisory skills required for the management of social welfare agencies. These include traditional management skills, their relationship to the not-for-profit sector and its unique management requirements. (GSWS-302, GSHH-547, 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, faculty expertise and developments in the field will be examined. (GSWS-302, GSHH-547, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 4 (offered on sufficient demand)
GSWS-466 Employee Assistance Programs: Registration #0516-466
An overview of Employee Assistance Programs: planning, development, program implementation, policy and procedures, ongoing monitoring and evaluation. Includes comparisons of various program models with corresponding advantages and disadvantages.

The course is designed specifically for professionals for whom knowledge of EAPs would be of benefit in their present positions. (GSWS-302, GSHH-547, GSPP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 2 (offered on sufficient demand)

GSWS-467 Employee Assistance Programs: Treatment Approaches Registration #0516-467
The course will assist participants in identifying and establishing working arrangements with appropriate treatment/counseling Service providers. Identification will include diagnostic or treatment centers appropriate for referral of troubled employees having problems with alcohol, drugs, mental health, family, finances, the legal system, gambling and stress. On-site visitation will be included.

The course is designed for professionals already working in the fields of employee assistance, personnel benefits, human resources, human development, counseling, social work and psychotherapy. (GSWS-302, GSHH-547, GSPP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 2 (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 parenting, 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-547, GSPP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 4 (offered on sufficient demand)

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 ways 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 annually)

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
The 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 cultural, environmental and institutional changes as they relate to an increasing population of older people. (GSWS-302, GSHH-547, GSPP-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 (SR, F)

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-547, GSPP-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 (W)

GSWS-538 Family Violence Registration #0516-538
This course is designed to acquaint social work students and practitioners with the problem of family violence. The causes and dynamics of various forms of violence in the family will be addressed. These include: child abuse, incest, spouse abuse, sibling violence, marital rape, abuse of parents by adolescents, and the abuse of the elderly by their adult children. Factors affecting intervention in families where these occur and techniques for intervention will be included. (GSWS-302, GSHH-547, GSPP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 4 (SR, every other year)

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-547, GSPP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)
Class 3, Credit 4 (S)
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)

**Graduate Courses**

**GSWS-705** Social Policy: Service and Process
Registration #0516-705

This course is designed to help students understand, analyze and identify methods by which social policy is developed and implemented. Through the process of program planning for a more equitable delivery of services, students will be exposed to the fundamental aspects of policy formulation. Students will investigate various social welfare policies and planning procedures that affect society in general and social work client systems specifically.

Class 3, Credit 3 (F)

**GSWS-710** History and Philosophy of Social Welfare
Registration #0516-710

This course is designed to acquaint the student with the historical and philosophical roots of our present system of social welfare, emphasizing its development in the U.S., and the concurrent development of social work as a profession. Course content will focus on the value base, the ideologies, and the economic, social, and political factors of each era that helped shape the welfare system as a societal institution. Along with the effects of these factors, consideration will be given to the effects the social welfare system has on individuals and families. Differing philosophical views of social welfare will be addressed with attention to the consequence of these views on our current thinking and structure of human service programs. Students also will examine current trends and philosophies and where these may be leading us in the future.

Class 3, Credit 3 (W)

**GSWS-715** Human Behavior and the Social Environment: Individual Development
Registration #0516-715

This course is designed to give students a basic knowledge of human development over the life cycle, the family life cycle approach and ecological systems theory. It is the foundation course on which further courses in the Human Behavior and Social Environment (HBSE) sequence build. It also, along with those HBSE courses, forms the knowledge base for most of the interventive methods courses.

The course will give students an overview of various developmental theories. They will study some of these theories in more depth and learn to apply them to the life span development of individuals. This individual development will be placed in the context of the family developmental life cycle and the ecological perspective of social work practice.

The differing aspects of individual development within various American cultural groups and within special populations of our society also will be addressed. Attention will be given to the developmental issues of special populations and minority groups.

Class 3, Credit 3 (SR)

**GSWS-720** Human Behavior and the Social Environment: Organizational Context
Registration #0516-720

This course is designed to present principles of organizational theory and the societal context within which organizations perform. The major focus will be on the function of organizational structures in today's society as operationalized through the delivery of human services. Many facets of theory, structure, behavior, bureaucracy, power, values and internal and external forces will be explored.

Course content will assist students' understanding of the necessary theories and research that constitute the system of knowledge about organizations. Particular emphasis is placed on individuals, groups and communities and the resultant interaction with all levels of organizational structure and behavior.

Class 3, Credit 3 (S)

**GSWS-725** Computer Applications to Practice Research
Registration #0516-725

Introduction to the methodology of research and evaluation as applied to social work practice. Application to the evaluation of one's own practice and the programs of one's agency is the primary organizing principle of the course. Emphasis will be on an introduction to bibliographic search procedures; becoming a practitioner/researcher, formulation of research; the environmental contexts of research; ethics, and confidentiality; issues in research with minority populations; research methods and design; sampling, measurement; validity; reliability; indexes; scales; instrument design; research design; data gathering methods; 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.

Class 3, Credit 3 (F)

**GSWS-730** Computer Data Analysis for Social Work
Registration #0516-730

The second required course in the methodology of social work practice research, with emphases on idioraphic research and program evaluation. Contents include basic bivariate analysis techniques through an introduction to linear regression, e.g., measures of central tendency and dispersion; systems for comparing scores; estimation of population characteristics; hypothesis testing; correlation; F-tests and analysis of variance; non-parametric tests; and the implications of research with minority populations. (GSWS-725)

Class 3, Credit 4 (W)

**GSWS-735** Human Behavior and the Social Environment: Small Group Dynamics
Registration #0516-735

This course is designed to help students acquire the knowledge base and theoretical framework to understand human behavior, human development, social process needs and the development and consequential functions of how groups affect each other. This course also will investigate the theoretical functions of group dynamics and group behavior. The scope, techniques, and functions of group intervention and how it may be applied in a variety of social work settings will be emphasized. Specific attention will be given to the establishment of meaningful and disciplined communications as the basis for work with diverse populations and client groups. Course content will include direct experimentation with the students' own behavior in group settings; related written materials, discussions and lectures with emphasis placed on the students' experiential involvement.

Class 3, Credit 4 (SR)
Liberal Arts Courses

Language, Literature and Communication

GLLC-220 English Composition
Registration #0502-220
This course develops the language skills needed to write effectively. It should be taken in the freshman year. Class 3, Credit 4 (offered quarterly)

GLLC-440 Human Communication
Registration #0502-440
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 annually)

GLLC-441 Small Group Communication
Registration #0502-441
Practice in analysis of a variety of small group discussion techniques focusing on phenomena such as processes of interaction, decision making, norms structure and development, membership, and theory of group development. This course is part of the Language concentration and may also be taken as an elective. (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 or equivalent) Class 3, Credit 4 (offered annually)

GLLC-443 Writing and Thinking
Registration #0502-443
This course develops the reasoning and advanced language skills needed to carry out applied logic and applied problem-solving writing processes. This course is part of the Language concentration and may also be taken as an elective. (GLLC-220 or equivalent) Class 3, Credit 4 (offered annually)

GLLC-444 Technical Writing
Registration #0502-444
This course develops in students those skills necessary for completing technical 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-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 Problem Solving
Registration #0502-502
This course will acquaint students with the general body of theory and research concerning small group communication; enable them to prepare informational and problem-solving group discussions; aid them in developing skills in conference participation and leadership and improve their ability to observe, analyze and evaluate the group process. A major emphasis in the course will be on systematic methods of group problem-solving and decision making. Class 3, Credit 4 (offered annually)

GLLC-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. (GLLC-440 and either GLLC-442 or GLLC-502 or equivalent) Class 3, Credit 4 (offered annually)

GLLC-507 Professional Writing
Registration #0502-507
This course develops in the student those professional writing skills necessary to the composition of in-house journals or newsletters; press releases; trade journals/books; speeches; general interest writing; and ghostwriting. Students enrolling in Professional Writing should have command of clear and logical standard written English prose. (GLLC-220 or equivalent) Class 3, Credit 4 (offered annually)

GLLC-508 Organizational Communication
Registration #0502-508
This course examines both interpersonal and small group communication in organizational settings. Topics to be covered include information flow and networks, organizational theory, managerial decision making, interviewing, organizational development, and conflict resolution. (GLLC-440 or equivalent) Class 3, Credit 4 (offered annually)

GLLC-510 Visual Communication
Registration #0502-510
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. Class 15, Credit 5 (available any quarter)
GLLC-514  Mass Communication  
Registration #0502-514  
An introduction to the study of the mass media. The focus of the course is on the history, development, and law and regulation of the mass media in the United States.  
Class 3, Credit 4 (offered annually)

GLLC-515  Uses and Effects of the Mass Media  
Registration #0502-515  
An analysis of the "effects" and the "uses and gratifications" of mass communication research with focus on building mass communication theory. NOTE: Students may find GLLC-514 a useful introduction to this course.  
Class 3, Credit 4 (offered annually)

GLLC-516  Creative Writing/Poetry  
Registration #0502-516  
An exploration of techniques of writing poetry in both open and closed forms. (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.  
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. (GLLC-220 or equivalent)  
Class 3, Credit 4 (offered annually)

GLLC-519  Advanced Creative Writing  
Registration #0502-519  
Students who have completed Creative Writing or who have satisfied the instructor, normally by presentation of a writing sample, of their readiness to undertake the course will be given an opportunity to explore in depth a literary genre, subject or theme chosen by the individual student in conference with the instructor. The acceptability of the student's project will be determined on the basis of its intrinsic literary merit and its potential value to the student's development as a writer. (GLLC-220 or equivalent)  
Class 3, Credit 4 (offered occasionally)

GLLC-520  College Vocabulary Skills  
Registration #0502-520  
Application to the process of vocabulary building of the various disciplines of language study will be provided. Included among these will be applications of dictionary study, etymology, semantics, and structural linguistics. In addition, literary works, periodicals, and newspapers will be examined to strengthen the student's awareness of the contextual variation in the meaning of words. Ineffective and faulty devices of language usage will also be discussed. (0502-220 & 0504-332)  
Class 3, Credit 4 (offered annually)

GLLC-521  Intercultural Communication  
Registration #0502-521  
This course is an examination of the role of culture in face-to-face interaction. There are no prerequisites, but students may find a basic background in communication, anthropology, or psychology useful.  
Class 3, Credit 4 (offered annually)

GLLC-522  Persuasion and Social Change  
Registration #0502-522  
Readings and analysis of selected public speeches and essays advocating or opposing major issues of social change in the United States from the 18th century through contemporary advocacy.  
Class 3, Credit 4 (offered occasionally)

GLLC-524  Communication and Documentary Film  
Registration #0502-524  
An examination of the documentary film and video as case studies in communication media. The course focuses on film techniques used as argument, persuasion, propaganda and reconstruction of reality. Such elements as director, subject, shooting style, and editing techniques will be analyzed in terms of message, purpose and audience.  
Class 3, Credit 4 (offered annually)

GLLC-525  Special Topics in Communication  
Registration #0502-525  
A focused, in-depth study and analysis of a selected advanced topic in communication and associated issues. Specific course topic will vary according to faculty assigned and will be published when the course is offered. Topics include: semiotics, public relations, communication technologies, gender differences in communication, legal communication, and censorship and propaganda. (For junior and senior PTC students; non-PTC students must receive permission of the instructor.)  
Class 3, Credit 4 (offered annually)

GLLC-530, 482, 483  Beginning German I, II, III  
Registration #0502-530, 482,483  
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 Study 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 Study 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, n, in  
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 a member of 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 a member of 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 Study 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 a member of 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 put 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 a member of 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 students 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 a member of 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 students will learn reading and writing skills, the
primary emphasis will be the acquisition of oral fluency. (GLLC-
481 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 class-
cics (prose, poetry, fiction, drama) through the visual medium of
sign (sign language and sign-mime).
Class 3, Credit 4 (offered annually)

GLLL-332  Literature
Registration #0504-332
The students study some of the great literary works of our culture
to enrich their lives and reinforce their analytical abilities. The
students read representative poems, dramas, and narratives
drawn from the Ancient, Medieval-Renaissance, and Modern
Periods.
Class 3, Credit 4 (offered quarterly)

GLLL-337  Literature: Poetry 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 An-
cient, 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
The Drama/Theatre course studies drama as a genre and theatre
as a performing art. Intensive study of at least one major play-
wright 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)
Class 3, Credit 4 (offered annually)

GLLL-442  Short Fiction
Registration #0504-442
The course is a study of a collection of short stories with critical commentary in order to provide source materials on the nature
and development of this genre. This course is part of the Litera-
ture 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 course provides a close reading and analysis of several
texts of characterization and plot construction, and styles rep-
resentative of the genre. This course is part of the Literature con-
centration 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% litera-
ture and 50% film. This course is part of the Literature concen-
tration 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 (to 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 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
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

GLLL-445 Great Authors: Ibsen—Drama and Film
Registration #0504-445
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

GLLL-445 Great Authors: Chaucer and His Times
Registration #0504-445
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

GLLL-445 Great Authors: Jonathan Swift and the Age of Satire
Registration #0504-445
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

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

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

GLLL-445 Great Authors: Shakespeare—Comedy and History
Registration #0504-445
A generous sample of Shakespeare's tragedy and romance plays is investigated to reveal their literary excellence and their theatrical power. Reference is made to 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

GLLL-445 Great Authors: Shakespeare—Registration #0504-445
Registration #0504-445
Several of Shakespeare's comedy and history plays are read and analyzed to reveal their literary excellence and their theatrical power. This course is part of the Literature concentration and also may be taken as an elective. (0504-332 or equivalent)
Class 3, Credit 4

GLLL-446 Modern Literature
Registration #0504-446
The course provides extended study of works written in the 20th century (the particular genres or 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 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: Modern Latin Literature
Registration #0504-446
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

GLLL-446 Modern Literature: Modern Latin Literature
Registration #0504-446
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 also may be taken as an elective. (0504-332 or equivalent)
Class 3, Credit 4

GLLL-446 Modern Literature: Modern Latin Literature
Registration #0504-446
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 also may be taken as an elective. (0504-332 or equivalent)
Class 3, Credit 4
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 also may be taken as an elective. (0504-332 or equivalent)
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**Science and Humanities**

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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)

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)

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 occasionally)

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 Study concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

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 Study concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

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 Study concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

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)

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)

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)

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)

Picasso
Registration #0505-520
The life and work of one of the most influential artists of our century.

Class 3, Credit 4 (offered occasionally)

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)

20th Century Music
Registration #0505-526
A survey of major 20th century composers and their works. Emphasis will be placed on the development of music in the classical tradition, experimental music and jazz.

Class 3, Credit 4 (offered occasionally)

Romanticism in Music
Registration #0505-528
A survey of music written during the Romantic Period (19th century), including later trends-Impressionism (Debussy, Ravel) and Neo-classicism (Satie, Stravinsky). Genres include orchestral music, chamber music, piano, song, ballet, and opera. Representative composers are Chopin, Brahms, Wagner, and Tchaikovsky.

Class 3, Credit 4 (offered occasionally)

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)

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 cultural and political contexts.  
Class 3, Credit 4 (offered occasionally)

GSHH-442 The Contemporary Middle East  
Registration #0507-442  
This course analyzes the making of the contemporary Middle East from the rise of Islam to the present with special emphasis on the patterns of political development in the 20th century. This course is part of the History concentration and also the International Relations concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent for the History concentration; GSSM-211 or GSSM-215 or equivalent for the International Relations concentration)  
Class 3, Credit 4 (offered annually)

GSHH-443 European Social Intellectual History Since 1600  
Registration #0507-443  
An analysis of social events and intellectual movements in Europe since 1600. This course is part of the History concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)  
Class 3, Credit 4 (offered annually)

GSHH-444 European Diplomatic History, 1871-1945  
Registration #0507-444  
This course seeks to investigate the origins of the First and Second World Wars with special emphasis on the diplomacy of the European Great Powers. This course is part of the History concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)  
Class 3, Credit 4 (offered annually)

GSHH-445 Modern Latin America  
Registration #0507-445  
This course surveys the historical development of the Hispanic and Portuguese areas of the Americas from independence to the mid-twentieth century. The movement towards independence, the problems that emerged during the nineteenth century of forming unified nations, and the problems of modernization in the twentieth century are all covered. The histories of selected countries are used to illustrate these issues. This course is part of the History concentration and also the Foreign Language/Culture Study concentration, and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)  
Class 3, Credit 4 (offered annually)

GSHH-480 History of American Women  
Registration #0507-480  
A history of women in North America from the colonial period to the present. Concentrates on the social, political, cultural, diplomatic and economic history of women in the United States and Canada. This course is part of the Women's Studies concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHH-483 Christianity in the West  
Registration #0507-483  
This course traces the development of Christian thought in the broad historical context of Western Civilization. It concentrates on major movements and outstanding personalities. This history of Christian thought is examined against the background of economic, political, social and intellectual currents. The study sheds light on both the conflicts within and the criticisms from outside and Christian tradition. This course is part of the Perspectives on Religion concentration and also may be taken as an elective.  
Class 3, Credit 4 (offered annually)

GSHH-484 Europe Since 1945  
Registration #0507-484  
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 Global Studies 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 their cultural characteristics. This course is part of the Foreign Language/Culture Study concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GSHH-486 China and Japan in the 20th Century
Registration #0507-486
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 Study concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHH-487 History of Chinese Communism
Registration #0507-487
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 forth to the Chinese people. In addition, China and the world will be examined. This course is part of the Foreign Language/Culture Study concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

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 Study 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 Study 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 Study concentration and also may be taken as an elective.
Class 3, Credit 4 (offered occasionally)

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 implications 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-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 present.
Class 3, Credit 4 (offered occasionally)

GSHH-502 Europe of the Dictators: Stalin, Mussolini, Hitler
Registration #0507-502
A study of the European states and peoples in the inter-war period, the diplomatic and military history of World War II, the reconstruction of Europe, the Cold War, Detente, and contemporary Europe.
Class 3, Credit 4 (offered occasionally)

GSHH-503 The History of Russia
Registration #0507-503
A study of the historical context and development of Russian society and the factors leading to the emergence of the Soviet regime.
Class 3, Credit 4 (offered occasionally)

GSHH-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
The course will analyze the causes of the outbreak and rapid increase of violent and criminal trends in the world as the most serious realities of the 20th century. The course will be a comparative study on America's and the world's problems of violence, crime, and urban crisis.
Class 3, Credit 4 (offered occasionally)

GSHH-524 The Italian American Experience
Registration #0507-524
Examines the history and culture of the Italian Americans from the colonial period to the present. Stresses their role in the arts, business, politics, the Church, and the labor movement. Italian history is studied as it relates to the Italians in America.
Class 3, Credit 4 (offered occasionally)

GSHH-526 The United States and the Third World Revolutions in the 20th Century
Registration #0507-526
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 This History of Popular Culture in America
Registration #0507-528
American myths, icons, heroes, and institutions as represented in American popular culture from the late nineteenth century to the present. Examines the history of popular entertainment and the mass media in the United States.
Class 3, Credit 4 (offered occasionally)

GSHH-530 19th Century American Diplomatic History
Registration #0507-530
An examination of American diplomacy from the early years of American independence to the emergence of the United States as a world power. The War of 1812, Monroe Doctrine, and Manifest Destiny are among the topics considered.
Class 3, Credit 4 (offered annually)

GSHH-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 Constitution in American History
Registration #0507-538
This course will analyze how well the Constitution has met the social and political expectations of citizens. Emphasis will be placed on analyzing Supreme Court cases that explain the current state of social justice. This is a companion course to GSHH-532, Civil Liberties in American History.
Class 3, Credit 4 (offered annually)

GSHH-545 Revolutionary Leaders in Latin America
Registration #0507-545
In this course three movements will be studied: the rise of Juan Peron in Argentina in the 1940's, Fidel Castro's revolution in Cuba; and Salvador Allende's electoral victory in Chile in 1970. By studying these three "revolutionary" movements, it is hoped that the student will come to an understanding of the historical perspective and nature of the social discontent in Latin America.
Class 3, Credit 4 (offered annually)

GSHH-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-553 The United States Since World War II
Registration #0507-553
An analysis of the major themes characterizing post World War II United States history. The course aims to investigate the specific characteristics of America as a modern state. Selected themes will have an intellectual, cultural and political history focus.
Class 3, Credit 4 (offered 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 Kruschev and his successors, and current developments in the Soviet Union. **
Class 3, Credit 4 (offered annually)

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 which have contributed to the revival of the western culture and heritage.
Class 3, Credit 4 (offered occasionally)

GSHH-557 Communism, Fascism and Democracy in Their Theoretical Foundations
Registration #0507-557
A political and historical appraisal of these philosophies. Emphasis is placed upon the claims they make with regard to the individual and the state, and the changes they demand for the future.
Class 3, Credit 4 (offered occasionally)
GSHN-211 Science, Technology and Values
Registration #0508-211
This course explores the concepts and effects of science and technology in society, analyzes the relationship between science and technology, examines how each has come to play a major role today, and looks at how science and technology have been affected by our values. Science and technology are often assumed to be value free, yet people, guided by individual and societal values, develop the science and technology. In turn, the choices people make among the opportunities provided by science and technology are guided by their individual values.
Class 3, Credit 4 (offered annually)

GSHN-440 History of Science
Registration #0508-440
This course presents a study of the origins, nature, and development of Western science, and its social, economic, and cultural context. This course is part of the Social Impacts of Science and Technology concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-441 Science and Technology Policy
Registration #0508-441
This course will examine how local, state, Federal, and international policies are developed to influence innovation, the transfer of technology, and industrial productivity in the United States and other selected nations. This course is part of the Social Impacts of Science and Technology concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-442 History of American Technology
Registration #0508-442
This course presents an examination of the cultural context of American technology and its influence on American social, economic, political, and cultural institutions. This course is part of the Social Impacts of Science and Technology concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-443 Face of the Land
Registration #0508-443
This course is a case study in the relationship of technology and society, focusing on the interaction of land, people and technology. By considering the natural landforms of the United States and other countries as appropriate, students will see how the nature of land determines its value. As technological innovations are made and introduced, old relationships with the land are altered, sometimes irreversibly. Through this study students have a concrete example of the positive and negative effects of technology on the social structure. This course is part of the Social Impacts of Science and Technology concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-444 Social Consequences of Technology
Registration #0508-444
Modern society is increasingly based on technology. With each advance due to technology, unanticipated problems are also introduced. Society must define and solve these problems or the choices 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-445 Biomedical Issues in Science and Society
Registration #0508-445
A study of the impact of science and technology on life, our view of life, and of the value issues that arise from this impact. This course is part of the Social Impacts of Science and Technology concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-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 value, economic, and social implications of environmental regulation, enforcement, and will identify current developments in the area. This is a concentration course in the Environmental Studies concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-486 Modern Warfare Technology and Arms Control Problems
Registration #0508-486
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 of the individual due to the acceleration of the technological change.
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 also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-441 Logic
Registration #0509-441
An introduction to the basic principles of logic. The main emphasis will be on symbolic, or formal logic, but some attention may be paid to informal logic as well. This course is part of the Philosophy concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-442 Aesthetics
Registration #0509-442
An introduction to the basic principles of logic. The main emphasis will be on symbolic, or formal logic, but some attention may be paid to informal logic as well. This course is part of the Philosophy concentration and also may be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-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. This 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 nature 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)
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)

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 (Donagan, 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)

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)

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)

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)

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)

This course is designed to provide students with a basic understanding of how religion operates as an integral part of any society. In order to demonstrate this, the institution of religion will be studied from a cross-cultural, anthropological perspective. Emphasis will be on primitive and peasant societies. This course is part of the Perspectives of Religion concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

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)

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)

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)

Urban economics is the application of economic analysis to spatial relationships in densely populated (urban) areas. The first part of the course develops economic models which explain the location behavior of consumers and businesses in cities. The second part of the course is issue-oriented, applying the insights gained in the first part to a number of urban problems. This course is part of the Economic concentration and 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 Economic Problems
Registration #0511-442
This course aims to prepare the student to deal with foreign exchange market, international trade decisions, the macroeconomics effects of trade on domestic economics, and the effects of domestic business fluctuations on international trade and finance of each country. Though the course is basically a theory course in economics, the applied aspects of international trade and finance are emphasized. This course is part of the Economics concentration and 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 Macroeconomic Problems
Registration #0511-443
This course is an in-depth analysis of selected macroeconomic problems such as economic growth, inflation, and business cycles. The primary focus is consideration of current macroeconomic theory and policy application in the context of the U. S. economic problems, e.g., tax-based incomes policies, wage-price controls. This course is part of the Economics concentration and 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, the 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, Marxist, 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 and Competition
Registration #0511-446
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 Developed Countries
Registration #0511-448
This course introduces students to the economic problems of less developed countries (LDC). Students study the historical causes of underdevelopment gap between developed and underdeveloped countries, and the theories and the policies aimed at accelerating the rate of growth in LDC. In addition, the role of international organizations in the economic development of LDC is discussed. This course is part of the Global Studies concentration and the Economics concentration and also may be taken as an elective. (GSSE-210 or GSSE-301)
Class 3, Credit 4 (offered annually)

GSSE-449  Comparative Economic Systems
Registration #0511-449
This course provides a comparative analysis of different economic systems. The three major economic systems to be studied are the Capitalist Mode of Production, the Planned Economy, and the Mixed Economy. The student will study the economic decision-making process in each system including the economic structure, operation, and relative efficiency in achieving its macroeconomic goals. Upon completion of this course, the student will be able to critically evaluate each economic system, recognize the advantages and disadvantages of each, and propose general policy recommendations to improve each system's relative efficiency. This course is part of the Global Studies concentration and the Economic concentration and also may be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-450  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)
GSSM-215 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 GSSSM-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 also may be taken as an elective. This course is part of the International Relations concentration and also 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 Registration #0513-442 of the USSR
This course critically analyzes the structure and principles 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 Registration #0513-443 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 Registration #0513-445
This course provides a mode of analysis for the study of political systems. Basic concepts of political science are utilized to present a descriptive and analytical examination of various political systems that can be classified as western democracies, communist, or third world. Particular attention is paid to the governmental structure, current leadership, and major issues of public policy of those selected political systems under review. This course is part of the International Relations concentration and the Global Studies concentration, and also may be used as an elective.
Class 3, Credit 4 (offered annually)
GSSM-450 State and Local Politics
Registration #0513-450
This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. It will illustrate differences in state governments by comparing other states to New York, and will use the Rochester area for comparisons with local governments found elsewhere. This course is part of the American Politics concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-451 The Legislative Process
Registration #0513-451
This course examines the role of the legislature in the U. S. political process. The primary emphasis will be the study of the U. S. Congress, but some attention also will be directed to state legislatures. Topics to be studied include elections, party organization, committees, interest group activities, and executive-legislative relations. This course is part of the American Politics concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-452 The American Presidency
Registration #0513-452
This course is a study of the role of the presidency in the American Political System. Among the topics to be considered are: the nomination and election process, evolution 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 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 annually)

GSSM-455 Politics and Public Policy
Registration #0513-455
This is a course in the politics of the policy process. The basic questions of the course are: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government implement public policy? How does government evaluate public policy? This course is part of the American Politics concentration and also may be taken as an elective. (GSSM-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 Psychology of Adult Life
Registration #0514-442
This course encompasses the psychology of the span of life from young adulthood through the middle years. The developmental approach, presented in an interdisciplinary framework, provides a systematic orientation to the study of the individual during early adulthood. This course is part of the 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
The course will attempt to give a general overview of those areas of social psychology currently under the most intensive investigation, and likely to be of most interest to the student, including nonverbal communication, attraction, aggression, and group effects. 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
The course covers topics of all sense modalities with emphasis on visual perception. It traces what happens to the physical stimulus as our sensory systems analyze it to produce complicated perceptions of the world around us. Many complex perceptual phenomena draw upon explanations at the physiological, psychological and cognitive levels. 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 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
This 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 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 perspec-
tive. 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-518  Psychology of Aging
Registration #0514-518
The Psychology of Aging course will present a psychological over-
view of human aging with some study of the dynamic problems of
the elderly in contemporary society. Psychological aspects of
adulthood and aging will be emphasized within the perspectives
of an interdisciplinary approach (GSSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-519  Psychology of Altered States
Registration #0514-519
This course will cover such topic areas as the specialized con-
sciousness in the two halves of the brain, dreaming, hypnosis,
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)

GSSP-522  Psychology of Art
Registration #0514-522
An introduction to psychological research in the area of cog-
nition (thinking, perception, memory) and the application of
these findings to the study of art. Also included will be a critical
examination of certain theories of personality and abnormality
in terms of their relevance to the understanding of the artistic
process. Emphasis will be on the areas of painting, sculpture,
ceramics, photography and film. (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 impor-
tant research findings. Included are such topics as cultural dif-
ferences and ethnicnomcentrism, socialization, social statuses and roles,
group dynamics, social institutions, stratification, collective be-
havior.
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,
it's 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 pro-
fessions 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 per-
misson)
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 equiva-
 lent)
Class 3, Credit 4 (offered annually)

GSSS-445  Television and Social Change
Registration #0515-445
This course will analyze how television and other modern media
affect social and cultural change. It will emphasize historical de-
velopment, 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 broad-
casting violence; children and the media; the business of tele-
vision; economic control; the entertainment industry; the pro-
duction 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 (eti-
ology) and cure of disease in various societies and social groups.
Also included will be a discussion of the epidemiology of disease,
access to, and delivery of health care in contemporary U. S.
society, problems of patient care and the study of mental illness and
death and/or dying. This course is part of the Social Change in a
Technological Society concentration and also may be taken as an
elective. (GSSS-210 or GSSA-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSS-447  Women in Contemporary U. S. Society
Registration #0515-447
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)
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<th>Description</th>
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<tbody>
<tr>
<td>GSSS-448</td>
<td>Minority Group Relations</td>
<td>#0515-448</td>
<td>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 Minority Relations concentration and also may be taken as an elective. Class 3, Credit 4 (offered annually)</td>
</tr>
<tr>
<td>GSSS-482</td>
<td>Hispanic American Culture</td>
<td>#0515-482</td>
<td>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 specified. 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 in which Hispanics have “progressed” in the U.S. This course is part of the Minority Relations concentration and also may be taken as an elective. Class 3, Credit 4 (offered annually)</td>
</tr>
<tr>
<td>GSSS-483</td>
<td>Black Culture</td>
<td>#0515-483</td>
<td>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)</td>
</tr>
<tr>
<td>GSSS-506</td>
<td>Social Inequality</td>
<td>#0515-506</td>
<td>The study of social inequality is a survey course which will examine different dimensions of stratification in the U.S. and elsewhere. Explanations for the existence of inequality will be addressed at individual, group and institutional levels. Class 3, Credit 4 (offered occasionally)</td>
</tr>
<tr>
<td>GSSS-507</td>
<td>Complex Organizations</td>
<td>#0515-507</td>
<td>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)</td>
</tr>
<tr>
<td>GSSS-508</td>
<td>Aging and Society</td>
<td>#0515-508</td>
<td>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)</td>
</tr>
<tr>
<td>GSSS-509</td>
<td>Social Policy</td>
<td>#0515-509</td>
<td>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)</td>
</tr>
<tr>
<td>GSSS-510</td>
<td>Juvenile Justice</td>
<td>#0515-510</td>
<td>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)</td>
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<tr>
<td>GSSS-511</td>
<td>Population and Society</td>
<td>#0515-511</td>
<td>Study of demographic variables of mortality, fertility, and migration as they affect the rise and quality of population. Class 3, Credit 4 (offered annually)</td>
</tr>
<tr>
<td>GSSS-513</td>
<td>Criminology</td>
<td>#0515-513</td>
<td>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)</td>
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<tr>
<td>GSSS-514</td>
<td>The Urban Experience</td>
<td>#0515-514</td>
<td>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)</td>
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<tr>
<td>GSSS-515</td>
<td>Social Policy and the Aging</td>
<td>#0515-515</td>
<td>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)</td>
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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 psychology, 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 Air Power
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 Contemporary American Society I
Registration #0513-401
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 Contemporary American Society II
Registration #0513-402
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 annually)

GLAI-201 Seminar; Academic Fields of Study (Tech. and Lib. Studies)
Registration #0520-201
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 presumption 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)

GLCC-301, 302, 303 College Writing I, n, III
Registration #0502-301, 302, 303
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 Communication
Registration #0502-403
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 Handicapped
Registration #0502-404
An examination of the communication difficulties with the handicapped: specifically the deaf, blind and others with physical handicaps. To include interpersonal, family, social and rehabilitation modes of communication. (GSSP-210)
Class 3, Credit 4 (offered occasionally)

GLLC-505, 506 Research Methods I and II
Registration #0502-505, 506
This course is 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 will be offered in a sequence of two, two-credit courses to students in the third year of the Professional and Technical Communication Program.
Class 1, (505-Credit 2) (506-Credit 2) (offered annually)

GLLC-509 Senior Thesis in Communication
Registration #0502-509
This course 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 critique. (GLLC-505, 506, 504)
Class 3, Credit 4 (offered annually)
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 microeconomics. Topics of primary interest include economic methodology, the economizing problem, capitalist ideology, supply and demand, national income accounting, income determination, inflation, money, and the role of government in the economy. Other topics in basic economics will be selected by the instructor.

Class 3, Credit 4 (offered quarterly)

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)

A further elaboration of the elementary principles of economic analysis introduced in Principles of Economics I and II. Particular emphasis will be placed on the application of these principles to the decision making process of the firm. (GSSE-302)

Class 3, Credit 4 (offered annually)

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)

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)

A course designed to provide the student with the basic vocabulary of frequently used signs and the American manual alphabet.

Class 3, Credit 4 (offered on sufficient demand)

Graduate Courses

Film and Society

An inquiry concerning the relationship between motion pictures and society that will use historical, humanistic, and social science research to achieve an understanding of movies as a social force, industry, and art form.

Class 3, Credit 4 (offered occasionally)

A critical examination of key aspects of film criticism and of the development of film as an art. The emphasis of the course will be historical, with the development of cinema being traced through major films by important directors. There will be an opportunity to pursue individual interests.

Class 3, Credit 4 (offered occasionally)

A seminar exploring the philosophical and cultural perspectives underlying traditional Far Eastern art as a prelude to examining selected topics in Indian, Chinese and Japanese art. Emphasis will be placed on the application of research techniques and critical methods of an individually selected area of interest which may serve as a foundation for continuing study.

Class 3, Credit 4 (offered occasionally)

An investigation of American art from the Civil War to the present. Emphasis will be placed on the visual arts but many references will be made to music and architecture.

Class 3, Credit 4 (offered occasionally)

A study of the function of primitive art and the techniques of its production, including the use of clay, stone, fibers, bark, wood, bronze, gold, etc. Hair styling, body painting and scarification also will be discussed.

Class 3, Credit 4 (offered occasionally)

This course offers the graduate art student the opportunity to investigate those aspects of 20th century art that question the very nature of art and the role of the artist in today's and tomorrow's society.

Class 3, Credit 4 (offered occasionally)

Though the course will develop chronologically from the Renaissance to the present, emphasis will be placed on a close analysis of (1) selected works of art, including paintings, sculpture and architecture, and (2) the development of the unique oeuvre of selected artists. Topics chosen for study will be limited in number but treated in depth. Topical choices will be based on richness and import of the formal and/or conceptual content embodied therein. Some background in the history of art is helpful but not necessary.

Class 3, Credit 4 (offered occasionally)

The impact of Picasso and his circle on 20th century art. Their affinities with modern scientific and philosophical attitudes also will be discussed.

Class 3, Credit 4 (offered occasionally)
A detailed analysis of the art and times of the Baroque master. Emphasis will be placed on the development of his style and technique, on his and other artist's relationship to their society and to the character of the Baroque outlook.

This course is a study of various aspects of music in different historical environments with emphasis on analogies between music and the other fine arts.

A range of questions will be addressed in the seminar. What is it to perceive something aesthetically? Are there any essential or defining properties shared by all works of art? Are our evaluations and interpretations of art works objective or subjective? Are an artist's intentions relevant factors in critical arguments? Understanding how answers to these questions are constrained by features of actual art works will be an important part of discussion.

An investigation into concepts concerning mental experience. The basic questions is "What is consciousness?" The question hides some presuppositions and raises many further questions. Can we be conscious of consciousness? What does it mean to be conscious? Is there a mind-brain identity? Can computers think? It will be the business of this course to explore these and other related questions and to see what progress has been made in attempting to answer them.

An interdisciplinary introduction to the methods and procedures of country risk assessment. Practice in developing a country risk assessment will be offered in order to familiarize the student with the role of international environment analysis (political stability analysis) in the operations of business and financial institutions planning investments or operations abroad.

This course will cover the major theoretical approaches to the understanding of human development. Areas of study will include, but not be limited to, cognitive development, language development, development of personality, social development, and moral development. (See requirements for admission for prerequisites or receive permission of professor.)

This course is designed to furnish students with an understanding of the basic psychological processes underlying the educational process, and to apply them to concrete situations that may arise for persons who teach. (See requirements for admission for prerequisites or receive permission of professor.)

This introductory course, in a series of assessment courses, will study assessment, types of tests and their uses, strengths and weaknesses, basic measurement, principles of reliability, validity, scales and norms. Students will acquire an understanding of quantitative and qualitative principles of measurement. There will be extensive laboratory experiences on a variety of instruments, the clinical method, and the uses of tests in schools and other settings.

Laboratory experiences involve administration, scoring and interpretation of tests. Sample tests include Kaufman Assessment Battery for Children (KABC), Stanford-Binet-Riverside edition, Wide Range Achievement Test, the Detroit Test of Learning Aptitude, the Bracken Basic Concept Scale, Wisc-R, Colored Progressive Matrices, Bender Visual Motor Gestalt Test, Kinetic Family Drawing, Draw-A-Person, TAT, CAT, Incomplete Sentences, Child Behavior Checklist, Rokeach Value Survey, Taylor-Johnson Temperament Analysis, etc. (See requirements for admission for prerequisites or receive permission of professor.)
GSSP-728  Research for the School Psychologist
Registration #0514-728
The student will learn many of the statistical procedures commonly involved in research utilizing statistics in the planning, analysis and presentation of the data. (See requirements for admission for prerequisites or receive permission of professor.)
Class 3, Credit 4

GSSP-729  Computer Technology for the School Psychologist
Registration #0514-729
The student will acquire competence in applying computer technology in education and training, and in support of a professional role. Skills will be acquired in the use of a word processor, a database, and an electronic spreadsheet. In addition to developing skills in using the computer, students will become aware of ethical and social issues surrounding its use in education, and will learn skills in evaluating and selecting instructional software appropriate for achieving learning objectives. Computer-based instructional simulation and gaming will be explored. Students will apply computer skills in a specialized project responsive to their interests. Computer packages, MINITAB or SPSSX, will be used to analyze data. (Permission of professor)
Class 3, Credit 4

GSSP-730  Seminar for the School Psychologist
Registration #0514-730
Critical issues, theories and practices; role of the school psychologist as defined by competencies and responsibilities in the settings in which school psychology is practiced. (Matriculation in the School Psychology Program plus 16 quarter credit hours successfully completed in the program or permission of professor)
Class 3, Credit 4

GSSP-731  Intellectual Assessment
Registration #0514-731
This course concentrates on development of intellectual assessment skills. Students learn to select and administer individual intelligence tests, to interpret results, and to provide written and oral reports. (GSSP-726)
Class 3, Credit 4

GSSP-732  Personality Assessment
Registration #0514-732
This course uses interview, behavior observation and personality tests for clinical evaluation. Students gain experience in administering, interpreting and reporting results of personality tests currently used in the practice of school psychology. (Matriculation in the School Psychology Program plus GSSP-726 or permission of professor)
Class 3, Credit 4

GSSP-733  Behavioral Management
Registration #0514-733
Techniques and Assessment
Advanced training in the applications of behavioral assessment and modification techniques in educational settings. Supervised study and experiences will include individuals within the wide range of disabilities. (Matriculation in the School Psychology Program or permission of professor)
Class 3, Credit 4

GSSP-734  Analysis of Exceptional Individuals
Registration #0514-734
An applied course in the diagnostic evaluation of exceptional individuals in order to provide psychoeducational and psycho-neurological information to multidisciplinary evaluation teams. Students select, administer and integrate test data, and report results and recommendations for treatment. An overview of relevant information on theory of exceptionality and current status of diagnosis and treatment of exceptional children is provided. (Matriculation in the School Psychology Program plus GSSP-726, 731, 732 or permission of professor)
Class 3, Credit 4

GSSP-735, 736  Practicum in School Psychology I & II
Registration #0514-735, 736
The practicum serves as a bridge from theory and research to the professional practice of school psychology. Completion of at least 48 hours of sequential courses will serve as a basis for this course. A weekly classroom seminar will be provided in addition to a three to six hour/week placement in a school setting. The practicum experience is a major part of preparation for the field placement/internship. (Matriculation in the School Psychology Program plus 24 quarter credit hours successfully completed in the program or permission of professor)
Class 3, Credit 3

GSSP-737, 738  Internship in School Psychology
Registration #0514-737, 738
Psychology I & II
Through direct, supervised experience the student will practice the various professional roles of a school psychologist in a real setting. Competency in carrying out these tasks in an ethical and professional manner will be developed as preparation for employment. (Matriculation in the School Psychology Program plus completion of 60 hours in graduate program and qualifying examination)
Class 3, Credit 5

GSSP-739  Social Psychology
Registration #0514-739
This course examines the way human behavior is affected by the social and physical environment. It analyzes the situational variables which promote or inhibit various behaviors and suggests ways in which individuals can recognize and resist social influence or fashion an environment conducive to attainment of their goals. (See requirements for admission for prerequisites or receive permission of professor)
Class 3, Credit 4

GSSP-740  Psychology of Deafness
Registration #0514-740
This course is an introduction to the cognitive, linguistic and emotional processes of hearing-impaired persons. Emphasis is placed on understanding the functional integrity and the dynamics of hearing-impaired persons' psychological systems. (See requirements for admission for prerequisites or receive permission of professor)
Class 3, Credit 4

GSSP-741  Community Psychology Seminar
Registration #0514-741
Overview of the main concepts and issues in community psychology as they relate to the school psychologist. Explores functions of mental health education, consultation, crisis intervention, research and evaluation. (See requirements for admission for prerequisites or receive permission of professor)
Class 3, Credit 4

GSSP-742  Learning Disabilities: Identification and Intervention
Registration #0514-742
This course provides the student with an overview of the issues and research on learning disabilities. Because the topic of learning disabilities is diverse, the course emphasizes criteria and content that have an established empirical base. Attention is directed to the issues of definition with a focus on identification (definition and diagnosis) and intervention (instruction and service delivery). Issues related to etiology and theoretical constructs of learning disabilities are presented in readings and by lecture content. A neuropsychological approach is emphasized. (See requirements for admission for prerequisites or receive permission of professor)
Class 3, Credit 4
GSSS-701 Educational Sociology
Registration #0515-701
This course is designed to furnish students with an understanding of the basic sociological processes underlying the educational process, and to help students apply it to concrete situations that may arise for teachers. (See requirements for admission for prerequisites or receive permission of professor)
Class 3, Credit 4 (offered annually)

Independent Study
A student may register for a graduate independent study project subject to the approval of the director of the student's graduate program, the faculty sponsor, the graduate committee and dean of the College of Liberal Arts. Because of the length of the approval process, students who desire to take independent study should make arrangements several weeks before the quarter begins. An independent study project 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 the graduate course selection.
Credit variable (offered annually)
College of Science

Biology

SBIB-201  General Biology
Registration #1001-201
Characteristics and origin of life; basic principles of modern cellular biology including cell organelle structure; chemical basis and functions of life including enzyme systems, respiration and photosynthesis; nutrient procurement in plants and animals.
Class 3, Credit 3 (F)

SBIB-202  General Biology
Registration #1001-202
A study of the physiological processes of gas exchange, internal transport, osmoregulation, excretion, and hormonal control in plants and animals; nervous system and behavior in animals.
Class 3, Credit 3 (W)

SBIB-203  General Biology
Registration #1001-203
A study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology.
Class 3, Credit 3 (S)

SBIB-205, 206, 207  General Biology Laboratory
Registration #1001-205, 206, 207
Laboratory work to complement the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve ability to make, record and interpret observations. (Corequisite SBIB-201, 202, 203)
Lab 3, Credit 1 (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)

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 (S)

SBIB-302  Vertebrate Zoology
Registration #1001-302
Morphology, physiology, behavior, classification, and ecology of chordates. (One year of general biology)
Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SBIB-303  Comparative Vertebrate Anatomy
Registration #1001-303
A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)
Class 3, Lab 3, Credit 4 (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, SCHG-217 or permission of instructor)
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 (W, S)

SBIB-320  Histology
Registration #1001-320
Detailed studies on the structure and function of normal human tissues. (One year of general biology)
Class 3, Lab 3, Credit 4 (F)

SBIB-330  Small Animal Laboratory Techniques
Registration #1001-330
A course designed to prepare the student for small animal handling, biological administrations and preparations, minor surgery and autopsies. (Third-, fourth-, fifth-year status and permission of instructor)
Class 1, Lab 3, Credit 3 (offered upon sufficient request)

SBIB-340  General Ecology
Registration #1001-340
Introduction to ecosystem ecology stressing the dynamic inter-relationships of plant and animal communities with their environments. A study to include such ecological factors as energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, bio-geography and representative ecosystems. (One year of general biology)
Class 3, Lab 3, Credit 4 (F)

SBIB-350  Molecular Biology
Registration #1001-350
The study of structure, function, and organization of proteins, nucleic acids and other biological macromolecules. (One year of general biology)
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. (Corequisite SBIB-361)
Class 3, Credit 3 (offered upon sufficient request)
SBIB-361 Horticulture Laboratory  
Registration #1001-361  
Experiments relating to the basic principles of horticulture. (Corequisite SBIB-360)  
Lab 3, Credit 1 (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, illustration, literature research, abstracting and editing. (Third-, fourth-, fifth-year status)  
Class 1, Rec. 1, Credit 2 (F, W, S)

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, transplantation, tumors, autoimmune diseases, immunosuppression and tolerance. (One year of general biology, one quarter of organic chemistry)  
Class 3, Lab 3, Credit 4 (W, S)

SBIB-403 Cell Physiology  
Registration #1001-403  
Functional cytology, cellular water and electrolyte homeostasis, exchange of materials across cell membranes, regulation of cellular metabolism and control of cell growth. (SBIB-350)  
Class 3, Lab 3, Credit 4 (W, S)

SBIB-404 Introductory Microbiology  
Registration #1001-404  
Principles of anatomy, biochemistry, genetics, taxonomy, ecology of viruses, bacteria, molds, algae and protozoa. Useful and harmful activities. Basic laboratory techniques, microscopy, staining, counting, identifying. (One year of general biology, one year of organic chemistry)  
Class 3, Lab 4, Credit 5 (F, W)

SBIB-406 Virology  
Registration #1001-406  
Molecular biology, chemistry, epidemiology and clinical aspects of viruses; morphology, genetics, immunology, environmental effects; methods of isolation, cultivation, identification; assays. Human virus diseases. (One year of general biology)  
Class 4, Credit 4 (offered upon sufficient request)

SBIB-407 Microbial and Viral Genetics  
Registration #1001-407  
The study of the molecular genetics of bacteria, bacteriophages, fungi, and eucaryotic viruses. (SBIB-350, 421; SCHO-334)  
Class 3, Lab 3, Credit 4 (F, W)

SBIB-412 Parasitology  
Registration #1001-412  
Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SBIB-417 Industrial Microbiology  
Registration #1001-417  
Use of yeasts, molds, and bacteria for fermentations of economic importance. Industrial aspects of strain selection, cultivation, assay, production and recovery of fermentation products. Microbiology, biochemistry, chemistry and engineering aspects. (SBIB-350, 421; 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-404)  
Class 3, Lab 3, Credit 4 (W, 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 of slide mounts. Techniques in paraffin and frozen sectioning. Sectioning on the rotary and sliding microtomes and multiple staining techniques. (One year of general biology)  
Class 1, Lab 4, Credit 3 (offered upon sufficient request)

SBIB-442 Hybridoma Techniques  
Registration #1001-442  
Designed to acquaint each student with the basic methods employed in the production of hybridoma cell lines and monoclonal antibodies. To include preparation of viable cell suspensions, cell culture fusion techniques, cloning, and monoclonal antibody production and characterization. (Corequisite SBIB-402) (SBIB-445, one quarter of organic chemistry)  
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. (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, 421, 407)  
Class 2, Lab 6, Credit 4 (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 2, 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. (Third-, fourth- or fifth-year status)
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 of 2.5 in science and mathematics courses, and consent of faculty)
Class variable, Credit variable (F, W, S, SR)

SBIB-550  Biology Seminar
Registration #1001-550
Written and oral reports and their discussion by class members covering topics of current interest in the biological sciences. (40 quarter credits in biology and successful completion of the departmental writing requirement)
Class 2, Credit 2 (W, S)

SBIB-559  Special Topics-Biology
Registration #1001-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures.
Class variable, Credit variable (offered upon sufficient request)

SBIB-561  Biotechnology Senior Project
Registration #1001-561
Completion of a laboratory project in biotechnology using a team approach; preparation of laboratory notebook and research report. (Fourth- or fifth-year biotechnology major status)
Lab 6, Credit 2 (F, W, S)

SBIB-579  Topics in Biotechnology
Registration #1001-579
An in-depth study of one or more aspects of the field of biotechnology, with emphasis on current areas of research. (Fourth- or fifth-year biotechnology major status)
Class 3, Credit 3 (W, 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 system. (SBIB-305, 306 or equivalent; SCHO-233)
Class 3, Credit 3 (offered upon sufficient request)

SBIB-721  Introduction to Pharmacology Laboratory
Registration #1001-721
Laboratory work to accompany the lectures in Introduction to Pharmacology. (Corequisite SBIB-720)
Lab 3, Credit 1 (offered upon sufficient request)

SBIB-740  General Toxicology
Registration #1001-740
The study of the science of poisons (the harmful actions of chemicals on biologic tissue) through the examination of biological and chemical mechanisms, their implications for biological systems, and detection. (SBIB-741 a corequisite for biology majors) (Physiology, anatomy, organic chemistry or permission of the instructor. Genetics recommended.)
Class 3, Credit 3 (offered upon sufficient request)

SBIB-741  General Toxicology Laboratory
Registration #1001-741
Laboratory work to accompany the lectures in General Toxicology. (Corequisite SBIB-740)
Lab 3, Credit 1 (offered upon sufficient request)

NOTE: The following courses may not be taken for biology credit by biology or biotechnology majors.

SBIG-210  Microbiology in Health and Disease
Registration #1004-210
An introduction to microorganisms; their relationship to the environment and human health; 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 3, Credit 3 or Class 3, Rec. 1, Credit 4 (F, S)

SBIG-211  Human Biology I
Registration #1004-211
A general study of human anatomy and physiology. This course includes discussions of cellular biology, skeletal, muscular, nervous, and endocrine systems. (Corequisite SBIG-231)
Class 3, Credit 3 (W)
Student Body Information

Class 2, Lab 5, Credit 3 (offered every year) (W)

Registration #1008-262 Analysis II

A general study of human anatomy and physiology with emphasis on mechanisms by which the nervous and endocrine systems coordinate and integrate body functions. This second course includes discussions of nutrition, metabolism and respiratory, circulatory, lymphatic, urinary and reproductive systems. (Corequisite SBIG-232)

Class 3, Credit 3 (S)

Class 2, Credit 2 (S)

Registration #1004-220 Microbiology in Health & Disease Laboratory

A basic course in safe chemical laboratory practices. Topics includes protective equipment, toxicity, safe reaction procedures, handling flammable materials, compressed gases, cryogens, radioactive and other special chemicals.

Class 1, Credit 1 (F)

Class 3, Credit 3 (offered upon sufficient request)

Registration #1004-232 SBIG-232 Human Biology II Laboratory

Laboratory culturing, handling and identification of microorganisms with special emphasis on the relationship of bacteria to food handling and preservation, the production of food products by bacteria, and the prevention of food-borne diseases. (Corequisite SBIG-210)

Lab 3, Credit 1 (F)

Class 3, Credit 3 (offered every year) (S, SR)

Registration #1004-212 SBIG-212 Human Biology II Laboratory

Laboratory to complement the lecture material of SBIG-211. Experiments are designed to illustrate the dynamic characteristics of cells, tissues and organ systems.

Lab 3, Credit 1 (W)

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

Class 3, Credit 3 (offered every year) (S)

Registration #1004-231 SBIG-231 Human Biology I Laboratory

Laboratory to complement the lecture material of SBIG-212. Experiments are designed to illustrate the dynamic anatomy and physiology of major organ systems.

Lab 3, Credit 1 (S)

Class 2, Credit 2 (S)

Registration #1004-235 SBIG-235 Medical Genetics

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)

Class 3, Credit 3 (offered every year) (F)

Class 3, Credit 3 (offered upon sufficient request)

Registration #1004-289 SBIG-289 Contemporary Science-Biology

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)

Class 2, Lab 5, Credit 3 (offered every year) (W)

Class 4, Credit 4 (offered every year) (F, W)

Class 3, Credit 3 (offered every year) (S, SR)

Class 3, Credit 3 (offered upon sufficient request)

Registration #1004-311 SBIG-311 Analytical Chemistry-

Lab accompanying SCHA-311. Quantitative and qualitative experiments in ultraviolet, visible, and infrared spectrophotometry, molecular fluorescence and flame atomic absorption spectrophotometry. Laboratory report writing is emphasized. (Corequisite SCHA-318) (SCHC-253)

Lab 4, Credit 1 (offered every year) (F, W)

Class 3, Credit 3 (offered every year) (F, W)

Class 4, Credit 4 (offered every year) (F, W)

Class 4, Credit 4 (offered every year) (S, SR)

Registration #1004-220 SBIG-220 Microbiology in Health & Disease Laboratory

A basic study of human anatomy and physiology with emphasis on mechanisms by which the nervous and endocrine systems coordinate and integrate body functions. This second course includes discussions of nutrition, metabolism and respiratory, circulatory, lymphatic, urinary and reproductive systems. (Corequisite SBIG-232)

Class 3, Credit 3 (S)

Registration #1004-212 SBIG-212 Human Biology II Laboratory

Laboratory culturing, handling and identification of microorganisms with special emphasis on the relationship of bacteria to food handling and preservation, the production of food products by bacteria, and the prevention of food-borne diseases. (Corequisite SBIG-210)

Lab 3, Credit 1 (F)

Class 3, Credit 3 (offered every year) (S, SR)

Registration #1004-232 SBIG-232 Human Biology II Laboratory

Laboratory to complement the lecture material of SBIG-212. Experiments are designed to illustrate the dynamic characteristics of cells, tissues and organ systems.

Lab 3, Credit 1 (S)

Class 2, Credit 2 (S)

Registration #1004-235 SBIG-235 Medical Genetics

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)

Class 3, Credit 3 (offered every year) (F)

Class 3, Credit 3 (offered upon sufficient request)

Registration #1004-289 SBIG-289 Contemporary Science-Biology

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)

Class 2, Lab 5, Credit 3 (offered every year) (W)

Class 4, Credit 4 (offered every year) (F, W)

Class 3, Credit 3 (offered every year) (S, SR)

Class 3, Credit 3 (offered upon sufficient request)

Registration #1004-220 SBIG-220 Microbiology in Health & Disease Laboratory

A basic course in safe chemical laboratory practices. Topics includes protective equipment, toxicity, safe reaction procedures, handling flammable materials, compressed gases, cryogens, radioactive materials and other special chemicals.

Class 1, Credit 1 (offered every year) (F)
SCHC-230  Introduction to Co-op Seminar
Registration #1010-230
Exploration of cooperative education opportunities; practice in writing letters of application, resume writing, and interviewing procedures.
Class 1, Credit 1 (offered every year) (F)

SCHC-251  General Chemistry I Registration #1010-251
A detailed study of fundamental tools of chemistry; atomic theory and nuclear chemistry; 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 SCHC-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; properties of liquids and solids; chemical bonding theories; transition elements and coordination chemistry, introduction to organic chemistry, biochemistry and polymers; introduction to the use of chemical literature. (Corequisite SCHA-263) (SCHC-252)
Class 3, Credit 3 (offered every year) (S)

SCHC-401  Chemical Literature Registration #1010-401
Instruction will be given on the use of chemical literature resources such as Chemical Abstracts, Science Citation Index, Beilstein, etc., as well as an introduction to computer-based information retrieval. Research presentations will be given by faculty; students will be expected to prepare written and oral documentation utilizing the chemical literature. (SCHO-433, SCHP-422; may be taken concurrently)
Class 2, Credit 2 (offered every year) (F, W)

SCHC-541, 542, 543  Chemistry Research Registration #1010-541, 542, 543
Faculty directed student projects or research usually involving laboratory work and/or calculations that could be considered of an original nature. (SCHC-401 or permission of research advisor)
Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHC-599  Independent Study-Chemistry Registration #1010-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (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-211)
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)

SCHG-206  Chemical Principles D Registration #1011-206 Laboratory
A laboratory course for photoscience, microelectronics, and science majors and others who are taking SCHG-212. Laboratory experiments are designed to complement lecture topics and may include the following: titrations, thermochemistry, kinetics, spectrophotometry (visible), and redox reactions. (Corequisite SCHG-212) (SCHG-205)
Lab 3, Credit 1 (offered every year) (W, S)

SCHG-207  Introduction to Organic Chemistry Laboratory Registration #1011-207
An introduction to organic laboratory techniques. Methods of separating, purifying, and characterizing organic compounds are covered. (Corequisite SCHG-213) (SCHG-206)
Lab 3, Credit 1 (offered every year) (S)

SCHG-208  College Chemistry I Registration #1011-208
Primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stoichiometry, First Law of Thermodynamics, thermochemistry, electronic theory of composition and structure, chemical bonding.
Class 4, Credit 4 (offered every year) (F, W)

SCHG-209  College Chemistry II Registration #1011-209
A continuation of SCHG-208. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry and the chemistry of metals. (SCHG-208)
Class 4, Credit 4 (offered every year) (S)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Registration #</th>
<th>Description</th>
<th>Credit(s)</th>
<th>Offered Year(s)</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHG-211</td>
<td>Chemical Principles I</td>
<td>#1011-211</td>
<td>For science, microelectronics, and bioscience 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)</td>
<td>3</td>
<td>(F, W)</td>
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<tr>
<td>SCHG-212</td>
<td>Chemical Principles II</td>
<td>#1011-212</td>
<td>Problem solving applications of chemical principles. Topics include thermodynamics and equilibrium, oxidation-reduction, and chemical kinetics. (Corequisite SCHG-206)</td>
<td>3</td>
<td>(W, S)</td>
<td></td>
</tr>
<tr>
<td>SCHG-213</td>
<td>Introduction to Organic Chemistry</td>
<td>#1011-213</td>
<td>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)</td>
<td>3</td>
<td>(S)</td>
<td></td>
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<tr>
<td>SCHG-215</td>
<td>General &amp; Analytical Chemistry I</td>
<td>#1011-215</td>
<td>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)</td>
<td>3</td>
<td>(F)</td>
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<tr>
<td>SCHG-216</td>
<td>General &amp; Analytical Chemistry II</td>
<td>#1011-216</td>
<td>Introduction to quantitative gravimetric analysis, oxidation-reduction, nomenclature, chemical equilibrium and equilibria in aqueous solutions. Particular emphasis on solution equilibria including weak acids, bases, buffers, hydrolysis, pH titrations and heterogenous equilibria. (Corequisite SCHG-226)</td>
<td>3</td>
<td>(W)</td>
<td></td>
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<tr>
<td>SCHG-217</td>
<td>General &amp; Analytical Chemistry in</td>
<td>#1011-217</td>
<td>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)</td>
<td>3</td>
<td>(S)</td>
<td></td>
</tr>
<tr>
<td>SCHG-221</td>
<td>Survey of General Chemistry Laboratory</td>
<td>#1011-221</td>
<td>Laboratory courses to accompany SCHG-201. Emphasis on introduction to methods of chemical analysis, qualitative and quantitative techniques. (Corequisite SCHG-201)</td>
<td>1</td>
<td>(F)</td>
<td></td>
</tr>
<tr>
<td>SCHG-222</td>
<td>Survey of Organic Chemistry Laboratory</td>
<td>#1011-222</td>
<td>Laboratory course to accompany SCHG-202. Emphasis is on representative examples of typical organic techniques and synthesis. (Corequisite SCHG-202) (SCHG-221 or equivalent)</td>
<td>1</td>
<td>(W)</td>
<td></td>
</tr>
<tr>
<td>SCHG-225</td>
<td>General &amp; Analytical Chemistry Laboratory</td>
<td>#1011-225</td>
<td>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)</td>
<td>1</td>
<td>(F)</td>
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<tr>
<td>SCHG-226</td>
<td>General &amp; Analytical Chemistry Laboratory</td>
<td>#1011-226</td>
<td>Continuation of SCHG-225 laboratory. Topics include gravimetric analysis; atomic absorption analysis; redox titration; visible spectrophotometric titrations; and thin layer, gas and gel filtration chromatographies. Emphasis is placed on analytical methods of analysis, report writing and quantitative unknown reports. Experiments are designed to complement lecture material in SCHG-216. (Corequisite SCHG-216) (SCHG-225)</td>
<td>1</td>
<td>(W)</td>
<td></td>
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<tr>
<td>SCHG-227</td>
<td>General &amp; Analytical Chemistry Laboratory</td>
<td>#1011-227</td>
<td>Continuation of SCHG-226 laboratory. Topics include pH measurement, buffers and pH indicators, polyprotic acid multi-endpoint titrations, spectrophotometric analysis of equilibrium constants, a redox titration contest, enzyme catalysis, and an independent laboratory practical on the quantitative analysis of an unknown solution by various analytical methods. Experiments are designed to complement lecture material in SCHG-217. Emphasis is on independent laboratory analysis, experimental design and data analysis. (Corequisite SCHG-217) (SCHG-226)</td>
<td>2</td>
<td>(S)</td>
<td></td>
</tr>
<tr>
<td>SCHG-240</td>
<td>Fundamentals of Chemistry</td>
<td>#1011-240</td>
<td>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.)</td>
<td>4</td>
<td>(F, S, SR)</td>
<td></td>
</tr>
<tr>
<td>SCHG-271</td>
<td>Basic Chemistry</td>
<td>#1011-271</td>
<td>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.)</td>
<td>3</td>
<td>(W)</td>
<td></td>
</tr>
<tr>
<td>SCHG-272</td>
<td>Chemistry of Water and Waste Water</td>
<td>#1011-272</td>
<td>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)</td>
<td>3</td>
<td>(F)</td>
<td></td>
</tr>
<tr>
<td>SCHG-275</td>
<td>Basic Chemistry Lab</td>
<td>#1011-275</td>
<td>Laboratory to be taken concurrently with SCHG-240 or SCHG-271. General chemistry and volumetric techniques will be covered.</td>
<td>3</td>
<td>(F, W, SR)</td>
<td></td>
</tr>
<tr>
<td>SCHG-276</td>
<td>Chemistry of Water and Waste Water</td>
<td>#1011-276</td>
<td>Laboratory to be taken concurrently with SCHG-272. Techniques used in water and waste water analysis will be covered.</td>
<td>3</td>
<td>(F)</td>
<td></td>
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</tbody>
</table>

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Chemical Foundations I
Registration #1011-281
Aspects of general chemistry of widest application to graphic arts technology: definitions of terms, basic concepts and chemical laws, stoichiometry and moles; electronic structure of the atom. (SMAM-204)
Class 3, Credit 3 (W)

Chemical Foundations II
Registration #1011-282
Aspects of general chemistry of widest application to graphic arts technology: properties of gases, liquids, solids, solutions, and inorganic materials; acids and bases; oxidation-reduction; electrolytes. (SCHG-281)
Class 3, Credit 3 (offered every year) (S)

Chemical Foundations Lab I
Registration #1011-285
Laboratory to accompany SCHG-281. Laboratory experiments in general chemistry; quantitative techniques.
Lab 2, Credit 1 (W)

Chemical Foundations Lab II
Registration #1011-286
Laboratory to accompany SCHG-282. Laboratory experiments in general chemistry; quantitative techniques.
Lab 2, Credit 1 (S)

Contemporary Science-Chemistry
Registration #1011-289
This course examines a broad range of contemporary scientific topics with a chemical basis. These include nuclear power, sources of energy, air and water pollution, medicines and drugs in addition to the chemical laws and structure of the atom.
Class 4, Credit 4 (F, W, S)

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)

Organic Chemistry I
Registration #1013-231, 232
Survey of the structure names, reactions, and synthesis of the major functional groups. Mechanisms of main classes of reactions are discussed. (Corequisites SCHO-235, 236) (SCHG-216, or 212, or 209)
Class 3, Credit 3 (offered every year) (231-F; 232-W)

Organic Chemistry II
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)

Organic Chemistry Lab
Registration #1013-235, 236, 237
Laboratory work emphasizes techniques, preparations, and analyses. SCHG-237 emphasizes reactions and properties of bio-monomers and polymers. (Corequisites SCHO-231, 232, 233)
Lab 3, Credit 1 (offered every year) (235-F; 236-W; 237-S)

Organic Chemistry
Registration #1013-431
A rigorous survey of the reactions of major organic functional groups, emphasizing alkanes, alkenes, alkyl halides, and alkeny. Stereochemistry is also included. (Corequisite SCHO-435) (SCHC-253)
Class 3, Credit 3 (offered every year) (S, SR)

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)

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 and SCHO-432 with SCHO-436.) (SCHC-253)
Lab 6, Credit 2 (offered every year) (435-S, SR; 436-F, W)

Systematic Identification of Organic Compounds
Registration #1013-437
A laboratory course utilizing chemical and spectral (largely IR and NMR) techniques to identify and characterize organic compounds. (Should be taken concurrently with SCHO-433.) (SCHO-432, 436)
Lab 6, Credit 2 (offered every year) (S, SR)

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)

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 equilib-ribrium. (SCHC-253, SMAM-252, SPSP-311)
Class 3, Credit 3 (offered every year) (F, W)

Physical Chemistry I
Registration #1014-441
Review of the thermodynamic laws; criteria for equilibrium and spontaneity; chemical equilibrium; phase rule; equilibrium in ideal and non-ideal solutions; electrochemistry. (Should be taken concurrently with SCHP-445.) (SCHP-340)
Class 3, Credit 3 (offered every year) (S, SR)

Physical Chemistry II
Registration #1014-442
Introduction to quantum mechanics and spectroscopy, radioactivity; Planck's law; photoelectric effect; the Bohr atom; De-Broglie, Schrödinger, and Heisenberg theories; eigenvalue/eigen-function 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)
Class 4, Credit 4 (W)

Directions of MRI will be presented.

Future discussion of information available for water proton content imaging will be related to experimental results. (Should be taken concurrently with SCHP-441.)

Lab 3, Credit 1 (offered every year) (S, SR)

SCHP-446 Physical Chemistry Laboratory H

Experiments in the application of quantum chemistry, atomic and molecular spectroscopy, and in radioactivity measurements. (Should be taken concurrently with SCHP-442.)

Lab 3, Credit 1 (offered every year) (F, W)

SCHP-447 Physical Chemistry Laboratory HI

Laboratory experiments in chemical dynamics. (Should be taken concurrently with SCHP-443.)

Lab 3, Credit 1 (offered every year) (S, SR)

SCHP-602 Physical Chemistry of Polymers

Study of the theoretical and experimental aspects of polymer characterization. In addition, theoretically 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)

SCHP-603 Structure-Property Relationships in Polymers

An introduction to amorphous and semicrystalline polymeric systems; thermomechanical, tensile and impact properties of polymers; rubber elasticity, viscosity, viscoelasticity. (SCHO-601 or SCHP-602)

Class 4, Credit 4 (F, W)

SCHP-604 Characterization of High Polymers

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-601 or SCHP-602)

Lab 6, Credit 2 (F, W)

SCHP-605 Synthesis of High Polymers

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

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.

Class 4, Credit 4 (W)

Graduate Courses

SCHA-711 Instrumental Analysis

Registration #1008-711

Theory, applications, and limitations of selected instrumental methods in qualitative, quantitative, and structural analysis. Topics covered include mass spectroscopy, nuclear magnetic resonance, electrochemistry, surface methods and new analytical methods. (SCHA-312)

Class 3, Credit 3 (offered every year) (F, W)

SCHA-720 Instrumental Analysis Lab

Registration #1008-720

Lab accompanying SCHA-711. Experiments include AA, fluorimetry, coulometry, 13C and 1H NMR, polarography. Assignments depend on student background. (Corequisite SCHA-711) Lab 6, Credit 2 (offered every year) (F, W)

SCHB-702 Biochemistry: Biomolecular 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 and SCHP-340 or SCHP-742)

Class 3, Credit 3 (offered every year) (F, W)

SCHB-703 Biochemistry: Metabolism

Registration #1009-703

Bioenergetics principles; catabolism of carbohydrates, fatty acids and amino acids; photosynthesis, biosynthesis of carbohydrates, lipids, and nitrogenous compounds; metabolic diseases. (SCHB-702)

Class 3, Credit 3 (offered every year) (F, W)

SCHB-704 Biochemistry: Nucleic Acids and Molecular Genetics

The biochemistry of inheritance, expression of genetic information, protein biosynthesis, differentiation, viral and bacterial infection and the "origin of life." (SCHB-702)

Class 3, Credit 3 (offered every year) (S, SR)

SCHC-772 Special Topics

Registration #1010-772

Advanced courses which are of current interest and/or logical continuations of the course already being offered. These courses should be structured as ordinary courses and should have specified prerequisites, contact hours and examination procedures.

Class variable, Credit variable (offered every year)

SCHC-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)
SCHI-762 Inorganic Chemistry I: Composition & Structure
Techniques for determining composition and structure, nomenclature and symbolism of inorganic compounds, modern electronic theories of composition, bonding, geometry, magnetic, electrical, mechanical and spectral properties of inorganic compounds (main group and transition elements). (SCHO-433, SCHP-442)
Class 3, Credit 3 (offered every year) (S, SR)

SCHI-763 Inorganic Chemistry II: Stability & Reactivity
Acid-base and other classifications of inorganic reactions; thermodynamic and kinetic aspects of controlling inorganic reactivity at both the laboratory and industrial level; nonaqueous solvent systems; use of isoelectronic and pseudoatom concepts in synthesis design. (SCHI-762, SCHP-442)
Class 3, Credit 3 (offered every year) (F, W)

SCHI-764 Inorganic Chemistry III: Chemical Periodicity
An integrated survey of descriptive inorganic chemistry (including industrial applications and geochemical origins) based on the periodic table and the structure and reactivity concepts developed in SCHI-762 and SCHI-763. (SCHI-762, 763)
Class 3, Credit 3 (offered every year) (S, SR)

SCHI-765 Preparative Inorganic Chemistry
Laboratory oriented course designed to illustrate the characterization techniques presented in SCHI-762 and the various synthetic applications of thermodynamics and kinetics presented in SCHI-763. (Corequisite SCHI-763) (SCHI-762)
Class 1, Lab 6, Credit 3 (offered every year) (F, W)

SCHO-730 Chemical Toxicology
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) (W)

SCHO-736 Spectrometric Chemical Identification 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)

SCHO-737 Advanced 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 products, new synthetic reagents. (SCHO-433)
Class 4, Credit 4 (offered every year)

SCHO-739 Advanced Organic Chemistry
Selected topics in physical organic chemistry including: techniques for elucidation of mechanism (kinetic, linear free, energy relationships, isotope effects), molecular orbital theory, cyclic reactions. (SCHO-433, SCHP-443)
Class 4, Credit 4 (offered every year)

SCHO-832 Stereochemistry
Advanced treatment of steric relationships and stereo-isomerism in organic compounds. (SCHO-433, SCHP-443)
Class 4, Credit 4 (offered upon sufficient request)

SCHO-833 Heterocyclic Chemistry
This course will contain a comprehensive treatment of heterocyclic chemistry. Based on the concept of x-excessive and n-deficient ring systems, the student will be introduced to categorial 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
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 every year)

SCHP-742 Survey of Physical Chemistry
A study of the fundamental principles of physical chemistry for clinical chemistry and biotechnology students. Kinetic-molecular theory, quantum mechanics, spectroscopy, thermodynamics and kinetics are presented with applications to the life sciences. This course may also serve as a review of physical chemistry for MS chemistry students. Not acceptable for BS in chemistry.
Class 3, Credit 3 (offered upon sufficient request) (W)

SCHP-743 Chemical Kinetics
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
Matrix formulation of quantum mechanics; variation and perturbation methods, group theory molecular orbital energies of complex molecules, calculation of vibrational frequencies and selection rules for complex molecules. Emphasis on use of spectroscopy and quantum chemistry to obtain chemical information. (SCHP-442)
Class 4, Credit 4 (offered alternate years)

SCHP-747 Principles of Magnetic Resonance
This course will consist of a series of lectures introduced to the principles of both nuclear magnetic resonance (NMR) and electron spin resonance spectroscopies, of the more popular of magnetic resonance spectroscopies. Modern applications, classical and quantum mechanical theory and instrumentation, both pulsed and continuous wave, of magnetic resonance spectroscopies are the general subject areas to be covered. A few of the specific topics to be covered are Fourier transform spectroscopy, magnetic resonance imaging, solid state NMR, spin relaxation, two dimensional NMR, resonance line shapes, laser magnetic resonance, magic angle spinning, and spectrometer design. (SCHP-443)
Class 4, Credit 4 (offered upon sufficient request)

Mathematics
SMAM-200 Algebra
An algebra course including such topics as operations involving polynomials, algebraic fractions, factoring, exponents and radicals, solution of linear and quadratic equations, and graphing linear equations.
Class 4, Credit 4 (F, W)
SMAM-204 College Algebra and Trigonometry
Topics include a review of the fundamentals of algebra; solution of linear, fractional and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic and trigonometric functions; systems of linear equations. (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 queuing theory, with applications to computer technology.
Class 4, Credit 4 (205-F, S; 206-F, W; 207-S)

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: Several 2-3 week modules introducing students to various types of technical writing, including resume preparation, technical description and technical report writing.
Class 1, Credit 1 (offered every year) (210-F, 211-W)

SMAM-214, 215 Introduction to Calculus I, II
Registration #1016-214, 215
214: A non-rigorous introduction to the study of differential calculus. The following topics will be covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, maxima and minima. (SMAM-204 or equivalent)
215: A continuation of SMAM-214, dealing with an introduction to integral calculus. The following topics will be covered: definite integral, area, work and distance problems, volumes, fundamental theorem of calculus, approximation techniques, exponential and logarithmic functions, applications, introduction to differential equations. (SMAM-214)
Class 3, Credit 3 (offered every year) (214-F, W, S; 215-W, S)

SMAM-216, 217 Mathematics of Business and Registration #1016-216, 217 Finance I, II
A non-rigorous introduction to selected topics in matrix algebra, finite mathematics, and calculus used extensively in business and finance applications.
216: Demand, revenue and cost functions, breakeven analysis, matrix and vector operations and applications, solutions of systems of linear equations and inequalities, the simplex method of solving linear programming problems (with and without a computer). (SMAM-204 or equivalent)
217: Compound interest, annuities, depreciation, differentiation techniques, marginal cost and marginal revenue, elasticity of demand, applied max-min problems. (SMAM-216)
Class 3, Credit 3 (offered every year) (216-W, S; 217-S)

SMAM-225 Algebra for Management
Registration #1016-225 Sciences
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
Registration #1016-226
A calculus stressing applications of calculus concepts to solving problems in business and economics. Topics include the limit concept; differentiation of algebraic, logarithmic, exponential, and multivariate functions; and integration. (SMAM-226)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-251, 252, 253 Calculus I, II, in 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. (Sophomore standing)
Class 4, Credit 4 (offered every year) (W, S)

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 (S)

SMAM-289 Contemporary Science-Mathematics
Registration #1016-289
A basic survey of mathematical structures as well as an introduction to problem solving. Topics will be chosen from foundations of mathematics, algebra, topology, number theory, graph theory and probability theory. These structures will be examined as they occur naturally in modern settings. 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-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)
("lass 4, Credit 4 (offered every year) (S)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Notes</th>
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<tbody>
<tr>
<td>SMAM-309</td>
<td>Elementary Statistics</td>
<td>An introduction to elementary techniques of statistical description</td>
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<td>and inference. Topics include descriptive statistics, probability,</td>
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<td>estimation of parameters, hypothesis testing, and simple linear</td>
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<td>regression. The statistical software package MINITAB will be used to</td>
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<td>introduce students to the use of computers in statistical analysis.</td>
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<td>NOTE: This course may not be taken for credit if credit is to be</td>
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<td>earned in SMAM-319. (SMAM-204)</td>
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<tr>
<td>Class 4,</td>
<td>Credit 4 (offered every year) (W, S, SR)</td>
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<tr>
<td>SMAM-318</td>
<td>Matrices and Boundary Value Problems</td>
<td>This course provides an introduction to matrix algebra and boundary</td>
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<td>value problems. Topics will include: matrix operations with</td>
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<td>applications to the solution of linear systems of algebraic</td>
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<td>equations, Fourier series, separation of variables, the heat</td>
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<td>equation, and the wave equation. (SMAM-306)</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (S)</td>
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<tr>
<td>SMAM-319</td>
<td>Data Analysis</td>
<td>This course will study the statistical principles of presenting and</td>
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<td>interpreting data. Topics covered will include: descriptive statistics</td>
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<td>and displays, random sampling, the normal distribution, confidence</td>
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<td>intervals, and hypothesis testing. The statistical software package</td>
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<td>MINITAB will be used to introduce students to the use of computers in</td>
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<td>statistical analysis. NOTE: This course may not be taken for credit if</td>
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<td>credit is to be earned in SMAM-309. (SMAM-204)</td>
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<tr>
<td>Class 4,</td>
<td>Credit 4 (offered every year) (F, W)</td>
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<tr>
<td>SMAM-328</td>
<td>Engineering Mathematics</td>
<td>This course provides introduction to matrix algebra and vector</td>
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<td>calculus. Topics include: matrix operations with applications to the</td>
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<td>solution of linear systems of algebraic equations; gradient,</td>
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<td>divergence and curl; line and surface integrals; independence of path</td>
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<td>and the divergence theorem and Stoke's theorem with discussion of</td>
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<td>engineering applications. NOTE: This course may not be taken for</td>
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<td>credit if credit is to be earned in SMAM-309. (SMAM-204)</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (F, W)</td>
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<tr>
<td>SMAM-338</td>
<td>Boundary Value Problems</td>
<td>The course includes: power series solutions of ordinary differential</td>
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<td>equations about ordinary and regular singular points; Fourier series;</td>
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<td>separation of variables solution of the wave equation, the heat</td>
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<td>equations and LaPlace's equations in rectangular and polar coordinates.</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (S)</td>
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<tr>
<td>SMAM-350</td>
<td>Probability</td>
<td>Discrete and continuous probability models; random variables;</td>
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<td>probability density and distribution functions; mathematical</td>
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<td>expectation; measures of central tendency and dispersion; central</td>
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<td>limit theorem. (Corequisite SMAM-305) (SMAM-253)</td>
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<tr>
<td>Class 4,</td>
<td>Credit 4 (offered every year) (F, W, S, SR)</td>
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<tr>
<td>SMAM-352</td>
<td>Applied Statistics I</td>
<td>Basic statistical concepts, sampling theory, hypothesis testing,</td>
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<td>confidence intervals and non-parametric methods. (SMAM-351)</td>
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<tr>
<td>Class 4,</td>
<td>Credit 4 (offered every year) (W, S, SR)</td>
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<tr>
<td>SMAM-353</td>
<td>Applied Statistics II</td>
<td>Topics in simple linear regression, an introduction to analysis of</td>
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<td>variance and the use of statistical software packages. (SMAM-352)</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (W, S, SR)</td>
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<tr>
<td>SMAM-354</td>
<td>Introduction to Regression Analysis</td>
<td>A study of regression techniques with applications to the type of</td>
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<td>problems encountered in real-world situations. Includes extensive</td>
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<td>use of statistical software. Topics include: single-factor analysis</td>
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<td>of variance; multiple comparisons and model validation; multiple</td>
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<td>factor factorial designs; fixed, random, and mixed models; expected</td>
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<td>meansquare calculations; confounding; randomized block designs;</td>
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<td>Latin square designs; other designs and topics as time permits.</td>
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<td>(SMAM-353)</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (F, W)</td>
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<tr>
<td>SMAM-355</td>
<td>Design of Experiments</td>
<td>A study of the design and analysis of experiments. Includes extensive</td>
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<td>use of statistical software. Topics include: single-factor analysis</td>
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<td>of variance; multiple comparisons and model validation; multiple</td>
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<td>(SMAM-353)</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (S, SR)</td>
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<td>SMAM-356</td>
<td>Combinatorial Mathematics</td>
<td>An introduction to the mathematical theory of combination, arrangement</td>
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<td>and enumeration of discrete structures. Topics include: enumeration;</td>
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<td>recursion; inclusion-exclusion; block design; general functions.</td>
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<td>(SMAM-265 or permission of instructor)</td>
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<tr>
<td>Class 4,</td>
<td>Credit 4 (offered every year) (F, W)</td>
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<tr>
<td>SMAM-359</td>
<td>Co-op Seminar</td>
<td>Exploration of cooperative education opportunities; practice in writing</td>
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<td>letters of application; resume writing; and interviewing procedures.</td>
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<td>Class 1,</td>
<td>Credit 0</td>
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<tr>
<td>SMAM-411,412</td>
<td>Real Variables</td>
<td>411: An investigation and extension of the theoretical aspects of</td>
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<td>elementary calculus. Topics include: mathematical induction, real</td>
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<td>numbers, functions, limits, continuity, differentiation, l'Hopital's</td>
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<td>Rule, Taylor's theorem. (SMAM-305 and either SMAM-265 or permission</td>
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<td>of the instructor)</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (411-F, W; 412-S,</td>
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<tr>
<td>SMAM-420</td>
<td>Complex Variables</td>
<td>A brief discussion of preliminaries leading to the concept of</td>
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<td>analyticy. Complex integration. Cauchy's integral theorem and integral</td>
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<td>formulas. Taylor and Laurent series. Residues. Real integrals by</td>
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<td>complex methods. (SMAM-305)</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (F, W)</td>
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<tr>
<td>SMAM-431</td>
<td>Matrix Algebra</td>
<td>An introduction to the basic concepts of linear algebra, with an</td>
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<td>emphasis on matrix manipulation. Topics will include Gaussian</td>
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<td>elimination, matrix arithmetic, determinants, Cramer's rule, vector</td>
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<td>spaces, linear independence, basis, null and column space of a matrix,</td>
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<td>eigenvalues, and numerical linear algebra. Various applications will</td>
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<td>be interspersed throughout the course. (SMAM-306)</td>
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<td>Class 4,</td>
<td>Credit 4 (offered every year) (F, W, S, SR)</td>
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A further development of the basic concepts of linear algebra, including orthogonality. Topics will include similarity, linear transformations, diagonalization, inner products, Gram-Schmidt, quadratic forms, and various numerical techniques. Several applications of these ideas will also be presented. (SMAM-431)

Class 4, Credit 4 (offered every year) (F, W, SR)

SMAM-437

Computer Methods in Applied Mathematics

Emphasizes the formulation of problems to allow solutions by standardized techniques and library routines. A study of numerical techniques such as direct and iterative methods for solving linear and nonlinear equations and optimizing functions discrete methods for boundary value problems, and other techniques for solving problems. Computer based homework. (SMAM-306, 431)

Class 4, Credit 4 (S)

SMAM-451, 452

Mathematical Statistics I, II

Registration #1016-451, 452

451: Brief review of basic probability concepts and distribution theory, mathematical properties of distributions needed for statistical inferences; classical and Bayesian methods in estimation theory and mathematical justification of standard test procedures. (SMAM-352)

452: Chi-square test; Neyman-Pearson theory of hypothesis testing; non-parametric methods; sufficient statistics and further topics in statistical inference. (SMAM-451)

Class 4, Credit 4 (offered every year) (451-F, W; 452-S, SR)

SMAM-454

Non-Parametric Statistics

Registration #1016-454

This course provides a basis for understanding the selection of the appropriate tools and techniques for analyzing survey data. Topics include: design of sample surveys, methods of data collection, a study of standard sampling methods, and a discussion of specific industrial sampling methods. (SMAM-353, 355)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-457

Research Sampling

Registration #1016-457

Techniques that are valid under a wide range of shapes for the population distribution. Topics include: tests based on the binomial distribution, contingency tables, statistical inferences based on ranks, runs tests, and randomization methods. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-458

Statistical Quality Control

Registration #1016-458

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-353)

Class 4, Credit 4 (offered upon sufficient request)

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-412)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-466

Advanced Mathematical Programming

The optimization of functions of integers; theory and practice of branch and bound; implicit enumeration; cutting plane duality and related solution techniques; heuristics, and applications. (SMAM-465)

Class 4, Credit 4 (offered every year) (S)

SMAM-467

Theory of Graphs and Networks

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-353,361; ICSP-241, 242)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-501, 502

Advanced Differential Equations

Registration #1016-501, 502

A study of first order, linear higher order and systems of differential equations including such topics as existence, uniqueness, properties of solutions, Green's functions, Sturm-Liouville systems and boundary value problems. (SMAM-307)

Class 4, Credit 4 (offered every year) (501-F, W; 512-S, SR)

SMAM-511, 512

Numerical Analysis

Registration #1016-511, 512

511: Numerical techniques for the solution of non-linear equations, interpolation, differentiation, integration, initial value problems. (SMAM-306, ICSA-220)

512: Continuation of 511 which treats systems of equations, eigenvalue problems, boundary value problems, splines, additional topics at the discretion of the instructor. (SMAM-511)

Class 4, Credit 4 (offered every year) (511-F, W; 512-S, SR)

SMAM-521, 522

Probability Theory

Registration #1016-521, 522

Selected topics in applied probability and statistics to meet the needs and interest of the students. (SMAM-305, 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 time series, auto-covariance functions and spectrum, integral representation of time series, linear filtering, estimation of spectrum, and multivariate time series prediction. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-531, 532

Abstract Algebra

Registration #1016-531, 532

531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265, 432)

532: The basic theory of rings, integral domains, ideals and fields GF (p^n), applications to coding theory or abstract vector spaces, function spaces, direct sums, applications to differential equations, to scientific problems. (SMAM-531)

Class 4, Credit 4 (offered every year) (531-F, W; 532-S, SR)

SMAM-551

Topics in Algebra

Registration #1016-551

Topics in abstract algebra to be chosen by the instructor either to give the student an introduction to topics not taught in SMAM-531, 532 or to explore further the theory of groups, rings or fields. (Permission of instructor)
SMAM-555, 556  
Registration #1016-555, 556  
Statistics Seminar I, II  
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-353, 354, 355)  
Class 4, Credit 4 (offered upon sufficient request)

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 factor analysis. (SMAM-353, 431)  
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-305)  
Class 4, Credit 4 (offered upon sufficient request)

SMAM-565  
Game Theory  
Registration #1016-565  
Introduction to the theory of games with solution techniques and applications. Topics include: game trees; matrix games; linear inequalities and programming; convex sets; the minimax theorem; n-per games; and Pareto optimality. (SMAM-431 or permission of instructor)  
Class 4, Credit 4 (offered every year) (F, W)

SMAM-566  
Non-Linear Optimization  
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-599  
Independent Study-Math  
Registration #1016-599  
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.  
Class variable, Credit variable (offered every year)

SMAM-620  
The Fourier Transform  
Registration #1016-620  
This course provides an introduction to an important mathematical tool for the analysis of linear systems. Topics covered are: a Fourier integral theorem; the Fourier transform and its inverse; an introduction to generalized functions; the Dirac delta functions; evaluating transforms; convolution, serial products; the sampling theorem; Rayleigh, power convolution, and auto-correlation theorems; the discrete Fourier transform; the fast Fourier transform. (SMAM-420)  
Class 4, Credit 4 (offered every year) (S)

SMAT-420  
Calculus for Technologists I  
Registration #1019-420  
The first course in a calculus sequence covering essential concepts and manipulations. Topics include: limits, derivative, indefinite and definite integrals, and numerical approximation. Applications to physical problems are stressed. (SMAM-204)  
Class 4, Credit 4 (offered every year) (F, W, SR)

SMAT-421  
Calculus for Technologists II  
Registration #1019-421  
A continuation of SMAT-420. Topics covered in this course are applications of the integral calculus; differential and integral calculus of the transcendental functions; and basic techniques of integration with emphasis on applications to engineering technology problems. (SMAM-420 or equivalent)  
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAT-422  
Solutions of Engineering Problems  
Registration #1019-422  
A continuation of SMAT-421. Course covers selected applied mathematics topics including: differential equations through second order linear, Laplace transforms, Taylor series, and other appropriate topics. Emphasis is on the application of these topics to engineering technology problems. (SMAT-421 or equivalent)  
Class 4, Credit 4 (offered every year) (F, W, S, SR)

Physics  

SPSP-200  
Physics Orientation  
Registration #1017-200  
An introduction to the nature and scope of physics for freshmen interested in physics as a profession. Topics include: (a) what is physics? (b) professional opportunities in physics; (c) the physics profession; (d) the literature of physics; (e) communicating in physics. Laboratory includes safety instruction; measurement and recording techniques; graphical analysis; error analysis and report writing. Each student will present a formal written or oral report on some topic of interest at the end of the course.  
Class 1, Lab 2, Credit 2 (offered every year) (F)

SPSP-201, 202  
Physics in the Arts  
Registration #1017-201, 202  
A study of topics from the world of art in which the underlying physical laws have influenced the art form and its development. A weekly laboratory will allow study of the relation of an art form to basic optical, mechanical, and electrical physics and in addition will provide time for the development of student projects. 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) (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 lecture. (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 corresponding lectures. (Credit or coregistration in SPSP-212)
Lab 2, Credit 1 (offered every year) (W, S)

SPSP-273 College Physics Lab in Registration #1017-273
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in SPSP-213)
Lab 2, Credit 1 (offered every year) (F, S)

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-213, 273; SMAT-422)
Class 4, Credit 4 (W, SR)

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 in SMAM-253) (SPSP-311) (See SPSP-372 for three-hour lab, SPSP-376 for two-hour lab)
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-313 University Physics III
Registration #1017-313
Electrostatics, Gauss's law, electric field and potential, dielectrics, dc circuits, magnetic fields, Ampere's law, Faraday's law, inductance and capacitance, magnetism in matter, ac series circuits. (Coregistration or credit in SMAM-253) (SPSP-311) (See SPSP-373 for three-hour lab, SPSP-377 for two-hour lab)
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-314 Introduction to Modern
Registration #1017-314
Physics
An introductory survey of modern physics at the sophomore level. Fundamentals of relativity, photons, interaction of radiation with matter, de Broglie 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
Registration #1017-315
Semiconductor Physics
Kinetic theory of gases and transport phenomena; Drude's theory of metals; quantum mechanics of a particle in a box; atomic orbitals; band theory of metals, insulators, and impurity semiconductors; Fermi-Dirac distribution; equilibrium charge-carrier densities in metals, insulators, and semi-conductors; operation principles of diodes, bipolar junction transistors, and MOS-FET's. (SMAM-306, SPSP-314)
Class 4, Credit 4 (offered every year) (W, S)

SPSP-316 Electrical Processes in Solids
Registration #1017-316
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 and permission of instructor)
Class 4, Credit 4 (offered upon sufficient request) (S)

SPSP-321 Introduction to Laboratory
Registration #1017-321
Techniques
An introduction to equipment and procedures common to the physics research laboratory. The oscilloscope and ac circuit analysis, statistics, vacuum systems including vacuum pumps and gauges, the laboratory notebook, and writing for publication. (SPSP-313, 373)
Class 3, Lab 3, Credit 4 (offered every year) (F, transfer students only; W)

SPSP-331 Introduction to Electricity and
Registration #1017-331
Electronics
Fundamentals of electricity; construction and measurements of electrical and electronic circuits encountered in a scientific laboratory. (Two quarters of introductory physics)
Class 3, Lab 3, Credit 4 (offered every year) (F, W, S)

SPSP-341 Foundations of Scientific
Registration #1017-341
Thinking
Definition of science; historical perspective; ingredients of the scientific quest; the scientific method; scientific explanation, laws, theories, and hypotheses; the role of mathematics; probability and induction; science and other disciplines. (At least a year of basic sciences at the college level)
Class 3, Credit 4 (offered upon sufficient demand) Class 3, Credit 4 (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) (F, W, S)

SPSP-372  University Physics Lab II  Registration #1017-372
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (See SPSP-376 for a 2-hr lab)
Lab 3, Credit 1 (offered every year) (F, W, S)

SPSP-373  University Physics Lab III  Registration #1017-373
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (See SPSP-377 for a 2-hr lab)
Lab 3, Credit 1 (offered every year) (F, W, S)

SPSP-374  Modern Physics Laboratory  Registration #1017-374
Basic experiments representative of the experimental foundations of modern quantum physics, such as: photoelectric effect; Franck-Hertz experiment; X-ray diffraction; optical diffraction and interference; atomic spectroscopy; electron microscopy; nuclear spectroscopy; radioactive half-life; Millikan oil drop; blackbody radiation. Students enrolled in SPSP-315 may include experiments in semiconductor solid state physics. (SPSP-314)
Class 1, Credit 1 (offered every year) (F)

SPSP-375  University Physics Lab I  Registration #1017-375
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr lab)
Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-376  University Physics Lab II  Registration #1017-376
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr lab)
Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-377  University Physics Lab in Registration #1017-377
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr lab)
Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-401,402  Intermediate Mechanics  Registration #1017-401, 402
Particle dynamics, systems of particles, motion of a rigid body, gravitational fields and potential, moving coordinate systems, generalized coordinates, Lagrange's equations, mechanics of continuous media. (SMAM-307; SPSP-313)
Class 4, Credit 4 (offered every year) (401-F, 402-S)

SPSP-411, 412  Electricity and Magnetism  Registration #1017-411, 412
Electric and magnetic fields using vector methods, Gauss's law, theory of dielectrics, Ampere'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)
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
Advanced laboratory work in physics, with experiments selected from one or more of the following branches of physics: mechanics, acoustics, heat, electromagnetism, and physical optics. (SPSP-314, 321, 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 2, Lab 5, Credit 3 (offered every year) (W)
**SPSP-432** Computer Interfacing to Laboratory 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-0232C, IEEE488, and other industry standards. (SPSP-331 or 431 or equivalent)
Class 3, Lab 3, Credit 4 (offered every year) (F)

**SPSP-455** Optical Physics Registration #1017-455
Physical optics including interference, diffraction, and polarization. Brief introduction to modern optics. (SMAM-305; SPSP-312,313)
Class 4, Credit 4 (offered 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-313)
Class 4, Credit 4 (offered every year) (S)

**SPSP-501** Theoretical Physics II Registration #1017-501
Application of advanced mathematical methods to physics. (SMAM-307, SPSP-480, plus coregistration or credit in SPSP-401 and 411)
Class 4, Credit 4 (offered every year) (F)

**SPSP-521** Advanced Experimental Physics Registration #1017-521
Advanced laboratory experiments and projects in atomic physics, nuclear physics, or solid state physics. Special emphasis on experimental research techniques. (SMAM-307, SPSP-421)
Lab 6, Credit 2 (offered every year) (F)

**SPSP-522** Introduction to Quantum Mechanics Registration #1017-522
A study of the concepts and mathematical structure of non-relativistic quantum mechanics. Exact and approximate techniques for solving the Schroedinger equation are presented for various systems. (SPSP-314, 480) (SPSP-315 and 501 are recommended)
Class 4, Credit 4 (offered every year) (S)

**SPSP-531** Solid State Physics Registration #1017-531
The structure of solids and their thermal, mechanical, electrical and magnetic properties. (SPSP-315, 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 projects or research usually involving laboratory work or theoretical calculations that could be considered as of an original nature. (Permission of instructor)
Class variable, Credit variable (offered every year)

**SPSP-550, 551** Physics Seminar Registration #1017-550, 551
Preparation and presentation of papers based on physics literature search. May include reports on student research projects. Special emphasis on the techniques of physics literature search and on the mechanics of preparation, organization, and presentation of technical papers. (Senior physics major or permission of instructor)
Class 1, Credit 1 (offered every year) (F, S)

**SPSP-553** Nuclear Physics Registration #1017-553
A study of the structure of the atomic nucleus as determined by experiments and theory. Description and quantum mechanical analysis of nuclear properties, radioactivity, and nuclear reactions. (SPSP-522)
Class 4, Credit 4 (offered on sufficient request) (S)

**SPSP-559** Special Topics-Physics Registration #1017-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures. Topics could include: introductory statistical mechanics; plasma physics; general relativity; linear integrated circuits; cryogenics; radio astronomy; history of physics; astrophysics; astronomy.
Class variable, Credit variable (offered upon sufficient request)

**SPSP-599** Independent Study-Physics Registration #1017-599
Faculty-directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.
Class variable, Credit variable (offered every year)

**SSEG-621** Building Scientific Apparatus Laboratory 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)

**SCLG-289** Contemporary Science-Health Sciences Registration #1026-289
This course will examine areas within the health field, including evolutionary structural development and future projections, with emphasis on methods of diagnostic testing, selected disease conditions and the utilization of computers.
Class 4, Credit 4 (W)

**SCLG-301** Medical Terminology Registration #1026-301
Emphasizes etymology, definition, pronunciation and correct utilization of medical terms which enables students to develop a vocabulary essential to the understanding of and communication with the various health areas in which allied health professionals will serve. (SBIB-306 or permission of instructor)
Class 3, Credit 3 (offered every year) (F, S)

**SCLG-415** Pathophysiology Registration #1026-415
This course combines knowledge of human physiology with disease processes, the etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, diagnostic and therapeutic procedures of common diseases will be covered. Topics include cellular and tissue response to pathogenic agents, neoplasia, developmental disorders, disorders of body systems, and diseases of major organs. (SBIB-306)
Credit 4 (S)

**SCLG-559** Special Topics-Clinical Sciences Registration #1026-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures.
Class variable, Credit variable (F, W, S)
SCLG-599 Independent Study—Clinical Sciences
Registration #1026-599 Faculty directed study of appropriate topics on a tutorial basis. This course will be used to enable an individual to pursue studies of existing knowledge available in the literature.
Class variable, Credit variable (F, W, S)

SCLB-201 Introduction to Biomedical Computing
Registration #1027-201 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)

SCLM-210 Medical Technology Seminar
Registration #1024-210 This course is designed to introduce the student to the profession of Medical Technology through a series of lectures which provide an overview of the major departments within the modern clinical laboratory. Historical perspectives, developmental aspects, and regulating standards of the Medical Technology profession will be discussed. Insights into the dynamics of the profession will be facilitated by informal discussions with interning students, practicing Medical Technologists, area sales representatives and members of the clinical sciences department.
Class 1, Credit 1 (F)

SCLM-401 Hematology/
Registration #1024-401 Immunohematology A study of the blood (erythrocytes, leukocytes, platelets, coagulation factors and blood group antigens). Descriptions of the cellular components of the blood in health and in disease. Cellular and immunological functions and their inter-relationships. Hemostasis and coagulation mechanisms. Structures of antigens and antibodies and mechanisms of antigen-antibody reactions. Lab procedures demonstrate cell counting techniques, coagulation studies, antigen-antibody reactions and compatibility testing of various blood groups. (SBIB-306 or permission of instructor)
Class 3, Lab 3, Credit 4 (S)

SCLM-405 Diagnostic Bacteriology and
Registration #1024-405 Mycology Study of bacteria and fungi that cause human disease. Lecture and laboratory subjects include microorganism growth, isolation, identification, antibiotic sensitivity, and related human immunological and serological responses. (SBIB-404)
Class 3, Lab 3, Credit 4 (W)

SCLM-432 Biology Laboratory
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, atomic absorption spectrophotometry, chromatography, electrophoresis, osmometry, radiation counters, and automated chemical analyzers. (SCHG-217 or equivalent, SBIB-306)
Class 2, Lab 6, Credit 4 (F, W)

SCLM-433 Biology Laboratory
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-201 Careers in Nuclear Medicine
Registration #1025-201 Introduces the student to the field of nuclear medicine and the career opportunities available. Current and future applications of nuclear medicine will be discussed.
Class 1, Credit 1 (W)

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-502 Procedures—Central Nervous System
Registration #1025-502 Procedures—Skeletal 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-503 Respiratory System
Registration #1025-503 Nuclear Medicine Procedures— Urinary 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 Urinary System
Registration #1025-510 Nuclear Medicine Procedures— Endocrine System A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the urinary system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 1 (F)

SCLN-511 Endocrine System
Registration #1025-511 Nuclear Medicine Procedures— A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the endocrine system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 2 (W)
SCLN-512 Nuclear Medicine Procedures—Cardiovascular System
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the cardiovascular system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 2 (W)

SCLN-513 Nuclear Medicine Procedures—Digestive System
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the digestive system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 2 (S)

SCLN-514 Nuclear Medicine Procedures—Special Studies
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving special studies. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 1 (S)

SCLN-515 Nuclear Medicine Procedures—Hematological and In Vitro Studies
This course covers the basic procedures utilized in nuclear medicine for the evaluation of patients with hematologic disorders. Medical indications, fundamental principles, technique, data calculations and test interpretation are covered for each procedure discussed. (Fourth-year standing in NMT program)
Credit 1 (S)

SCLN-516 Instrumentation and Computers in Nuclear Medicine
A combination lecture/practicum course covering the various nuclear instrumentation found in the clinical setting. The lectures provide knowledge of the function and characteristics of the basic components of any scintillation detection system necessary to understand its applications in nuclear medicine. Lectures are reinforced through clinical practicums in which the student operates the equipment. Collimation, quality control, computer systems and data processing are covered. (Fourth-year standing in NMT program)
Credit 2 (W)

SCLN-517 Radiochemistry and Radiopharmacology
A combination lecture/lab course covering the production and use of radioisotopes in medicine. Radiopharmaceutical compounding, quality control procedures, dose calibration, and licensing regulations regarding the handling and use of radiopharmaceuticals are covered. (Fourth-year standing in NMT program)
Credit 2 (W)

SCLN-518 Radionuclide Therapy
A study of the application of radionuclides in the treatment of disease and the study of the biologic changes which occur following irradiation. (Fourth-year standing in NMT program)
Credit 1 (W)

SCLN-519 Radiation Health Safety
A course designed to familiarize the student with the daily routine for safe handling of radioactive materials. Radiation protection, licensing regulations, decontamination procedures, waste disposal and area surveys are covered. (Fourth-year standing in NMT program)
Credit 2 (S)

SCLN-520 Radioassay
A combination lecture/practicum course in RIA. Topics include theory and basic principles, instrumentation, types of assays performed, and quality control. Commonly encountered pitfalls, current RIA developments and the diagnostic meaning of several tests are covered. (Fourth-year standing in NMT program)
Credit 4 (S)

SCLN-521 Review in Nuclear Medicine
Discussion of all aspects of nuclear medicine covered during the clinical internship including preparation for the national certification exams in nuclear medicine technology. (Fourth-year standing in NMT program)
Credit 2 (S)

SCLN-522 Clinical Nuclear Medicine I
A clinical practicum which gives the student the opportunity to learn and master nuclear medicine procedures through technical and practical experience. Each student is assigned a particular combination of three hospitals and trains approximately four months in each. Students work with patients under the supervision of physicians and technologists on the hospital staff. Student progress and performance is monitored by the RIT nuclear medicine technology clinical coordinator who makes periodic visits to the hospital department. (Fourth-year standing in NMT program)
Credit 7 (F)

SCLN-523 Clinical Nuclear Medicine II
Continuation of Clinical Nuclear Medicine I. (Fourth-year standing in NMT program)
Credit 7 (W)

SCLN-524 Clinical Nuclear Medicine III
Continuation of Clinical Nuclear Medicine II. (Fourth-year standing in NMT program)
Credit 7 (S)

SCLS-411 Introduction to Diagnostic Ultrasound
A course which surveys the historical development of medical ultrasound technology, the professional and occupational development of sonography and the current major diagnostic uses of ultrasound. Registry certification will also be discussed.
Class 2, Credit 2 (F)

SCLS-412 Ultrasonic Cross-Sectional Anatomy
Basic cross-sectional anatomy of the head, neck, abdomen, and pelvis. Emphasis is placed on sonographic correlation of anatomical structures. Course is self-paced within each assigned section. Students draw and label cross-sections using the cadaver slices as guides. (SBIB-305, 306 or permission of instructor)
Class 4, Credit 4 (W)
SCLS-413  Ultrasound Instrumentation
Registration #1030-413
Principles and fundamentals of diagnostic ultrasound instrumentation. Application of ultrasonic physics to ultrasound scanning techniques will also be discussed. Laboratory will stress the development of scanning techniques and use of instrument controls.
Class 4, Credit 4 (S)

SCLS-551  Introduction to Clinical Ultrasound
Registration #1030-551
A combined lecture/laboratory course introducing clinical concepts of diagnostic medical sonography. Topics include both clinical and didactic applications of ultrasound. (Fourth-year standing in the ultrasound program)
Credit 5 (F)

SCLS-552  Introduction to Obstetrical Ultrasound
Registration #1030-552
This course will equip the student with the practical skills and clinical knowledge necessary to perform basic diagnostic obstetrical ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in basic obstetrical ultrasound. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. (SCLS-551, fourth-year standing in the ultrasound program)
Credit 5 (F, W, S)

SCLS-553  Introduction to Gynecologic Ultrasound
Registration #1030-553
This course will equip the student with the practical skills and clinical knowledge necessary to perform basic gynecologic ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in gynecologic ultrasound. Instruction includes review of teaching files. Completion of a clinical practicum is required. (SCLS-551, fourth-year standing in the ultrasound program)
Credit 5 (F, W, S)

SCLS-554  Advanced Obstetrical Ultrasound
Registration #1030-554
This course is a continuation of SCLS-552 and will equip the student with the practical skills and clinical knowledge necessary to perform advanced diagnostic obstetrical ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in advanced obstetrical ultrasound. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. (SCLS-551, fourth-year standing in the ultrasound program)
Credit 5 (F, W, S)

SCLS-555  Advanced Gynecologic Ultrasound
Registration #1030-555
This course is a continuation of SCLS-553 and will equip the student with the practical skills and clinical knowledge necessary to perform advanced gynecological ultrasound scans. Image production, recognition, and acceptability are stressed. Examination protocols will be outlined. This course provides classroom, simulation laboratory, and clinical instruction in advanced gynecologic ultrasound. Instruction includes the review of teaching files. This is an internship course. Completion of a clinical practicum is required. (SCLS-551, fourth-year standing in the ultrasound program)
Credit 5 (F, W, S)

SCLS-556  Introduction to Abdominal Ultrasound
Registration #1030-556
This course will equip the student with the practical skills and clinical knowledge necessary to perform basic abdominal ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in basic abdominal ultrasound procedures. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. (SCLS-551, fourth-year standing in the ultrasound program)
Credit 6 (F, W, S)

SCLS-558  Advanced Abdominal Ultrasound
Registration #1030-558
This course will equip the student with the practical skills and clinical knowledge necessary to perform basic abdominal and small parts ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in advanced abdominal ultrasound procedures. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. (SCLS-551, fourth-year standing in the ultrasound program)
Credit 7 (F, W, S)

SCLS-560  Seminar in Ultrasound I
Registration #1030-560
Case study presentations by ultrasound interns. Students prepare and orally present two ten-minute case studies. Presentations to include: history, physical findings, laboratory data, clinical impression, ultrasound findings, followup, pathology, and scanning techniques. Students present one case study during each of their two clinical rotations. This is an internship course. (Permission of instructor)
Class 1, Credit variable (W, S)

SCLS-561  Seminar in Ultrasound II
Registration #1030-561
Intern must write and present a topic paper on some aspect of diagnostic ultrasound. Paper and presentation should include: history and statistics of disease entity, the role of ultrasound in the diagnosis of the entity, correlative imaging, treatment and prognosis of the entity, drawings, illustrations and appropriate sonograms. Paper is due in March, April or May of the internship year as assigned. Paper should be a minimum of five pages in length not including the bibliography or references. (Permission of instructor)
Class 2, Credit 2 (S)
Graduate Courses

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 (offered every other year)

SCLC-712

Statistics and Quality Control

Registration #1023-712

The principles of statistics as applied to biomedical research as well as clinical laboratory analysis will be studied. Using a problem-oriented approach, probability, normal values, analysis of variance and quality control as well as the relationship of these procedures to patient care will be studied.

Class 3, Credit 3 (S)

SCLC-722

Clinical Laboratory Computer Applications

Registration #1023-722

The basic concepts of data processing, as well as the design, evaluation and utilization of computer systems in both hospitals 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, hematology, coagulation, and various standard methods. (Permission of instructor)

Class 4, Credit 4 (offered every other year)

SCLC-821

Advanced Clinical Chemistry II

Registration #1023-821

Proteins, enzymes, hemoglobin, iron, renal functions, lipids, quality control, automation, and method selection. (Permission of instructor)

Class 4, Credit 4 (F)

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 (S)

SCLC-870

Clinical Chemistry Seminar

Registration #1023-870

Credit 1

SCLC-872

Special Topics in Clinical Chemistry

Registration #1023-872

In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of regular courses will be presented. These courses will be structured as ordinary courses with specified prerequisites, contact hours and examinations.

Class variable, Credit variable (offered upon sufficient request)

SCLC-877

External Clinical 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 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

Class 4, Credit 4 (offered every year)

SESM-702

Introduction to Polymer Science

Registration #1028-702

A study of the chemical nature of plastics detailing the relationships between polymerization conditions, structure and properties in both the solid and fluid states.

Class 4, Credit 4 (offered every year)

SESM-703

Solid State Science

Registration #1028-703

This course will survey topics in the physics of solids. Included in these will be crystal symmetry, structure, and bonding; mechanical, thermal, and electrical properties of insulators, semiconductors, and conductors including band theory.

Class 4, Credit 4 (offered every year)

SESM-704

Introductory Theoretical Methods

Registration #1028-704

Class 4, Credit 4 (offered every year)

SESM-705

Introductory Experimental Techniques

Registration #1028-705

The list of laboratory projects includes the areas of:

a) Microanalysis of materials: x-ray, diffraction, scanning electron microscopy, metallography, microelectronics, fluorescence, phosphorescence, etc.;

b) Thermal systems: thermomechanical and thermogravimetric systems and differential scanning calorimetry;

c) Thin films: thermal evaporation system, sputter coating system, phase contact microscopy, chemical vapor deposition system;

d) Sonics and ultrasonics;

e) Dielectrics: time domain reflectometry

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.

Class variable, Lab variable, Credit 4 (offered every year)
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 productivity.

Class 4, Credit 4

SSEM-722 Polymer Processing
Registration #1028-722
A study of the basic principles and methods involved in the technology of processing polymeric materials, including treatment of heat transfer, mass transfer, mixing and shaping or molding of these materials.

Class 4, Credit 4

SSEM-730 Optical Properties
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.

Class 4, Credit 4
National Technical Institute for the Deaf

Department of Support Service Education

**Interpreting**

**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)
Class 2, Lab 2, Credit 3 (any quarter)

**NITP-204**
American Sign Language II
Registration #0850-204

Students apply the skills and principles learned in Principles of American Sign Language. The student will practice interpreting from English to American Sign Language (ASL). Practice will include interpreting both live talent and audiotapes. The speed of the spoken message will be between 80-111 words per minute. (NITP-203)
Class 3, Lab 2, Credit 3 (F, W, S, SR)

**NITP-205**
American Sign Language III
Registration #0850-205

The course is built around a series of advanced vocabularies necessary for interpreting in the community and in educational environments. Materials are structured so that students progressively increase transmission skills from 80 to 120 words per minute. Students' skills in American Sign Language (ASL) will be enhanced with ongoing critiques. (NITP-204)
Class 3, Credit 3 (W, S)

**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

**NITP-210**
Fingerspelling and Number Comprehension
Registration #0850-210

Students improve their ability to comprehend fingerspelled words and manually signed numbers within messages signed at a conversational rate of speed. Instructional activities include games, drills, and voice interpreting in a lecture/lab format.
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-203, 204, 210)
Class 3, Credit 3 (W, S)

**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-203, 211, 331)
Class 3, Credit 3 (F, S)

**NITP-213**
Voice Interpreting in Voice I and II
Registration #0850-213

This course continues development of the voice interpreting 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, 332)
Class 3, Credit 3 (F, W)

**NITP-251, 252**
Aspects and Issues of Deafness I, II
Registration #0850-251, 252

The student learns the communication and psycho-social/cultural aspects of deafness through panels, discussions, readings, and field trips. (NITP-251, no prerequisite; NITP-252, prerequisite, NITP-251)
Class 3, Credit 3 (offered annually)

**NITP-261**
Theory and Practice of Interpreting I
Registration #0850-261

This course addresses the current theory and practice of the profession of interpreting. Topic areas include: (1) general communication principles of their application to the interpreting task; (2) the history of the profession of interpreting, (3) different types of interpreting and related terminology; (4) general skills required in interpreting and current applications by professional interpreters; (5) overview of the professional code of ethics and its rationale; (6) populations served by interpreters, e.g., hearing-impaired speechreaders, deaf/blind individuals, multiply handicapped individuals, etc; (7) resources available to students related to interpreting and mainstreaming, (8) current issues facing the profession, i.e., multiple roles, mainstreaming specialists.
Class 3, Credit 3 (offered annually)

**NITP-262**
Theory and Practice of Interpreting II
Registration #0850-262

Students use a communication process model to acquire a theoretical base for the interpreting task. Addressed are the linguistic principles associated with sign language and the interpreting task, and skills in positioning and lighting. These courses include lectures and student participation in small and large group activities. (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, 252, 262, 271, 283, 331; for NITP-382: 212, 213, 281, 332, 372, 395)
Class 15, Credit 5 (available any quarter)
NITP-283, 384  Interpreting Seminar I, II
Registration #0850-283, 384
Designed as part of the field experience, students share their experiences and concerns as practicing interpreters. Panels of interpreters and consumers of interpreting services are used. (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 (F, W, S)

NITP-343  Expressive Oral Interpreting/Transliteration
Registration #0850-343
This course concentrates on the skill of expressive oral transliteration. Students develop the skill of receiving an auditory message and reproducing it in a highly visual modality by applying the principles of clear speech production and support techniques. Emphasis will be placed on speech production principles, natural gestures, body language, facial expression, and speed of transmission. (NITP-252, 211)
Class 2, Lab 2, Credit 3 (F, W)

NITP-391  Principles of Tutoring/Notetaking
Registration #0850-391
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 Practicum
Registration #0850-392
Students provide tutoring and notetaking services to hearing-impaired students. A minimum of 10 hours per week is committed to taking notes in class and tutoring outside of class. Practicum sites include the Rochester City School District, the Monroe County Board of Cooperative Educational Services (BOCES) program, colleges of RIT, and other Rochester area universities and colleges. Supervision is provided. (NITP-391)
Class 10, Credit 3 (available any quarter)

NITP-395  Mainstreaming: Educational Programs and Alternatives
Registration #0850-395
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-252)
Class 3, Credit 3 (offered annually)

NITP-396  The Support Service Professional
Registration #0850-396
This course addresses the knowledge and skills necessary for functioning in a variety of educational and/or non-educational settings where the support service provider will have more than one major responsibility. Case studies and practical experience in the field will be used to enhance student's awareness of what it means to-be a support service professional. (NITP-281, 382, 391)
Class 3, Credit 3 (S)

NITP-397  Contemporary Studies in Support Services
Registration #0850-397
This course addresses the dynamic nature of support services and special education. As changes and growth happen in the field, this course will address "state-of-the-art" issues. Some examples are: court decisions; state or federal legislation; research findings; developments of new techniques or technology; in-service training programs for faculty and/or service providers; management of support services. The course will be offered as new topics arise, or if a lecturer with specific expertise is available to conduct the course. (NITP-281)
Class 1-3, Credit variable 1-3 (F, W, S)

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-203, 252, 271, 262, 331, 391)
Credit variable 1-3 (W, S, SR)