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

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

Service Courses from the Department of Applied Computer Studies

Courses are offered by the Department of Applied Computer Studies for students in other departments. These courses may not be taken by Computer Science and Technology majors.

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 under a "modified-PSI" plan. Topics available for study include straightforward 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 Registration #0602-210 Validation
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 Registration #0602-220 Engineers
Students will be introduced to computer systems, learn problem solving techniques, and have an opportunity to study the FORTRAN programming language under a "modified-PSI" plan. Topics available for study include straightforward programming, decision and repetition capabilities formatted input/output, data structuring, use of subprograms, and application packages (e.g., plotter routines and the IMSL package). Several classical numerical techniques are illustrated. Programming projects will be required.
Class 4, Credit 4

ICSA-300 Business Applications Using Registration #0602-300 COBOL
A study of elementary COBOL programming, using structured design and programming concepts developed in ICS-P-210. The course will emphasize the use of COBOL in solving common business, commercial, and managerial problems. Topics include COBOL program organization, sequential file I/O, COBOL control structures, arithmetic operations and report editing, control break processing, and table handling. Students will write programs that adhere to specific programming and documentation standards. (ICSA-210)
Class 4, Credit 4

ICSA-303 Advanced Business Registration #0602-303 Applications
An advanced course developing more expertise in the application of COBOL to business and industrial problems. Topics include advanced COBOL constructs, direct and indexed sequential access methods, sorting and searching, and database system access using commands embedded in the COBOL source. Students will write programs which adhere to specific programming and documentation standards. (ICSA-300)
Class 4, Credit 4

ICSA-410 Computer Concepts and Registration #0602-410 Software Systems
An introduction to the overall organization of digital computers and operating systems for non-majors. Topics include basic machine organization, an overview of machine and assembly language, properties of common I/O devices, synchronization and scheduling of processes, physical and virtual memory management techniques, resource allocation and protection, and user interface issues. (ICSA-210)
Class 4, Credit 4

ICSA-411 Data Communications and Registration #0602-411 Computer Networks
An introduction to data communications hardware and software, and the use of these components in computer networks. Topics include communication system components, communications software, packet switching, network control, common carrier issues, long-haul vs. local area networks, and performance considerations. (ICSA-210)
Class 4, Credit 4

ICSA-483 Applied Database Registration #0602-483 Management
An introduction to issues in data management in organizations, and the role of database management systems in addressing these issues. Topics include the uses and needs for data in organizations, review of simple data structures, the influence of computer architecture and I/O devices on the management of data, basic file organizations supporting data management (sequential, direct access, indexed sequential), logical data models and their physical implementation, database administration, and DBMS selection. (ICSA-300 or permission of instructor)
Class 4, Credit 4

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

ICSA-700
Registration #0602-700
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
Registration #0602-701
Programming I
Fundamentals of computer programming and problem solving using a modern software development environment and a structured programming language (Pascal or Ada). Introduction to and use of an interactive editor and file system. Applications in business, science, mathematics, engineering, education, systems programming, and graphics will be covered. Techniques will be introduced for data representation and structuring, sorting, and searching. Programming projects will be required. (Computer literacy, pre-calculus; discrete math, is a corequisite.)
Credit 8

ICSA-702
Registration #0602-702
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
Registration #0602-703
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
Registration #0602-704
Assembly Language Programming
Introductory computer architecture (von Neumann machine): addressing methods - direct, indirect, immediate, absolute, indexing, base register, etc.; operations-machine instructions, directives or pseudo-operations, and macros; representing program paradigms in assembler language - decisions, loops, subroutines, arrays, links, etc; assembly language program design techniques; macro definitions and use; libraries. Programming projects will be required. (ICSA-700, 701 or a programming proficiency in some high-level language.)
Credit 4

ICSA-705
Registration #0602-705
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-707
Registration #0602-707
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
Registration #0602-708
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, multiprogramming, traps and interrupts, etc. The intent of this course is to prepare the student for future courses in computer architecture and operating systems. Programming projects will be required. (ICSA-704, ICSA-703, ICSA-707)
Credit 4

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

ICSA-899
Registration #0602-899
Independent Study
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

Computer Science Courses

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

ICSP-241
Registration #0601-241
Programming I Algorithmic Structures
An introduction to programming emphasizing the development and documentation of modular computer-based algorithms. A structured procedural programming language (e.g., Pascal) is used to demonstrate modern programming principles. Topics include variables, expressions and assignment, control structures (sequencing, selection and repetition), modularity via procedures and functions, parameter mechanisms, and identifier scope in block structured languages. Programming assignments are an integral part of the course.
Class 4, Credit 4
ICSP-242 Programming II 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, repeatability, storage allocation, subroutine linkage, looping and addressing, character manipulation, bit manipulation, floating point arithmetic, decimal instructions, some system I/O macros and debugging techniques. Programming projects will be required. (ICSP-243)
Class 4, Credit 4

ICSP-306 Systems Programming Fundamentals
Registration #0601-306
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. (ICSP-325)
Class 4, Credit 4

ICSP-307 Business Applications Programming
Registration #0601-307
An introduction to the concepts and techniques relevant to the business programming environment. Structured COBOL is used to solve common business application problems, including report generation, sorting, 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
Registration #0601-319
An introduction to classical algorithms used in the solution of numerical problems encountered in science and engineering. The FORTRAN and APL languages will be introduced as tools for implementing these algorithms. Topics include an introduction to FORTRAN and APL, algorithms for finding roots of equations, solutions to systems of equations, general matrix manipulation. Programming projects will be required. (ICSS-325)
Class 4, Credit 4

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

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

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

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

ICSS-315 Digital Computer Organization
Registration #0603-315
An introduction to computer design and implementation. Topics include a review of arithmetic and Boolean algebra, combinational 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
Registration #0603-325
A course on the considerations associated with the external storage of data. Topics include file organization (sequential, indexed and direct access), space optimization and directory organization, an introduction to external sorting and searching, and the basics of data modeling, database organization, and management. Programming projects will be required. (ICSP-305)
Class 4, Credit 4

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

ICSS-360 Fundamentals of Computer Science for Transfer Students
Registration #0603-360
This course covers selected topics from ICSP-241, 242 and 243. It introduces the student to the Unix operating system, and the Pascal language, which is then used to examine various data structures including records, linked lists, stacks, queues, trees and graphs. The use of recursion is also studied. This course is intended for students with previous programming experience, but with no background in data structures. Open only to transfer students; not to be taken as a Computer Science Elective.
Class 4, Credit 4
ICSS-400 Logical Design
Registration #0603-400
An in-depth study of the logical design of digital circuits. Topics include combinational circuit design with emphasis upon use of MSI and LSI circuits and CAD tools, sequential circuit synthesis, both synchronous and asynchronous, and an introduction to interfacing techniques. Additional topics to be covered include testing, CAD tools such as logic simulators and logic reduction programs, analog IC’s such as op amps, integrated circuit technologies, and an introduction to VLSI design. (ICSS-315, SMAM-265 or equivalent, and SPSP-313)

Class 3, Lab 2, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4

ICSS-470 Finite State Machines and Automata
Registration #0603-470
Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilinear 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 examination of microcomputers and microcomputer applications, including the study of microprocessors and their use in the construction of microcomputers. Additional topics covered include microcomputer busses, parallel and serial interfaces, analog interfacing, interrupts, and real time clocks. The use of microprocessors in real world situations is emphasized. Single board microcomputer systems are used in laboratory projects to explore hardware and software design issues, as well as memory design and I/O interface techniques. Students who have taken ICSS-545 cannot receive credit for this course. Programming projects will be required. (ICSS-315)

Class 3, Lab 2, Credit 4

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

Class 4, Credit 4

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

Class 4, Credit 4
ICSS-541 Introduction to Computer Networks
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
This course will build on topics developed in ICSS-420 Data Communication Subsystems and ICSS-541 Introduction to Computer Networks in a lab setting. Students will be required to design and implement a small computer network addressing issues such as routing strategies, virtual circuits vs. datagrams, data link protocols, and user (presentation) level services. (ICSS-540 and ICSS-541)
Class 4, Credit 4

ICSS-545 Computer Architecture Laboratory
This course applies the hardware and software concepts learned from logic design, computer architecture, data communications, and operating systems. Laboratory work will include the design, implementation, debugging, and documentation of major hardware/software projects. Topics to 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
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
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
A study of the hardware and software principles of computer graphics. Topics include an introduction to the basic concepts, 2-D transformations, viewing transformations, display file structure, geometric models, picture structure, interactive and non-interactive techniques, raster graphics fundamentals, 3-D transformations and perspective, hidden surface elimination, graphics packages and graphics systems. Programming projects will be required. (ICSS-325)
Class 4, Credit 4

ICSS-580 Language Processors
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. (ICSS-450)
Class 4, Credit 4

ICSS-590 Seminar in Computer Science
Current advances in computer science. (Prerequisites set by instructor)
Class 2-4, Credit 2-4

ICSS-599 Independent Study
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to study particular computer science topics in greater depth. (Faculty approval is required prior to registration.)
Class 2-4, Credit 2-4

ICSS-610 EDP Auditing
Registration #0603-610
A study of the techniques and approaches used to audit computer data centers and systems. Topics include the methodology and tools of EDP auditing, internal departmental controls, program controls, input/output controls, data security, physical security, computer hardware controls and data communication control. (Fourth-year standing in Computer Science and Technology)
Class 4, Credit 4

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

Graduate Courses

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
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, ICSA-703)
Credit 4

ICSS-709 Programming Language Theory
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

ICSS-711 Programming Language Theory
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 and ICSS-709)
Credit 4
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICSS-720</td>
<td>Computer Architecture</td>
<td>Review of classical computer architectures, the design of operation codes and addressing modes, data formats, and their implementations. Analysis of internal and external bus structures. Architectural features to support virtual storage and page-replacement policies, high-level language features, and operating systems. Speed-up techniques. Future directions. Programming projects will be required. (ICSS-708)</td>
</tr>
<tr>
<td>ICSS-721</td>
<td>Microprocessors and Microcomputers</td>
<td>A study of microprocessors, microcomputers, and microcomputer applications. Topics to be covered include microprocessor architecture, microcomputer organization and buses, parallel 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)</td>
</tr>
<tr>
<td>ICSS-730</td>
<td>Modeling and Simulation I</td>
<td>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. (ICSA-703, statistics)</td>
</tr>
<tr>
<td>ICSS-731</td>
<td>Modeling and Simulation II</td>
<td>Design and validation of systems models using advanced statistics and queuing theory. Programming languages that support simulation and procedural applications (e.g., Simscript, Simula, SLAM). Continuous system simulation and programming packages. Applications to world population models, computer operating systems, etc. Programming projects will be required. (ICSS-730)</td>
</tr>
<tr>
<td>ICSS-735</td>
<td>On-Line Information Systems Design</td>
<td>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 are also highlighted. (ICSA-708)</td>
</tr>
<tr>
<td>ICSS-738</td>
<td>Database Concepts</td>
<td>An introduction to the storage and processing of formatted data using database management systems. Topics include: objectives of database management, file and indexing structures, database system architectures, normalization theory, traditional database models and selected topics (as time permits). Several existing and experimental systems will be studied. (ICSA-703, ICSS-708)</td>
</tr>
<tr>
<td>ICSS-739</td>
<td>Database System Implementation</td>
<td>An examination of the technical issues related to the implementation of shared access databases. Topics include concurrency control, transaction processing, reliability and recovery. Extensions to the distributed processing environment are also covered. Programming projects will be required. (ICSS-738)</td>
</tr>
<tr>
<td>ICSS-744</td>
<td>Data Communications and Networks I</td>
<td>An introduction to Computer Communication. This course will cover the fundamentals of data communication, including terminal communication and computer to computer communication. Emphasis in the first course will include the theoretical basis for data communication, terminal handling, data transmission and multiplexing, error detection and correction, as well as an introduction to the hierarchical model for computer networks. Also included will be an introduction to graph theory and the topological design of networks, queuing theory and delay analysis. Additional emphasis will be on the fundamental protocols for computer communication. (Statistics, ICSA-708)</td>
</tr>
<tr>
<td>ICSS-745</td>
<td>Data Communications &amp; Networks II</td>
<td>A second course in computer communication and networks. Emphasis will be on higher level protocols and local networks. Included in this course will be design and analysis of communication protocols, routing algorithms, satellite and local networks. Also included will be higher level protocols and the application of computer networks. (ICSS-720, ICSS-744)</td>
</tr>
<tr>
<td>ICSS-770</td>
<td>Fundamentals of Computer Graphics</td>
<td>Topics include basic concepts, 2-D transformation, 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. (ICSA-703)</td>
</tr>
<tr>
<td>ICSS-771</td>
<td>Advanced Topics in Computer Graphics</td>
<td>Animation techniques and packages. Modeling 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)</td>
</tr>
<tr>
<td>ICSS-781</td>
<td>Introduction to Artificial Intelligence</td>
<td>An introduction to the theory and techniques underlying the development of &quot;intelligent&quot; 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. (ICSA-708, ICSS-709)</td>
</tr>
<tr>
<td>ICSS-801</td>
<td>Software Engineering</td>
<td>An introduction to software engineering methodologies and technologies useful for developing quality, cost-effective and schedule-meteing 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. (ICSA-708, ICSS-709)</td>
</tr>
</tbody>
</table>
ICSS-802  
Software Engineering  
Registration #0603-802  
Laboratory  
A projects course in applied software engineering with emphasis on the use of software based engineering tools. Available tools include Higher Order Software's specification and code generation system and Stanford University's WEB, an integrated programming and documentation system. Students work in small teams on software development projects. Programming projects will be required. (ICSS-801)  
Credit 4

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

ICSS-810  
Operating Systems II  
Registration #0603-810  
A laboratory practice course, Operating Systems II is designed to provide the student with practical experience in implementing many of the notions discussed in Operating Systems I. The class, with the instructor serving primarily as a technical advisor, designs the kernel of a small operating system in class in the first 2-3 weeks. This kernel is module tested and downloaded to a standalone processor and test run until it is debugged. Then students form into groups of 3-5 persons each and choose a project to pursue, which involves implementing additional features of the operating system. Typical projects are: file systems, memory management, scheduling, and interprocess communications. Programming projects will be required.  
Credit 4

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

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

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

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

ICSS-852  
Coding Theory  
Registration #0603-852  
A study of error-correcting codes and their applications to reliable communication of digitally encoded information. Topics include cyclic codes, hamming codes, quadratic residue codes, B. C. H. codes, Designs and Codes, Weight Distributions. (ICSS-706)  
Credit 4

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

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

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

ICSS-895  
MS Thesis  
Registration #0603-895  
Capstone of the Masters Degree program. Student must submit an acceptable thesis proposal in order to enroll. (Permission of the graduate studies committee)  
Credit variable 4-8

ICSS-899  
Independent Study  
Registration #0603-899  
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to study Computer Science topics in greater depth and more detail. (Faculty approval)  
Credit variable 1-8

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

Undergraduate Courses

IPKG-201  
Principles of Packaging  
Registration #0607-201  
An overview of packaging: the historical development of packaging, the functions of packaging, and the materials, processes, and technology employed to protect goods during handling, shipment and storage. A brief review of container types, packaging 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, orthogonal 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)n
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 affecting packaging and their relative importance. Course includes a discussion of packaging 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. (IPKG-433, Professional elective)
Class 2, Recitation 1, Lab 2, Credit 4

IPKG-541 Computer Applications
Registration #0607-541
Application of computer techniques and data processing for packaging. Review and analysis of current computer software packages for packaging, including optimum sizing, process control, simulation, and specification preparation. Computer program development and coding projects associated with packaging are assigned. (ICSA-210)
Class 2, Lab 4, Credit 4

IPKG-555 Military and Export Packaging
Registration #0607-555
Study of the particular forms and requirements for packaging for the military and export environments. Preservation techniques, military specifications, crates and large export containers, construction techniques, the export handling and transportation environment, and related topics (IPKG-432; Professional elective)
Class 3, Lab 2, Credit 4

IPKG-562 Packaging Regulations
Registration #0607-562
A detailed study of federal, state, and local regulations that affect packaging. History of the development of packaging law; detailed study of recent packaging regulations, including the Fair Packaging and Labeling Act and the Poison Prevention Packaging Act; consideration of Food and Drug Administration regulation of packaging, including requirements for tamper evident packaging; hazardous materials packaging regulations administered by the Department of Transportation; freight classifications, freight claims, the Interstate Commerce Act as it applies to goods in packages; consumer product safety law, environmental law, and patent, trademark, and copyright law as it applies to packaging.
Class 3, Credit 3

IPKG-566 Food Preservation and Packaging
Registration #0607-566
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, SIBB-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.
Credit variable 3-4

IPKG-590 Senior Thesis
Registration #0607-590
An independent 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. Packaging 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 relation 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, optimal sizing of package systems, process control, and similar applications will be presented. Computer program development and individual research on an interest basis.
Credit 4

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

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

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

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

School of Engineering Technology
Upper Division Civil Engineering Technology

ITEC-099  Introduction to CET
Registration #0608-099
This course will introduce CET transfer students to RIT, showing them the difference in types and methods of instruction and what is expected in the way of student ethics. Guest lectures will be used to show the many aspects of the industry.
Class 1, Credit 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, Euler's circle, transversely loaded members, statically indeterminate problems. Euler's equations, and parabolic column equations, (statics, and strength of materials)
Class 4, Credit 4

ITEC-420  Hydraulics
Registration #0608-420
Study of principal physical and mechanical properties of liquids, hydrostatic pressure and forces; pressure measuring devices; buoyancy and flotation, flow of liquids in closed conduits, and introductory principles of piping systems design; pumps and pump selection; flow of water in open channels and introduction to their design. (Physics)
ITEC-421  Hydraulics Lab must be taken concurrently.
Class 3, Credit 3

ITEC-421  Hydraulics Laboratory
Registration #0608-421
Laboratory to be taken concurrently with ITEC-420. Eight laboratory exercises are introduced to support lecture material.
Lab 3, Credit 1

ITEC-422  Elements Of Building Construction
Registration #0608-422
Elements and details of building construction; study of building codes from a design concept; foundations; wood, steel and concrete construction and wall systems; and introduction to construction specifications for materials and methods.
Class 4, Credit 4

ITEC-428  Technical Communications
Registration #0608-428
The principles of organizing data and information into clear and concise engineering memos, letters, reports, and presentations. The techniques of library research, word processing and oral presentations, including audiovisual, are also stressed. (Basic college writing)
Class 4, Credit 4

ITEC-432  Water and Wastewater Transport Systems
Registration #0608-432
Discussion of surface and groundwater sources. The hydraulic design of sanitary and storm sewer systems, and water distribution systems. (ITEC-420, 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
Application of structural design methods to timber. Topics covered include: the structure and properties of wood; grade, size, and design properties of structural lumber; design of wood structures; plywood; nailed joints; and trusses. (ITEC-404)
Class 4, Credit 4

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

ITEC-482 Hydrology
Registration #0608-482
Course presents major theoretical and practical consideration of hydrology in application to study groundwater hydraulics, hydraulic structures, water transportation systems, and transportation.
Class 4, Credit 4

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

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 included beams, trusses, and frames which are loaded in the plane of the structure. Topics include influence lines and approximate methods. The course is intended to bridge the gap between the previous course in Applied Mechanics of Materials and the subsequent course in Structural Design. (ITEC-404)
Class 4, Credit 4

ITEC-495 Structural Design
Registration #0608-495
Structural design in reinforced concrete and structural steel. In the reinforced concrete portion of the course, the working stress method is briefly covered, but emphasis is on the strength method; members and frames are primarily of the indeterminate type. In the structural steel portion, the working stress method is emphasized; members and frames are primarily of the determinate type. In both portions the accent is on building structures. Provisions of the ACI code and AISC specification will be followed. (ITEC-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 also lecture.
Class 2, Credit 2

ITEC-505 Construction Safety
Registration #0608-505
General safe practices in construction operations. Safety standards, both voluntary and mandatory. Employers' responsibilities under the provisions of OSHA and state labor law. A portion of this course is audiovisual.
Class 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
Registration #0608-510
Principles of water treatment plant design, conceptual and hydraulic design of water purification and conditioning facility. Includes: setting, filtration, softening, disinfection, organics, removal, and plant design construction elements.
Class 2, Credit 2

ITEC-513 Computer Techniques In Civil Engineering Technology
Registration #0608-513
Designed as a supplement to the introductory programming course. Topics include: word processing, use of packaged programs such as COGO and MINITAB, electronic mail, introduction to graphics, and design of user-friendly programs. Work will be done using timesharing, primarily, but with some time devoted to personal computers. (ICSA-220)
Class 2, Credit 2

ITEC-514 Land Planning
Registration #0608-514
The environmental and social aspects of land planning are covered as well as the engineering and cost considerations. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wetlands, other planning and control tools, and solar access planning.
Students are involved in an independent project consisting of a concept design for a subdivision or other land use project. Extensive use is made of field trips and attendance at appropriate meetings or work sessions. (Drafting, surveying, and ITEC-432)
Class 4, Credit 4

ITEC-516 Analysis and Design of Reinforced Concrete Structures
Registration #0608-516
Introduction to the analysis of indeterminate flexural members and frames, emphasizing the method of moment distribution. Design of continuous reinforced concrete elements and frames. The accent is on building structures and the use of the ACI Code. The working stress method is briefly covered, but primary emphasis is given to the strength method (ITEC-404)
Class 3, Recitation 2, Credit 4

ITEC-518 Masonry Design
Registration #0608-518
An introduction to masonry design and construction. Both brick and concrete masonry will be covered, with the emphasis on concrete masonry. Topics covered include terminology, non-reinforced masonry, joint reinforcement, types of mortar, design of bearing walls and partitions. Use will be made of the publications of the Brick Institute of America, the National Concrete Masonry Association, and the Portland Cement Association. (ITEC-404)
Class 2, Credit 2
ITEC-S20 **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 phosphorous removal will be discussed. Processes, plant design, and construction elements are stressed.
Class 3, Lab 2, Credit 4

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

ITEC-525 **Hazardous Waste**
Identification, classification and legal aspects of hazardous waste. Generator, transport, storage and disposal of hazardous waste with emphasis on chemical landfill and incineration of hazardous and toxic wastes. The possibility of using genetic engineering in treating 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 footings analysis and design; lateral earth pressure and retaining walls analysis and design, pile foundation analysis and design principles; slope stability, study of modern and traditional soil improvement technology. (ITEC-404)
ITEC-528 Soil Mechanics Laboratory must be taken concurrently.
Class 3, Credit 3

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

ITEC-530 **Transportation Engineering**
The course exposes the student to the fields of highway, airport, and rail engineering. The areas of administration, planning, design, construction, maintenance, and operation are covered; however, after the introductory material is presented, stress is put on specific skills needed in these fields, including highway, rail, and airport standards, geometry and alignment, drainage, earthwork, safety standards, and structures. Ample field exposure to all elements is part of the formal structured program. (Route surveying)
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.
Class 3, Lab 2, Credit 4

ITEC-544 **Contracts & Specifications**
This course includes a fundamental overview of contract law, followed by the application of this material into the contracts of construction. Subsequently, the student is exposed to construction specification. Substantial use is made of actual documents such as those of the New York State Department of Transportation, the Construction Specification Institute, and trade standards such as an ANSI, ASTM, and others. Students are required to develop and assemble a mock-up set of contract documents.
Class 3, Lab 2, Credit 2

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

ITEC-550 **Construction Practices**
An introduction to basic construction management and organization with CPM scheduling, estimating, bidding, heavy construction techniques, methods, and equipment application. This is a survey course for non-construction students.
Class 2, Credit 2

ITEC-552 **Analysis and Design of Steel Structures**
An introduction to the analysis and design of steel structures. Emphasis is on low-rise buildings of the determinate type which are braced versus lateral loads. Topics include tension members, fasteners, welding, columns under axial load and bending, and beams; background of the AISC specification is stressed; current practice in detailing fabrication, and erection; design project. (ITEC-404)
Class 4, Credit 4

ITEC-555, 557 **Wastewater Treatment Plants Operation and Control I & II**
A self-paced audio-visual course. Emphasis on the functional aspects of waste water treatment plants’ operation. Discussion of the significance of the results of laboratory analysis and their interpretation and application to the control of treatment processes. (ITEC-438 and consent of instructor)
Credit 1-4

ITEC-560 **Construction Project Management**
An introduction to basic construction management and organization. Topics include company and project organization, contracts, specifications, bonds, insurance, bidding, cost and financial accounting, labor relations, and project planning and scheduling. (ITEC-509 and ITEC-422 may be taken concurrently.)
Class 4, Credit 4
ITEE-314 Basic Electrical Principles
Registration #0609-414
Basic study of important electrical concepts for both AC and DC circuits. Topics covered include AC/DC circuit theory, single and three phase power distribution, power factor, line losses, efficiency, AC motors and transformers, energy costs, wiring methods, instrumentation and circuit protection. (SMAT-421)
Class 3, Lab 2, Credit 4

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

ITEE-425 Power Concepts
Registration #0609-425
Steady-state AC circuits both single and three phase, transformers, dynamometer theory, motor characteristics, DC and stepper motors, solid-state power electronic devices and application to control of motors.
Class 3, Lab 1, Credit 3

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

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

ITEE-413 Applied Microprocessors
Registration #0609-413
Applications of microprocessors for manufacturing engineering technology students. Application of the 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-424 Logic and Digital Devices
Registration #0609-424
The analysis and simplification of logic equations using Boolean algebra with applications to semiconductor integrated circuits. Truth tables and Karnaugh map reduction techniques, multiple output circuits, multi-level gate networks, multiplexers and demultiplexers, synchronous sequential circuits, state diagrams and counter circuits are also studied.
Class 3, Lab 2, Credit 4

ITEE-425 Power Concepts
Registration #0609-425
Steady-state AC circuits both single and three phase, transformers, dynamometer theory, motor characteristics, DC and stepper motors, solid-state power electronic devices and application to control of motors.
Class 3, Lab 1, Credit 3
ITEE-437 Computer Programming
Registration #0609-437
The objective of this course is to learn to write good, well documented programs using PASCAL as the programming language. The emphasis of the program will be to learn modern programming techniques and methods of solving problems using computers.
Class 4, Credit 4

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

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

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

ITEE-530 Operational Amplifiers
Registration #0609-530
A study of discrete differential amplifiers and integrated operational amplifiers, including applications in instrumentation, active filters, waveform generation and shaping and precision rectifiers.
(ITEE-428)
Class 3, Lab 2, Credit 4

ITEE-532 Power Amplifier Design
Registration #0609-532
The design of Class A and B low frequency power amplifiers is studied with special attention to transistor ratings and heat sinking requirements. Principles of transformer design. Class C RF amplifiers and Class D regulators are also covered.
(ITEE-428)
Class 3, Lab 2, Credit 4

ITEE-534 Analog Communication Systems
Registration #0609-534
Circuit design and systems concepts for AM, DSB, SS, VSB, and FM of each type of modulation are determined using the Fourier series of periodic waveforms. The noise figure, noise temperature, and signal-to-noise ratio of each system is determined.
(ITEE-428)
Class 3, Lab 2, Credit 4

ITEE-535 Telecommunication Systems
Registration #0609-535
Topics include sampling theorem, pulse 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
Registration #0609-536
A review of ITEE-404. Control Systems I; Root locus and Nichols charts will also be discussed. Design of control systems for specific application and performance criteria; application of control theory to specific electromechanical, temperature, and light control systems. Time domain analysis including state variables, matrices and numerical solutions to state equations will be studied. Digital computer control utilizing real-time controllers and z-transforms will also be included.
(ITEE-404)
Class 3, Lab 2, Credit 4

ITEE-538 Digital Computer Design I
Registration #0609-538
Design of logic circuits using 7400 series TTL gates; a study of TTL flip-flops, one shots and oscillator circuits; design of timing circuits, shift registers and counters.
(ITEE-424)
Class 3, Lab 2, Credit 4

ITEE-539 Digital Computer Design II
Registration #0609-539
A continuation of ITEE-538 with application of logic circuits to computer design. Multiplexers, semiconductor memories, ALU’s 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 includeUARTs, IC timers, TTYs, modems, CRT drivers, disc drives, line printers, and D/A and A/D converters. Methods of interfacing these peripherals to minicomputers and microprocessors are emphasized. Advanced topics in microprocessors will also be considered.
(ITEE-539 and ITEE-542 or permission of the instructor)
Class 3, Lab 3, Credit 4

ITEE-547 Digital Processing of Signals
Registration #0609-547
Basic concepts of linear systems are covered, followed by an introduction to digital signal processing from a hardware and software approach. Emphasis is placed on digital filter design and FFT. Applications are considered. Programming projects will be assigned.
(SMAT-422, ITEE-530)
Class 3, Recitation 2, Credit 4

ITEE-550 Power Systems I
Registration #0609-550
Basic elements of a power system, energy sources, substation configuration, load cycles, balanced and unbalanced three phase circuits, power factor correction, transmission line configurations and impedances, voltage regulation of transformers, and the per unit system are studied. The symmetrical component method of analysis is introduced.
(ITEE-425 or ITEE-412)
Class 4, Credit 4
ITEM-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

ITEM-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

ITEM-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

ITEM-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

ITEM-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

ITEM-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

ITEM-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

ITEM-590 Protective Relaying
Registration #0609-590
Introduction to the analysis of machine members.

ITEM-607 Materials Technology II
Registration #0610-607
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-610 Applied Dynamics
Registration #0610-610
Examines the principles of kinematics and the basic laws of motion as applied to the design and analysis of mechanical components and systems. (ITEE-404, SMAT-421 or concurrent)
Class 3, Recitation 2, Credit 4

ITEM-620 Dynamics of Machinery
Registration #0610-620
A study of the kinematics of machine elements such as gears, cams and linkages with emphasis on graphical methods. (ITEE-405)
Class 3, Recitation 2, Credit 4

ITEM-630 Mechanical Engineering
Registration #0610-630
Technology Laboratory I
A course in mechanical laboratory techniques and the preparation of laboratory reports; experimental work in materials testing, strength of materials, experimental stress analysis, metallurgy, and metallography; instruction in the preparation of laboratory reports. (It is intended that students enroll concurrently in ITEM-404 and ITEM-414).
Class 2, Lab 2, Credit 2

ITEM-640 Introduction to Strength of Materials
Registration #0610-640
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-650 Mechanical Engineering
Registration #0610-650
Technology Laboratory II
A course in mechanical laboratory techniques, the analysis of experimental results and the preparation of laboratory reports. Experimental work in mechanics of materials, materials science and plastics technology will be conducted. Instruction will be provided in several forms of technical communication. (ITEM-404, ITEM-407; ITEM-415 concurrently)
Class 1, Lab 2, Credit 2

ITEM-660 Engineering Materials
Registration #0610-660
A study of the physical properties of materials; survey of manufacturing processes including casting, molding, metal removal, metal forming, welding; field trips to local manufacturing installations; material testing inspection labs, and selected heat treating experiments are available. (For non-mechanical majors)
Class 3, Recitation 2, Credit 4

ITEM-670 Materials Technology I
Registration #0610-670
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-680 Materials Technology II
Registration #0610-680
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 Communications
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. Development of vocabulary and spelling skills; improvement of grammar, syntax and punctuation; and improvement of basic English language skills are also objectives of this course. Students must attain a satisfactory score on the Test of Standard Written English (TSWE) to enroll in this course.
Class 3, Recitation 2, Credit 4

ITEM-432 Computers in Mechanical Technology
Registration #0610-432
The use of computers to solve problems encountered in mechanical engineering technology will be emphasized. This will include an introduction to the RIT academic computing system and introduction to the use of personal computers. Instruction will be provided in word processing, spread sheet programming, plotting and other applications programs. Assignments will be based on problems encountered in mechanics of materials, dynamics, materials testing, etc. A course in a programming language is a prerequisite.
Class 3, Credit 3

ITEM-440 Applied Thermodynamics
Registration #0610-440
The first and second laws of thermodynamics and their applications in mechanical engineering technology. Thermodynamic properties of fluids including ideal gases and pure substances are studied. Thermodynamic processes and applications of thermodynamic principles to steam cycles and refrigeration cycles.
Class 4, Credit 4

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

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. Principles and applications of fluid statics, fluid kinematics, fluid kinetics, the energy conservation principle, dimensional analysis and fluid momentum. Also covered are laminar and turbulent flow in pipes and products, fluid machinery, fluid meters and lifting vanes. (ITEM-440, 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 Mechanical Technology Co-op
Registration #0610-499
One quarter of appropriate work experience in industry.
Class 0, Credit 0

ITEM-506 Machine Design
Registration #0610-506
The study of the static and dynamic failure of machine elements and the design and analysis of fasteners, springs, 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 the student with an overview of analog feedback control systems. Students are introduced to topics such as block diagrams, classification of control types, mathematical models, measuring means, and Laplace Transforms. Control systems design will also be discussed. Lab demonstrations will be presented. (ITEM-405, ITEM 460, and SMAT-422)
Class 4, Credit 4

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

ITEM-541 Alternative Energy
Registration #0610-541
Applications
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, 544 Energy Management I, II
Registration #0610-543, 544
Technical, management, and cost aspects of energy conservation. Technical aspects of reducing energy consumption in utilities, processes, buildings, heating, air conditioning, and ventilation systems. Special topics such as furnace efficiency, heat recovery, heat pumps, pumping and piping, and architectural considerations. (ITEM-540)
Class 4, Credit 4

ITEM-545 Solar Thermal Applications
Registration #0610-545
Study of analytical methods to model and predict the performance of solar energy systems. The emphasis will be on the application and design of systems appropriate for the available technology. Additional areas of study include the economic feasibility and analysis of potential solar energy applications, selection of appropriate equipment based on the economic and energy use of various applications.
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 fans, heat exchangers, and compressors. The methods of modeling the dynamic thermal performance of buildings are studied, and energy 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-547 Pipe and Duct Design
Registration #0610-547
Theory and application methods for designing hydronic, refrigeration, steam, and compressed air piping and air handling ducts. The use of computer-aided methods is emphasized. (ITEM-460, ITEM-454)
Class 3, Lab 2, Credit 4

ITEM-548 Computer-Aided Energy Analysis
Registration #0610-548
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 3, Lab 2, Credit 4

ITEM-549 Systems Design
Registration #0610-549
Use of computer programs for evaluating system sizing, annual operating cost analysis, and system optimization will be emphasized while studying the impact of various architectural and HVAC designs on energy utilization. Current professionally used design programs will be used including the Carrier Corporation E-20 Series of programs and the McClintock Corp. MC2 series, main frame programs accessible through Trane Corp. and APEC. (ITEM-542)
Class 3, Lab 2, Credit 4

ITEM-550 Power Plant Design
Registration #0610-550
Description of power plants and their components; boilers, turbine, pumps, condenser, heat exchangers, nuclear reactors. Relevant analytical tools; cycle calculations, heat balances, gas analysis, fuel analysis. Also, internal combustion power plants and cogeneration plants are covered. (ITEM-440, ITEM-460)
Class 4, Credit 4

ITEM-551 Independent Study
Registration #0610-551
A supervised investigation within a mechanical technology area of student interest. Student must submit written proposal and have it approved prior to registering. Credit variable (1-4)

Upper Division Manufacturing Engineering Technology

ITEM-404 Materials In Manufacturing
Registration #0617-404
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

ITEM-405 Applied Kinematics
Registration #0617-405
This is an introductory course dealing with the principles of Kinematics as they are applied to manufacturing. Topics include: displacement, velocity, acceleration, linkages, gears, cams, bearings, and lubrication.
Class 4, Credit 4

ITEM-406 Manufacturing Processes
Registration #0617-406
A comprehensive course in metal manufacturing processes. Topics include metal solidification processes, bulk deformation processes, sheet-metal working processes, part manufacture, 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

ITEM-407 Statistical Quality Control I
Registration #0617-407
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

ITEM-408 Statistical Quality Control II
Registration #0617-408
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. (ITEM-424)
Class 3, Recitation 2, Credit 3

ITEM-410 Engineering Economics
Registration #0617-410
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 tax 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, pair comparisons, magnitude estimation, criteria analysis, and cost estimation.
Class 3, Credit 3

ITEF-450 Plastics Processing
Registration #0617-450
A course dealing with the various methods used to manufacture plastics products. Topics include compression and rotational molding, extrusion, injection molding, blow molding, thermoforming, pre- and post-molding operations and economics of plastics processing.
Class 3, Lab 2, Credit 4

ITEF-460 Computer-Aided Design
Registration #0617-460
The course introduces CAD as an integral part of Computer Integrated Manufacturing. It deals with the basic concepts in CAD, the hardware and software related to 2D and 3D interactive graphics, CAD applications, the relationship between CAD and CAM, and the economics of CAD. The course concentrates on the CAD functions involving geometric modeling, finite element analysis, and drafting. Emphasis is placed on the laboratory work involving turn-key systems for 3D wire frame modeling and 3D solids modeling.
Class 2, Lab 4, 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 the manufacturing tools. Examines the concepts in tool design, tool specification and tool selection. Major portion of the course is devoted to the design of dies.
Class 2, Lab 2, Credit 4

ITEF-475 Computer-Aided Manufacturing
Registration #0617-475
A course dealing with the process aspects of Computer Integrated Manufacturing systems. Introduces the various elements of CIM and concentrates on the role of CAM in CIM. Deals with the concepts and application of Group Technology, Computer-Aided Process Planning, and Flexible Manufacturing Systems. 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 and Measurement
Registration #0617-481
Principles and application of basic methods for the improvement of operator - assignment time relationship. Methods of measuring and analyzing work, motion studies, and process analysis are covered.
Class 3, Credit 3

ITEF-485 Robots in Manufacturing
Registration #0617-485
A course dealing with the technology and application of robotics. Included are the study of hardware and software of robots and the integration of robots with other elements of Computer Integrated Manufacturing (CIM) systems. The hardware aspects will include the mechanical components, the power systems, the control units, and the sensors. The software aspects will cover the various methods of programming the robots and interfacing them with other components of CIM. The integration aspects include the potential areas of application of robots and their economics. (ITEM-521, ITEE-413; instructor's consent)
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, electrochemical 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
An advanced course. Presents an opportunity for the student to apply the knowledge gained in the program. The student is expected to design and build a system and demonstrate its operation. May include oral and written reports. (ITEF core or instructor's consent)
Class 1, Recitation 4, Credit variable 3-4

ITEF-526 Quality Systems
Registration #0617-526
Study of quality related aspects from design of products to providing maintenance services in the field. Students are presented with case studies for analysis and problem solving.
Class 3, Credit 3

ITEF-530 Special Topics in Computer Integrated Manufacturing
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.
(ITEF-485)
Class 3, Credit 3

ITEF-599 Independent Study
Registration #0617-599
A supervised investigation within a manufacturing technology area of student interest. Student must submit written proposal and have it approved prior to registering.
Credit variable 1-4
Computer Engineering Technology

ITEP-201
Registration #0618-201
DC Circuits
An introduction to electrical technology, with emphasis on DC circuits analysis techniques. Topics include resistance, inductance, capacitance, and diodes with circuit techniques of Ohm’s Law, current-voltage division, simplification of series, parallel, bridge, and networks requiring Delta-Wye transformations, Kirchoff’s Laws, Thewarin’s Theorem, Mesh analysis and superposition. (Corequisite SMAM-204)
Class 3, Lab 3, Credit 4

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

ITEP-203
Registration #0618-203
Electronic Devices
An introduction to electronic devices and systems. Emphasis on semiconductor diodes, zeners, transistors, and other two and three terminal devices. The basic operation and biasing of transistors (BJTs and FETs) is stressed. A basic TTL logic gate will be introduced. (ITEP-202)
Class 3, Lab 3, Credit 4

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

ITEP-302
Registration #0618-302
Linear Electronics
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

ITEP-303
Registration #0618-303
Microcomputers
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-301)
Class 3, Lab 3, Credit 4

ITEP-305
Registration #0618-305
Drafting and Fabrication
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.
Class 3, Lab 2, Credit 4

ITEP-403
Registration #0618-403
Advanced Circuit Theory
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-202, 203, SMAT-422)
Class 4, Recitation 2, Credit 5

ITEP-405
Registration #0618-405
Control Theory
A course in the fundamentals of linear control systems, as used from the standpoint of the digital computer. Emphasis on feedback control theory, control system components, digital control systems and solid state control. (ITEP-403)
Class 3, Lab 2, Credit 4

ITEP-429
Registration #0618-429
Advanced Electronics
A course in the modern application of linear integrated circuits, with emphasis on the operational amplifier. (ITEP-302)
Class 3, Lab 2, Credit 4

ITEP-471
Registration #0618-471
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 FORTRAN, new programming microprocessors languages, microcomputer systems, and computer communications systems and techniques. A fourth-year status in computer technology is required.
Class 3, Lab 3, Credit 4

ITEP-499
Registration #0618-499
Cooperative Education
One quarter of appropriate work experience in industry.
Credit 0

ITEP-538
Registration #0618-538
Digital Systems Design I
A study of the design of combinational and sequential logic circuits and subsystems. Emphasis is on proper design techniques and the use of different SSI/MSI logic families in implementing the designs. (ITEP-301, 305)
Class 3, Lab 2, Credit 4

ITEP-539
Registration #0618-539
Digital Systems Design II
A study of the design of complete digital systems using combinational and sequential subsystem circuit design (ITEP-538) and microprocessors (ITEP-303). Included is the hardware design used in digital communications systems. (ITEP-303, 538)
Class 3, Lab 2, Credit 4

ITEP-540
Registration #0618-540
Digital Systems Design III
An introduction to the devices necessary to supply input to digital computers. A/D and D/A converters, impedance bridge circuits and sensing devices are emphasized. (ITEP-405, 429, 539)
Class 3, Lab 2, Credit 4

ITEP-580
Registration #0618-580
Senior Project
Selected independent study of design project by computer 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

ITEP-581
Registration #0618-581
Senior Project
Selected independent study of design project by computer 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
Department of Instructional Technology

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

Audiovisual Communications Service Courses

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

ICIC-413 AV Production for Biomedical Communications
Registration #0612-413 Design, creation, and presentation of 35mm slide and 35mm slide+tape productions as applied to medical and scientific needs. Planning, researching, scripting, production, revision, evaluation. Dissolve programming; graphics; combination of music, words, and images. (For biomedical photography majors only)
Class 2, Lab 4, Credit 4
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 documentation for users. This course is a prerequisite to the third quarter of cooperative education. (For computer science majors only)
Credit 2

ICIC-489 Audio for Audiovisual Presentations
Registration #0612-489 Students record, transfer, edit, and mix sound tracks—with music, narration and sound effects—for audiovisual programs. Course stresses practical approach with hands-on experience. Enrollment required by the department. (For nonmajors except by department permission)
Credit variable 3-4

Upper Division Major Courses

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

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-405 Audiovisual Seminar
Registration #0612-405 Permits students to discuss in a seminar setting a series of topics related to the field of audiovisual communications, including career choices, academic preparation, and professional growth opportunities. (Required for graduation)
Credit 2

ICIC-424 Visual Production Techniques
Registration #0612-424 Students develop and refine the visual techniques in developing an audiovisual show, especially a multi-image show. Includes lighting, color balancing, format design and principles of continuity composition in audiovisual production. (Required for graduation, but may be waived on demonstration of competency)
Credit 4

ICIC-430 Audiovisual Presentation Design
Registration #0612-430 Students review basic production skills and develop slide+tape presentations to communicate ideas or to change the attitudes of the viewer. This development process includes an analysis of the client’s needs and setting communications objectives; preparing the treatment, script, and storyboard; producing the audio track and visual materials and synchronization of the presentation. Stresses more design and planning than production. (For audiovisual communications majors only, required for graduation)
Credit 4

ICIC-440 Audiovisual Program Design I
Registration #0612-440 Students differentiate between audiovisual presentations and programs and then design programs which incorporate a number of presentations within a program. Emphasis is on analyzing the performance problem, setting appropriate communications objectives, and then developing a program to improve performance. Actual case studies are used to illustrate the design process in business and industrial settings. (Required for graduation)
Credit 4

ICIC-450 Audiovisual Program Design II
Registration #0612-450 Students analyze the elements used in design of audiovisual programs and presentations. Emphasis is on the application of the key psychological principles — perception, memory, experience, attitudes — underlying successful communications. Students must design a series of presentations incorporating these principles. (Required for graduation) (ICIC-440)
Credit 4
ICIC-490 Audio Techniques
Registration #0612-490
Students review principles of sound recording and produce audi-
otypes in a variety of situations. Course includes both practical and
theoretical aspects of studio and field recording, selection of equip-
ment, acoustical considerations, and the electronics related to audio
recording. (ICIC-489 or equivalent)
Credit 4

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

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

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

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

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

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

ICIC-571 Staging Audiovisual
Registration #0612-571 Presentations
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 troublshooting common audiovisual equipment such as sound sys-
tems, projectors, multi-image equipment, screens. (ICIC-489,
ICIC-422)
Credit 4

ICIC-580 Producing Multi-Image
Registration #0612-580 Presentations I
Students design, produce, and present multi-image productions (3-6
projectors) controlled by microprocessor-based programmers using lei-
sure time programming. Basic research and theory of multi-image
covered. Projects required. (Photography skills, and ICIC-489, and ICIC-401 or ICIC-422 or equivalent)
Credit 4

ICIC-581 Producing Multi-Image
Registration #0612-581 Presentations II
Students design and produce multi-image presentations (6-15 pro-
jectors) controlled by microprocessor-based programmers using lei-
sure 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 pres-
extions, using memory programming and multiple projectors. Projects may focus on a single special effect or a complete pres-
extation. The number of credits allowed depends on the scope and
complexity of the project undertaken. (ICIC-580, and 581, and ap-
proval of project prior to enrollment)
Credit variable 1-2

ICIC-585 Producing Special Effects
Registration #0612-585 Slides Production
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 tech-
niques to produce effects such as multiple exposures, streaks,
zooms, neons, registration techniques to produce slide animation
and seam and planning. 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
Registration #0612-586 Slides Production
In this continuation of ICIC-585, the student will analyze, design, and
produce special effects slides with a number of elements. The stu-
dent will also have the opportunity to learn the operation of a com-
puter-controlled special effects camera stand and to incorporate
basic techniques like positive, negative, and gradation masks with
cameras and compound movements and multiple exposures to pro-
duce special effects slides like streaks, zooms, neons, step and
repeats, spins, posterizations, seamless masks, pans and animation.
Empasis will be on the development of such slides for multi-
projector presentations. In addition to camera operation, the stu-
dent must design and produce any necessary artwork.
Credit 2-4

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

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

Instructional Technology

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

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

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

ICIT-712 Computer Assisted Instruction (CAI-1)
Registration #0613-712
Students learn the use of the computer for instruction (computer-assisted instruction) and then produce their own computer-assisted instruction programs. Students review research and computer-assisted instruction, select hardware and software configurations, programmed languages, and sources of already developed computer-assisted courses. The course covers some methods of course and lesson development. Project required. (ICIT-755 or with permission of department)
Credit 4

ICIT-713 Advanced Computer Assisted Instruction (CAI-2)
Registration #0613-713
The student develops complex and sophisticated instructional sequences which incorporate advanced CAI programming techniques; enters the sequences on the computer; tests and debugs the sequences; and using the computer, gathers the student response information necessary to validate the sequences. The student also explains and demonstrates CAI and writes proposals for CAI courses and lessons. (ICIT-712) Two projects required.
Credit 4

ICIT-714 Computer Based Interactive Instructional Systems (CAI-3)
Registration #0613-714
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

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

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

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

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

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

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

ICIT-745 Instructional Facility Design
Registration #0613-745
Designed to enable the instructional developer to assist and participate in the design of spaces and related facilities for effective learning. Specific topics include acoustics, lighting, ventilation, electric circuits, planning for electronic distribution systems, equipment specifications, spatial relationships, together with architectural engineering and contracting procedures.
Credit 4
ICIT-750  Instructional Development I
Registration #0613-750
Covers the concepts and principles underlying the development of instructional programs and materials. Instructional development is the systematic solution of instruction and learning problems involving needs assessment, task analysis, specification of objectives, analysis and synthesis of instructional strategies, and methods of evaluation. A limited instructional development project is part of the course. Required for graduation. (Note: ICIT-700 must be taken before or simultaneously with ICIT-750; must be taken before 18 hours of program are completed; ICIT-735 and ICIT-755 are prerequisites)
Credit 4

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

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

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

ICIT-756  Criterion Referenced 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 procedure’s. 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)
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-735)
Credit 4

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

ICIT-772  Group Development and 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-780  Selected Topics in Instructional Technology
Registration #0613-780
This seminar provides a forum for a small group of students to examine various areas of interest to them. Students select topics, examine them thoroughly, and present the findings for group consideration. Required for graduation. (30 hours course work)
Credit 2

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

ICIT-850  Independent Study
Registration #0613-850
An opportunity for a student to explore, with a faculty advisor, an area of interest to the student. A proposal (guidelines available from the department) must be submitted prior to registering for this course. (ICIT-750, ICIT-751 plus 20 hours of course work)
Credit variable 1-3
Department of Career and Human Resource Development

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

IJCC-703 Management of Learning
Registration #0615-703
Systems of curriculum planning and cognitive styles, goals, objectives, evaluation, measurement, and productivity are studied as they relate to the accountability of faculty, students, and administration.
Credit 2

IJCC-704 Instructional Techniques
Registration #0615-704
To develop professional competence in direct applications and uses of various learning styles, including television, special audiovisuals, prepared lectures, seminars, computer-assisted instruction, and programmed learning.
Credit variable 1-4 credits

IJCC-742 Career Decision Making Concepts
Registration #0615-742
Based upon prior knowledge of basic sociological and psychological constructs, this course concentrates on the processes and influences involved in choices regarding careers. The relative and collective impacts of peers, teachers, and relatives, immediate family, and professional advisors are analyzed. Additional course goals include applications of processes such as socialization, acculturation, assimilation, status and role playing, and perception to related activities such as career education-orientation-advising. Current psychological research relating personality/self concepts/motivation to career decision making will be studied. A special topic involves the problems of communicating information on emerging careers to individuals to effect real and valid perceptions.
Credit 4

IJCC-743 Industry Interrelationships
Registration #0615-743
A study of the interrelationship of the world of formal education to the business, industrial, and labor communities. Constraints, problems, and values of cooperative effort will be studied in relation to organizations of varying size. Elementary, secondary and postsecondary education, differing size business organizations and industrial groups that involve differing levels of technical specialization are studied.
Credit 2

IJCC-745 Career Concepts: Production
Registration #0615-745
Credit 3

IJCC-746 Career Concepts: Commerce
Registration #0615-746
Credit 3

IJCC-747 Career Concepts: Services
Registration #0615-747
These three courses form a single set and are separated only to facilitate registration and scheduling flexibility.
Each of these three courses concentrates on particular careers. Production includes manufacturing, construction, mining, skilled trades, design and engineering related fields, and food processing and the field of agriculture, fisheries, etc. Commerce covers general business, banking and finance, sales and advertising, communications, hospitality and tourism, retail and wholesale distribution and related fields. Service includes allied health careers, education, government and civil service, law and criminal justice careers, and other service careers.
Each course is designed to present a foundation view of several types of a particular employer. Investigated will be systems of career opportunities, management, personnel policies, employer/employee relations, required training/educational levels, manpower long-range projections, philosophies, in-house education and training, competitive relationships, national/international affiliations, and civic/humanitarian expectations.
Credit 3

IJCC-748 Information Retrieval
Systems in Career Planning
Registration #0615-748
The primary goal is the ability to use several data bases and information gathering tools related to career information.
Additional goals are an awareness of the other systems based upon media and print materials, and the ability to evaluate various systems. (CTAM-712 or equivalent, plus 20 hours)
Credit 4

IJCC-749 Manpower Forecasting Fundamentals
Registration #0615-749
Two different purposes that depend on a common base are goals for this course. The common base is an understanding of the techniques, theories and limitations of manpower forecasting as it applies to numbers in current occupations and to the probabilities of emerging careers.
The two purposes are: (1) the ability to provide, as a generalist having a broad knowledge of different careers, assistance to discipline specialists in feasibility studies for new educational programs, and (2) assisting people in making decisions in those careers for which insufficient information exists. The ability to assist people in making decisions about the pursuit of a career that is projected to be available several years later will be studied in order to develop a uniform and responsible judgement in those areas where probability statements are extremely important. (CTAM-712 or equivalent, plus 20 hours)
Credit 4

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

IJCC-751 Occupational/Industrial Environments
Registration #0615-751
This course offers educators firsthand exposure to industrial and/or occupational work environments with focus on the various components of the work force such as research, skilled trades, computer-related areas, production supervision, finance and retailing. Students will have presentations from executives, training directors, employment personnel and workers about skills required for entry-level jobs, application and interview procedures, scope of work, economic benefits, salary and wage scales, employment outlook, and worker and employer expectations.
Credit 3
IJCC-752  Career Education in Colleges and Special Settings
Registration #0615-752
The course goals are to develop the abilities and knowledge necessary to function effectively in college career education and information centers and other organizations helping adults develop career plans. Topics include career education components in community/junior and four year colleges and universities: multiple, middle, and late careers; advocacy; spouse and family concerns; and special settings for career assistance. (Offered occasionally)
Credit 4

IJCC-753  Group Dynamics for Career Development
Registration #0615-753
This course concentrates on the abilities needed to plan, conduct and evaluate various group counseling and peer assistance processes as used in assisting individuals to formulate career plans. Each participant will understand the appropriate functions, advantages and disadvantages of different group dynamic procedures and will demonstrate the required “attending,” listening, guidance, problem solving, and decision making skills needed to plan and moderate such sessions. Required for all Instructional Technology students.
Credit 4

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

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

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

IJCC-850  Special Projects
Registration #0615-850
This course provides for independent study, investigation, or research activity in subject matter areas not formalized by the Center's program, but having specialized value. Proposals approved by director required prior to enrollment. (IJCC-742, IJCC-760, 20 additional hours of coursework)
Credit 4, Lab 15 Class 4, Credit 4

School of Food, Hotel and Tourism Management
Dietetics and Nutritional Care

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

ISMD-402  Dietetics Environment
Registration #0620-402
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
Principles of management in organizational structure, supervision and evaluation of employee performance, and use of computers in food management; the functions of an administrative dietitian in planning, organizing, directing, coordinating, and controlling dietetic activities. (ISMF-215)
Class 1, Credit 8, Practicum in hospital by arrangement.

ISMD-554  Nutrition In Life Cycle
Registration #0620-554
This is an applied course in nutritional needs throughout the life cycle. Emphasis will be given to nutrition during pregnancy, infancy, early childhood, adolescence, and in later years. (ISMD-213)
Class 4, Credit 4
ISMD-560, 561  Clinical Dietetics I & II
Registration #0620-560, 561 (Coordinated Dietetics Program)
An intensive integrated study and application of advanced nutrition and
diet therapy theories and principles. The course is structured to
integrate class lectures (ISMD-560) with clinical experience
(ISMD-561) in a hospital setting. Designed for senior students in the
Coordinated Dietetics Program. (ISMD-213, SCHG-203, SBI/G-212)
ISMD-560 Class 4, Credit 4
ISMD-561 Clinical Hours by Arrangement, Credit 4

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

Food and Beverage Management

ISMF-210  Introduction to Food, Hotel
Registration #0621-210 and Tourism Management
An orientation course designed to trace the history, organizational
structure, problems, opportunities and the place of the industry in the
national and world economy. Trends and developments in the indus-
try 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 pro-
ducts. Topics include history, kinds, varieties, seasonal availability,
sources, and composition of foods and ingredients; essential vo-
cabulary; organization and management of work area; techniques
and methods used for menu planning. Uniform required.
Class 3, Lab 6, Credit 5

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

ISMF-311  Design & Equipment
Registration #0621-311
Recognizing, analyzing and solving equipment and space problems
in layouts of existing institutions and in designing new food service
plans. Consideration of food service equipment; determination of
needs; development of specifications; procedures of maintenance,
sanitation, and safety. (ISMF-215)
Class 3, Lab 2, Credit 4

ISMF-314  Fundamentals of Food
Registration #0621-314
Sanitation
Survey of micro-organisms of importance to the food industry; em-
phasis on causes and prevention of food spoilage and poisoning.
Responsibilities of management to provide and establish safe work-
ing conditions and policies; discussion of current problems con-
fronting the industry as a result of recent legislative developments as
they relate to safety and health. (ISMF-215)
Class 2, Credit 2 (For all ISMD, ISMF, and ISMH majors)

ISMF-321  I  Menu Planning and
Registration #0621-321
Merchandising
Recognizing, analyzing, research and solving fundamental merchan-
dising techniques including menus for food and beverages found in
the food service industry. (ISMF-215)
Class 2, Credit 1

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 eval-
uating problems related to all aspects of food production and man-
agement 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 Com-
puter System. Students in the Coordinated Dietetics program will
have hospital practicum arranged. (ISMF-215, 321)
Class 1, Lab 12, Credit 5

ISMF-340  Beverage Operations
Registration #0621-340
Practical course dealing with the management of a commercial bev-
erage operation. Class and laboratory includes objectives, proce-
dures, characteristics, regulations, controls and mixology of alco-
holic beverages. Students will utilize computerized dispensing equip-
ment. (Open to sophomores and juniors only, age 19 or older)
Class 3, Credit 3

ISMF-341  Beverage Operations Lab
Registration #0621-341
Course will allow experience in the actual operation of Henry's bev-
erage center. Students will become familiar with Remanco and Bev-
con electronic liquor control system. Open to sophomores and ju-
niors 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 in-
gredients; recipe development and presentation; problem-solving;
experimental design; technical writing. (ISMF-331, SCHG-289)
Class 2, Lab 6, Credit 4

ISMF-424  Food and Labor Cost Control
Registration #0621-424
A fundamental course to assist the student in costing of food and
labor needed to operate a food 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-426, ISMF-331)
Class 4, Credit 4

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

ISMF-430  Restaurant Management
Registration #0621-430
Application of theories and techniques dealing with total restaurant
operation including: menu planning, marketing strategies, supervi-
sion of purchasing, equipment, production and service operations.
Creation and calculation of management reports to evaluate effi-
ciency and effectiveness of restaurant operations. (ISMF-311, 314,
341, 416, 424, 425, 426, 435) (Senior Standing)
Class 1, Lab 12, Credit 5

ISMF-435  Purchasing and Inventory
Registration #0621-435
Control Laboratory
Practical application of theory discussed in ISMF-425 is provided by
operating as an integral part of Food Systems Management I
(Henry's Restaurant). Emphasis is placed on selecting, ordering,
receiving, storing, inventory control and evaluation of these com-
ponents. The laboratory is taken in the subsequent quarter in the
School's Purchasing Department. (ISMF-425)
Class 3, Lab 2, Credit 2
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, chaud-froid, 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. (ISMH-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
Registration #0621-511 Management
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 distribution, personnel and customer relations and attitudes. Evaluation of management experience by preparation of operations reports. Open to seniors only. (ISMH-331, 340, 341, 424, 425)
Class 1, Lab 12, Credit 4

ISMF-554 Senior Career Seminar
Registration #0621-554
A variety of current topics will be researched and discussed as they pertain to the hospitality industry: e.g., employee stress, employee dishonesty, alcoholism, divorce, management's response to current DWI laws, legal drinking age, casino operations.
Class 2, Credit 1

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

Hotel and Resort Management

iSMH-400 Resort and Recreation Enterprises
Registration #0622-400
A course designed to provide students an understanding of the planning, development, managing, design, marketing and operations of tourist and recreational enterprises. Student will additionally select specific recreational areas to analyze the unique planning and development strategies associated with each type of enterprise. See courses ISMH-401 to 406 for specific enterprises.
Class 4, Credit 4

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

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

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

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

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

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

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

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

iSMH-412 Maintenance and Engineering Systems 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 it proper maintenance for quality resort development. Computer energy monitoring systems are evaluated.
Class 4, Credit 4

iSMH-420 Hotel and Travel Law
Registration #0622-420
Policies, laws, and liabilities are examined as they pertain to the traveling public. The focus will be on current management problems and responsibilities as they entail the legal aspects of the hospitality industry. (ISMH-425)
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, BBUA-301, junior standing)
Class 5, Credit 5
Travel Management

ISMT-201  Travel Lab I
Registration #0623-201
The basics of the domestic air transportation system are examined with the focus on the student achieving proficiency in reservations, itinerary construction, fare calculation, and ticketing procedures. The labs make use of the various air carriers 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
Registration #0623-210
An operational facility 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 the subsequent travel labs. The operation of a typical tour wholesaler's program is examined. Financial and documentation flows are emphasized. The role of the tour wholesaler is examined. Emphasis is given jointly in planning convention sales to various market segments, and in providing convention services at the meeting site. Students utilize local facilities to view first hand, convention operations. (ISMT-220 or permission of instructor)
Class 4, Credit 4

ISMT-230  Passenger Transportation
Registration #0623-230
A detailed analysis 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. (ISMT-450)
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  Corporate Travel Planning
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 expanses, 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. Initial steps used in passenger transportation are conducted. Application of the ASTA manual and several computer accounting systems are examined. (Permission of instructor)
Class 4, Credit 4

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

ISMT-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. (ISMT-210, ISMH-400, ISMH-410)
Credit 4

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

Department of Military and Aerospace Science Reserve Officers Training Corps (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. (The Physical Education course—Drill and Ceremonies, XPEF—may be taken in lieu of this course.)
Class 1, Lab 1, Credit 2

Second Year

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

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

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

Third Year

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

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

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

MMSM-501 Combined Arms Operations
Registration #0701-501
The course introduces the student to the mission, organization, and capabilities of the branches of the Army. Discussions on the tactics of the Airland Battle 2000, advanced studies in U. S. and Soviet capabilities and tactics, and practical application of these tactics through war gaming; leadership laboratory.
Class 2, Lab 1, Credit 3

MMSM-502 Military Administration and 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-310, 311 Air Force Management and Leadership I, II
Registration #0750-310, 311
An integrated management course emphasizes the concepts and skills required by the successful manager and leader. Includes individual motivational and behavioral processes, leadership, communication and group dynamics providing the foundation for the development of the junior officer’s professional skills (officership). Fundamentals of management emphasizes decision making, the use of analytic aids in planning, organizing and controlling in a changing environment as necessary professional concepts. Organizational and personal values (ethics), management of change, organizational power, politics and managerial strategy and tactics are discussed within the context of military organization. Actual Air Force case studies are used to enhance the learning and communication process.
Credit 5

MMSF-401,402,403,404, 501, 502 Leadership Lab III, IV, V
Registration #0750-401, 402, 403, 404, 501, 502
Advanced leadership experiences in officer activities gives students opportunity to apply principles learned in labs and courses. Orientation for active duty.
Credit 1
College of Business

Undergraduate Business Courses

Accounting

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

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

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

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

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

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

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

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

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

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

Management

BBUB-310 Career Seminar
Registration #0102-310
Career planning for the college student. Aptitudes, interests and course and major selections while in college. Transition from college to the world of work; job search; resumes, interviews, job offers. Getting on board. Importance of career paths to career achievement in organizations.
Credit 2

BBUB-315 Legal Environment of Business
Registration #0102-315
An introduction to legal principles and their relationships to business organizations. This includes a review of the laws that govern their operations. This course will explore the background and origin of the U. S. legal system, its law enforcement agencies, and the legal procedures used by the government to enforce its laws. Representative topics will include Torts, Bankruptcies, Regulatory law. A substantial portion of the course will deal with contract law.
Credit 4

BBUB-318 Business Law
Registration #0102-318
This course explores in greater depth the implications of the Uniform Commercial Code to business operations. Representative topics covered include: agency, commercial paper, corporations, and torts. Topical cases and examples are used to help the student grasp the business implications of the law and its nomenclature. (BBUB-315)
Credit 4

BBUB-402 CPA Business Law
Registration #0102-402
A preparatory course in law for those planning careers as CPA's. Topics include contracts, agency, Uniform Commercial Code, sales, letters of credit, bulk transfers, investment securities, estates, trusts, suretyship and guaranty, creditor's rights, corporation and partnership law. (CBCB-302 or BBUB-318)
Credit 4

BBUB-403 Legal Aspects of Physical Distribution
Registration #0102-403
Legal problems of transportation and traffic including evolution, construction, interpretation, and applications of the Interstate Commerce Commission Act. The Organization of the Interstate Commerce Commission and a review of its decisions are presented. (BBUB-315)
Credit 4
BBUB-427, 428 Health Institutions Registration #0102-427, 428 Management I, II
Introductory survey of administration in health care facilities including roles, functions, and responsibilities; organization structure; health care focusing on patient care, education and research; supervisory management for hospitals and related care facilities; emphasizing managerial planning, span of supervision, financing and coordination of public and private efforts. (Junior status)
Credit 4

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

BBUB-430 Organizational Behavior Registration #0102-430 Human behavior in organizations. Course emphasis: individual and interpersonal skills; group and intergroup processes; and management of organizational performance and change. Topics include: leadership, communication, motivation, perception and conflict management. (Junior status)
Credit 4

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

BBUB-440 Personnel and Human Resource Management Registration #0102-440 Personnel Selection
An overview of the personnel and human resource (personnel) function in both large and small organizations. The major topics studied include employee selection, training and development, compensation, safety and health, performance evaluation, compensation systems, the management of ineffective performance, and equal employment opportunity. Emphasis is placed on the legal aspects of managing human resources. (BBUB-430)
Credit 4

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

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

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

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

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

BBUB-534 Purchasing Management Registration #0102-534
An exploration of the purchasing and materials handling function of industrial firms. The objective will be to develop an understanding of the relationship of purchasing and materials management to other functions in the industrial environment. The key elements and techniques used for making sound purchasing and materials decisions will be explored. Methods may include: case analysis, independent research, presentations, and attendance at a local professional meeting. (Junior status)
Credit 4

BBUB-536 Organization Theory Registration #0102-536
An analysis of organizations as entities from the perspective of the total organization rather than from the small-group or individual point of view. Among the topics included are the various forms of organization structure, the design of organizations, matrix structures, centralization and decentralization, organizational effectiveness, and the interaction of organizations with their external environments. The student may be asked to prepare an analysis of the strengths and weaknesses of an existing organization. (BBUB-430)
Credit 3
BBUE-547 Small Business Administration
Registration #0102-547
Students enrolled in this course are provided the opportunity to serve as consultants to a specific small business firm within this geographic area. Under an arrangement with the Small Business Administration, and working under the supervision of a senior faculty member, teams of students provide management consulting about a variety of problems to small businesses. As a Practicum this course does not have regularly scheduled class hours. Instead students confer with their faculty member on an as-needed basis. (Senior status)
Credit 4

BBUB-551 Integrated Business Analysis
Registration #0102-551
An integrated viewpoint on business operations achieved through analysis and evaluation of actual cases. Also referred to as business strategy and policy, this course provides experience in combining theory and practice gained in other management courses. The content of the course if from the viewpoint of top management in its role as a developer and implementer of strategy and policy. As a capstone course, the workload is considerably above average. (Senior status, BBUB-430, BBUF-441, BBUM-463, BBUQ-401)
Credit 4

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

Economics

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

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

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

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

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

BBUE-481 Money and Banking
Registration #0103-481
Analysis of money, credit, and financial system. Banking operations and the money supply process. The business of commercial banking and the act of central banking. Central bank activities in relation to national and international monetary policies. (BBUA-301, GSSE-302)
Credit 4

BBUE-509 Advanced Money and Banking
Registration #0103-509
Development of monetary theory. Money and income; theories of interest, liquidity preference and loanable funds; theories of income and employment, Keynesian and neo-Keynesian approach. Money and prices; quantity theory, velocity and cash—balance approach; inflationary process; and money wage rates and prices. (BBUE-481)
Credit 4

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

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

Finance

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

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

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

BBUF-504  International Finance
Registration #0104-504
This course is concerned with the monetary aspects of international economic relations. It deals with the following topics: the balance of payments, foreign exchange rates and markets, gold standard, flexible exchange rates system, international capital movements, exchange restrictions, and international monetary experience. (BBUF-441)
Credit 4 (offered upon demand)

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

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

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

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

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

BBUF-554  Seminar in Finance
Registration #0104-554
Course will be designed by individual instructor. (Varies by seminar content)
Credit 2

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

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

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

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

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

BBUM-550  Marketing Management Problems
Registration #0105-550
A course designed to provide the student with an in-depth knowledge of middle and upper management level marketing problems. In addition, the student should become familiar with tools used by marketing managers at these levels. (BBUM-463, BBUM-551, BBUM-505) (Senior status)
Credit 4

BBUM-551  Marketing Research
Registration #0105-551
A study of research methods and procedures used in the marketing process. Topics include problem formulation, sources of market data, research methodology, data collection, data analysis, and the role of marketing research within the firm. (BBUM-463, BBUQ-530)
Credit 4

BBUM-553  Sales Management
Registration #0105-553
The course emphasizes the sales function of marketing management. It centers around the problems managers face in the direction, control, and supervision of sales activities. (BBUM-463)
Credit 1
### Decision Sciences

**BBUQ-330**  
**Data Analysis**  
Registration #0106-330  
An introduction to the use of data analysis and applied statistics in decision making. Topics include descriptive statistics, sampling and sampling distributions, statistical inference, and regression analysis. Extensive use of MINITAB. (SMAM-226, ICSA-200)  
Credit 4

**BBUQ-334**  
**Management Science**  
Registration #0106-334  
A survey of quantitative approaches to decision making. Topics include linear programming models (including goal, integer, assignment, and transportation models), decision analysis, and computer 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  
Study of the production of goods and services. Topics include quality assurance, resource planning, scheduling, materials and capacity control, inventory management, project management, and strategic considerations. (BBUQ-334)  
Credit 4

**BBUQ-406**  
**Quality & Reliability**  
Registration #0106-406  
Study of quality and reliability concepts and tools, objectives of quality control, and the use of statistical methods for quality control and improvement. The course focus is on the management of quality and reliability improvement. (BBUQ-401)  
Credit 4

**BBUQ-408**  
**Project and Master Planning**  
Registration #0106-408  
Study of the dependent demand environment and its interface with independent demand. Includes project planning, forecasting, production planning, and master scheduling. (BBUQ-401)  
Credit 4

**BBUQ-409**  
**Material & Capacity Planning**  
Registration #0106-409  
Study of material and capacity requirements planning and production activity control. Operational control of priorities and capacity. (BBUQ-401)  
Credit 4

**BBUQ-412**  
**Inventory Management & 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)  
Credit 4

**BBUQ-444**  
**Productivity Improvement**  
Registration #0106-444  
Examination of productivity and efficiency issues. Concept of productivity and links between quality and productivity. Effects of system design on productivity. (BBUQ-401)  
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 process technologies and production structures of a selected industry. (BBUQ-401) (Not offered in 1986-87)  
Credit 4

**BBUQ-450**  
**Applied Data Analysis**  
Registration #0106-450  
A second course in data analysis and statistics emphasizing inference with the use of Minitab. Topics to be covered include hypothesis testing, bivariate and multiple regression, and experimental design. (BBUQ-330)  
Credit 4
BBUQ-453 Business Forecasting
Registration #0106-453
An introduction to forecasting methods in business. Students will be required to analyze data sets using computer software packages. (BBUQ-350)
Credit 4

BBUQ-464 Systems Analysis and Design II
Registration #0106-464
A continuation of the system development process, with focus on applications of material learned in Systems Analysis I to actual or simulated systems. Students will also get experience using current systems analysis software. (BBUQ-363)
Credit 4

BBUQ-478 Systems Simulation
Registration #0106-478
The development of system models and their manipulation using simulation. Topics include: statistical review, sampling of random events, elementary queuing theory, data collection and analysis for simulation modeling and models validation. A special purpose simulation language, such as GPSS, will be used in team projects that simulate a production process. (BBUQ-330, ICSA-210) (Not offered in 1986-87)
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-301, BBUA-302, BBUB-430)
Credit 4

BBUQ-518 Manufacturing Information & New Developments
Registration #0106-518
Study of topics at the interface of production and engineering. In addition to standard engineering data needed for production planning and control, topics will be selected from areas of current interest involving new technology. (BBUQ-408, BBUQ-409) (not offered in 1986-87)
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)
Credit 4

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

Center for Retail Management

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

BRER-300 Retail Career Seminar
Registration #0109-300
A fundamental course to assist the student in establishing a sound basis for profiting by the co-op work experience and making career decisions. Major areas covered are: self-awareness and aptitude testing, resume and letter writing techniques, sources of job opportunities, and interviewing procedures.
Credit 1

BRER-301 Retail Accounting and Merchandise Control
Registration #0109-301
An overview of retail management and its role in the organization of retailing. A study of the acquisition of merchandise investment planning, analysis, and control of the dollar merchandise investment to meet profitability objectives. The course will be organized around the task of the retail buyer.
Credit 4

BRER-401 Retail Store Operations and Management
Registration #0109-401
A detailed examination of the operation of a retail enterprise including fixtures, information systems, operating costs, merchandise flows, and security. Particular attention will be paid to the managerial tasks of selecting, training and motivating store personnel. (BRER-201)
Credit 4

BRER-412 Advanced Merchandising
Registration #0109-412
An extension of basic merchandising with advanced topics and complex merchandising applications. The emphasis is on merchandising as a control and management tool. The course will enable the student to develop and evaluate the impact of alternative merchandising decisions on the performance of the retail operation. (BRER-301)
Credit 4

BRER-413 Buying Management and Market Analysis
Registration #0109-413
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. (BRER-201, BRER-301)
Credit 4

BRER-431 Interior Design
Registration #0109-431
An overview of interior design principles for the home furnishings retailer. Topics include basic principles of design, color theory, floor plans, electrical plans and furniture history.
Credit 2
BRER-452 Retail Sales Promotion
Registration #0109-452
The study of the overall sales promotion functions in a retail environment. Includes the planning, analysis, and evaluation of alternative promotional activities in terms of media selection, budgeting, copy writing, layout. The full promotional mix employed by typical retailers including newspapers, broadcast, display, specialty advertising, and in-store promotions is analyzed and evaluated. (BRER-201)
Credit 4

BRER-501 Senior Seminar in Retail Registration #0109-501
An opportunity to apply and integrate all previous retailing and business core courses to solve retail management problems in a number of different organizations and situations. The problems will reflect a mix of actual managerial problems and complex cases. Written and oral presentations of analysis and conclusions will be stressed. The course will reflect a top management perspective. (All retail core courses, one senior level co-op)
Credit 4

BRER-552 Current Trends in Retailing Registration #0109-552
A course that studies and identifies the forces that promote trends in the industry, and the environments in which they exist. Further analysis and attempts to translate the trends into lifestyle merchandising strategies. (BRER-201)
Credit 4

BRER-553 Textiles Registration #0109-553
Analysis of textile fibers, weaves, and fabrics, methods of printing, dyeing and finishing, evaluation of fabrics and materials commonly used in fashion and home furnishings. (BRER-301)
Credit 4

BRER-554 Seminar in Retail Registration #0109-554
Management
Selected topics associated with various aspects of retailing. Course content and structure will differ according to faculty assigned and quarter when offered. (Permission of instructor)
Credit 4

Graduate Business Courses
Accounting

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

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

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

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

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

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

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

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

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

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

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

BBUB-730 Business Law I
Registration #0102-730
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

BBUB-731 Business Law II
Registration #0102-731
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 are also discussed.
(BBUB-730)
Credit 4

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

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

BBUB-742 Technology, Business and Society
Registration #0102-742
A study of changing technologies and their impact on organizations and managers. Consideration of national policy and organizational practices concerning research and implementation of new technologies in areas such as artificial intelligence, robotics, and automation of the service sector. Special attention is paid to social problems deriving from the use of new technologies.
(BBUB-740)
Credit 4

BBUB-745 Business and Public Policy
Registration #0102-745
Legal issues in areas such as consumer protection, environmental law, occupational safety and health, employment discrimination, labor management relations, antitrust policies, and industrial policy. Ethical, economic, political, legal and cross-cultural perspectives are considered.
Credit 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, and contemporary issues. An analysis is made of how market forces, labor unions, employee associations and labor law influence employee compensation. Employee and labor relations are studied in both private and public sector firms.
(BBUB-740, BBUE-710)
Credit 4

BBUB-750 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, BBUQ-782)
Credit 4

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

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

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

BBUB-756 Conflict Management and Negotiating Skills for Managers
Registration #0102-756
A study of current theories and techniques related to constructive management of organizational conflicts and negotiations. Current theories on interpersonal, group and intergroup conflict management.
(BBUB-740)
Credit 4
BBUE-711 Microeconomics
Registration #0103-711
This is an intermediate microeconomic theory course with applications. The fundamentals of consumer behavior theory, market demand, and the theory of the firm are stressed with applications. Also, resource allocation and product distribution are fundamentals to management and to understanding the role of a firm in an economy.
Credit 4

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

BBUE-713 Advanced Microeconomic
Registration #0103-713 Theory
An advanced study of the fundamental economic principles underlying the nature of a business firm. Topics include: theories of demand and revenue; theory of costs and production analysis in both the short-run and the long-run; equilibrium of demand and supply and efficiency of competition; market structures and their characteristics; pricing and output under perfect competition, pure monopoly, imperfect competition, and oligopoly; resource allocation and product distribution. Business applications are given along with the exposition of the theory. (BBUE-711)
Credit 4

BBUE-714 Advanced Macroeconomic
Registration #0103-714 Theory
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 disequilibria; and wage-price policies. (BBUE-712)
Credit 4

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

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

Finance

BBUF-721 Financial Management I
Registration #0104-721
An examination of the basic financial theories relating to the valuation of assets and the analysis of risk. The course will concentrate on both the theory and practice of capital budgeting decision making. Topics include: capital budgeting techniques, portfolio risk and diversification, the capital asset pricing model, and practical problems in the selection of long-term assets. (BBUQ-782, BBUA-703, BBUE-711)
Credit 4

BBUF-722 Financial Management II
Registration #0104-722
An introduction to the concept of capital market efficiency. In this course, capital structure decisions and dividend policy will receive primary emphasis. 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.  
(Credit 4, BBUF-721, BBUF-722)  

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.  
(Credit 4, BBUF-721, BBUF-722)  

BBUF-725  
Securities & Investment  
Registration #0104-725
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.  
(Credit 4, BBUF-721, BBUF-722)  

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

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

Marketing  

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

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

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

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

BBUM-765  
Sales Management  
Registration #0105-765
An examination of selling and sales management as they pervade both the marketing process and the management communications process. Topics covered include building and managing an effective sales force and selling philosophy and techniques creating managerial "win-win" situations with both superiors and subordinates.  
(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.  
(Credit 4)  

BBUM-767  
Marketing Communications  
Registration #0105-767
A study of inter-relationships of three communications mix functions; public relations, advertising, and sales promotion. Topics covered will center on the use of these functions in the development of models for persuasive communications and their interrelationships with other elements of the marketing mix.  
(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, resource planning, scheduling, materials and capacity control, inventory management, project management, and strategic considerations. (BBUQ-780, BBUQ-782)  
(Credit 4)  

BBUQ-780  
Management Science  
Registration #0106-780
An introduction to quantitative approaches to decision making. Topics covered include linear programming, goal programming, integer programming, computer simulation, and 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  

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 & Sampling  
Registration #0106-788  
This course will cover the following topics in survey design and sampling: (1) questionnaire design, (2) types of sampling techniques, (3) determination of sample size, (4) methods for increasing the response rate, (5) use of appropriate statistics to analyze results. (BBUQ-782) (Not offered in 1986-87)  
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 1986-87)  
Credit 4  

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

BBUQ-793  Business Forecasting Methods  
Registration #0106-793  
An introduction to quantitative and qualitative forecasting methods and their use in business forecasting. The student will be taught how to recognize which forecasting procedures to use based upon an analysis of problem characteristics. Includes the use of interactive forecasting techniques. (BBUQ-782) (Not offered in 1986-87)  
Credit 4  

BBUQ-794  Multivariate Methods in Business  
Registration #0106-794  
An introduction to the use of multivariate techniques (other than multiple regression analysis) and their use in analyzing business data. The major objective will be to demonstrate the proper use of a variety of multivariate techniques using several large-scale data sets. The student will be required to use a standard statistical package. A major objective will be to teach the student how to interpret the output of a computer package in terms of the decision-making situation underlying the problem being investigated. (BBUQ-785) (Not offered in 1986-87)  
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
Registration #0201-201
Financial Accounting
Emphasis is placed on analyzing and recording business transactions, and understanding the results of these transactions. Preparations of basic financial statements required by any business are included.
Credit 4

CBCA-203
Registration #0201-203
Managerial Accounting
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
Registration #0201-207, 208
Accounting for Engineers
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.

CBCB-301 Business Law I
Registration #0202-301
Introductory course in business law including basic legal principles and procedures, criminal law, torts, contracts, sales, and real property.
Credit 4

CBCB-302 Business Law II
Registration #0202-302
Continuation of CBCB-301 includes law agency, partnerships, corporations, insurance and bankruptcy. Also presents survey of commercial paper, secured transactions, and bank deposits.
Credit 4

CBCC-321 Data Processing Principles
Registration #0203-321
Data Processing and Systems Analysis
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. (CBC-321 or equivalent)
Credit 4

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

Finance

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

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

General Management

CBCE-101, 102, 103 Human Relations
Registration #0205-101,102,103
Designed to acquaint both employees and supervisors with basic principles of human behavior: motivation, morale, leadership, communication, emotional understanding and organizational behavior. Managerial aspects common to all supervisory positions emphasized. An identical daytime class also available for shift workers.
Credit 2/Qtr.
CBCE-200, 201, 202  The Management Process Registration #0205-200, 201,202
A comprehensive 3-quarter course in effective supervision and management for supervisors and potential supervisors. Approximately 50 topics of current importance to supervisors are presented, as well as essential management principles, business communications, and practical supervision techniques. Specific supervisory problems of course participants are discussed in informal sessions and through projects conducted outside the classroom. Instruction is usually guided by a team of management specialists. Lecture-discussion, panel presentations, audiovisual presentation, simulation exercises and case studies. (Course extends over three consecutive quarters and should be taken in sequence.) A management certificate is awarded for successful completion of the course.
Credit 12

CBCE-203  Organization Management Registration #0205-203
A general introduction to the major management functions and the organization of business. Topics include business and personal planning, organizing, staffing, implementing, direct, control, time management, appraisal, compensation, organization theories, decision-making, problem solving, influences on managerial decision making, communication, management styles and motivation. Extensive use is made of learning groups in which students work together in small groups to discuss and apply concepts. Some out of class time is required to prepare for a learning group presentation.
Credit 4

CBCE-253  Management Science Registration #0205-353
Foundation course which introduces mathematical model-building and the use of management science in the decision-making process. Mathematical techniques will include: linear programming; the assignment model; the transportation model; inventory control models; critical-path models (PERT/CPM); and computer simulation. Homework assignments will include running "canned" computer application programs. (CBCH-201, 202, 351, 352 and CBCC-321)
Credit 4

Small Business Management

CBCE-221  New Venture Development Registration #0205-221
Course presents factors to be considered by those interested in the ownership and management of small business enterprises. Includes who should be an entrepreneur, guidelines for starting a new business, basic legal consideration, and approaches for obtaining capital and credit.
Credit 4

CBCE-222  Small Business Management and Finances Registration #0205-222
The functions required to successfully manage and finance a small business are presented. A variety of topics include staffing a small business, purchasing and supplier relations, consumer credit policies, and the financial and administrative controls necessary to minimize business risk.
Credit 4

CBCE-223  Small Business Marketing and Planning Registration #0205-223
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 3

Marketing

CBCG-210  Effective Selling Registration #0207-210
Investigates the importance of the sales function within the overall marketing organization and the necessary general characteristics of a successful salesperson. The various steps of the sales process and the practical applications of effective sales presentation are discussed.
Credit 4

CBCG-213  Advertising Principles Registration #0207-213
Social, economic and mass communication aspects of advertising with special emphasis on the role of advertising in the marketing mix. Special topics include agency/client relationship, radio and TV ratings, history of advertising, the creative process and psychographics. Guest lectures discuss corporate campaigns.
Credit 4

CBCG-214  Advertising Evaluation and Registration #0207-214
Techniques Course presents basic approaches used in planning, preparation and evaluation of advertising and sales promotional materials. Course incorporates a number of projects involving writing/layout/production for print, broadcast and specialized media advertising.
Credit 4

CBCG-361  Marketing Registration #0207-361
An introductory course in marketing designed to provide a better awareness of the function of marketing and how marketing relates to other areas of business. Topics include the marketing concept, developing a product strategy, behavioral aspects of consumer marketing, the marketing mix, segmentation and current marketing issues.
Credit 4

Mathematics and Statistics for Business

CBCH-201, 202*  Mathematics for Business Registration #0208-201, 202
An introduction to mathematical concepts and quantitative methods required in business management. Included are: sets and real number system, linear, non-linear and exponential functions, and system of equations and inequalities. Differential and integrated calculus is introduced plus some special topics in quantitative analysis such as linear programming and simulation.
Credit 4/Qtr.

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

CBCH-351, 352  Business Statistics Registration #0208-351, 352
An introduction to the basic tools of statistical analysis used in business including charts, frequency distribution, averages, dispersion, probability theory, sampling. Logical procedures for making business decisions under conditions of uncertainty are emphasized. Hypothesis testing including, one, two, and k-sample test means, proportions, regression and correlation analysis are also included. (CBCH-202)
Credit 4/Qtr.

Personnel Administration

CBCI-224  Interviewing Techniques Registration #0209-224
A practical approach to interviewing techniques with emphasis on role plays and case studies. Coverage includes employment, disciplinary, counseling, and performance appraisal interviews.
Credit 4
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
Registration #0210-306
Economy
The economic factors required for rational decisions are presented. Emphasis is placed on analytical tools used in manufacturing environment including evaluation of capital spending alternatives, depreciation methods, decision-making under risk conditions, and value analysis methods. (CBCJ-305)
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
Registration #0213-201
Salesperson's Course
Comprehensive study of real estate principles including: law of agency, human rights and fair housing, real estate instruments, financing, valuation and listings, contracts, license law and ethics, closings, land use regulations, and real estate math. Completion of this course satisfies the NVS 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 262-2608.
Credit 4

CBCM-202 Advanced Real Estate Principles
Registration #0213-202
Broker's Course
A study of topics related to real estate including: operation of a broker's office, construction, general business law, subdivision and development, leases, taxes, assessments, investment property, alienation, property management, condominiums and cooperatives, rent regulations, appraisals, and advertising. Completion of this course and Basic Real Estate Principles satisfies the educational requirement for a real estate broker's license. For licensure, participants must attend all classes and pass the final exam. Individuals interested in licensure only should call 262-2608.
Credit 4

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

CHAC-201 Introduction to Ceramics
Registration #0222-201
An extensive survey of on and off the wheel forming techniques using stoneware and porcelain clays. Students will be introduced to a variety of decorative methods as well as the basics of glazing and firing finished work. Class projects will emphasize the development of competent skills and good design.
Credit 2

CHAC-211 Intermediate Ceramic Wheel Throwing
Registration #0222-211
An exploration of Japanese wheel throwing techniques. Students will work with raku stoneware and porcelain, using methods and tools common to Japanese potters. Class projects will concentrate on production techniques with special emphasis being given to glazing and firing procedures. (CHAC-201 or equivalent)
Credit 2

CHAC-301 Advanced Ceramics
Registration #0222-301
An introduction to the world of the professional potter. Work will center on advanced forming and decorative techniques ranging from sectional throwing to photo-sensitive emulsion glazing. Special emphasis will be on independent projects which require the potter to master clay and glazing formulation, design, production and firing techniques. Kiln design and construction as well as marketing techniques for finished work will be discussed. (CHAC-211 or equivalent)
Credit 2

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

Credit Variable

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

Credit Variable

Design

CHAD-201, 202, 203 Basic Design Registration #0223-201, 202, 203
Study of basic elements of design: line, shape, texture, color, space and their incorporation in design principles as applied to two and three-dimensional design problems including the graphic arts.
Credit 2/Qtr.

CHAD-211, 212, 213 Display Design Registration #0223-211, 212, 213
First quarter examines the fundamentals of three-dimensional design. The second and third quarters apply these principles to develop mechanical, graphic and model making manipulative skills and problem solving approaches used by designers in space planning. (CHAD-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience)
Credit 2/Qtr.

CHAD-215, 216, 217 Rendering Techniques Registration #0223-215, 216, 217
This course will introduce students to the materials and techniques used by designers in rendering interiors, layouts, products, etc. Marker sketching, perspective, shadowing, media selection, and presentation techniques will be covered. Suggested for all design students. (CHAD-201, 202, 203; CHAD-201, 202, 203 or equivalent)
Credit 2/Qtr.

CHAD-220 Art for Reproduction Registration #0223-220
This course prepares students to enter the field of graphic design by providing orientation and the studio experience in the presentation of imagery for reproduction. Presentations will include board techniques, materials, tools, mechanical art procedures, printing and bindery processes, etc. (CHAD-201, 202, 203 or equivalent)
Credit 3

CHAD-224, 225 Interior Design Registration #0223-224, 225
Career orientation. Emphasis on practical aspects of the profession. Details of purchasing all furnishings used in a home. Client centered planning and design. (CHAD-201, 202, 203; CHAD-201, 202, 203 or equivalents)
Credit 2/Qtr.

CHAD-226 History of Interior Design Registration #0223-226
Historical survey of period decoration and furniture styles from antiquity to the present.
Credit 2

CHAD-227 Business Aspects of Registration #0223-227 Environmental Design
This course will introduce students to the various occupations available to the environmental and interior designer, and instruct them in the use of their artistic and technical skills to obtain employment and establish themselves in the design community. Dealing with clients, vendors, and contractors will also be covered. Assignments will be structured to meet the personal business needs of each student.
Credit 2

CHAD-231 Color Theory in Art Registration #0223-231
An opportunity to develop an awareness of and sensitivity to the world of color through slide lectures, class discussion and instructor's evaluation. Emphasis on the visual impact of color. (CHAD-201, 202, 203 or equivalent experience)
Credit 2

CHAD-235 Commercial Interior Design Registration #0223-235
Students will learn to develop a good commercial interior plan given clear specifications and boundaries. Presentation techniques, client relations and fee philosophy will also be discussed with frequent field trips and guest speakers. (CHAD-224, 225 or equivalent)
Credit 2

CHAD-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. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience)
Credit 2/Qtr.

CHAD-261, 262, 263 Lettering and Layout Registration #0223-261, 262, 263
Study of commercial layout procedures from rough layouts to comprehensive, type selection, copy fitting, pictorial indication and production procedures as related to contemporary practices.
Course emphasizes the design, structure, historical development and techniques of lettering. Proceeds from rough letter indication to development of finished lettering, and application in commercial advertising problems. Typography and photo lettering methods will be studied in relationship to their use in commercial design. (CHAF-201, 202, 203 and CHAD-201, 202, 203)
Credit 2/Qtr.

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

CHAD-311, 312, 313 Graphic Design Registration #0223-311, 312, 313
A contemporary approach to design for printed advertising with 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-281, 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-29S  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 and the Division of Business and the Arts. Credit may vary from one to five quarter-credits. For information on independent study contact the Division of Business and the Arts.
Credit Variable

Drawing

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

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

CHAF-207  Basic Figure Drawing
Registration #0224-207
Drawing from the costumed and nude model. The student makes a visual analysis of action, and gesture through quick sketches. Short poses gradually extend to longer studies so that the student can develop techniques, skills and the control of media. (CHAF-201,202, 203 or equivalent)
Credit 2

CHAF-307  Figure Drawing
Registration #0224-307
Drawing from the costumed and nude model for combined action and figure construction. Short poses gradually extended to longer studies for sustained attention to the problem. May be elected more than once for credit. (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
Registration #0224-301
Painting with opportunities for gifted and advanced students to explore media, seek new skills, develop a new style of expression. The instructor, an accomplished artist, works individually with the student. Models are available on a limited basis. Still-life and sketches will be used for inspiration. May be elected more than once for credit. (CHAF-211 or equivalent)
Credit 2

CHAF-227  Figure Painting
Registration #0224-227
Painting from costumed and nude models. The emphasis is placed on action, structure, gesture, composition, experimental attitudes and techniques. The student is provided with an opportunity to achieve clear understanding of various media in his or her individual search for expression. May be elected more than once for credit. (CHAF-317 or equivalent)
Credit 2

CHAF-337  Portrait Painting
Registration #0224-337
Particular attention is given to the development of anatomical understanding. Several media will be explained. Emphasis will be placed on understanding various aesthetic and craft traditions. Individual attention is supplemented by demonstrations and discussions with the instructor who is an active portrait artist in the community. May be elected more than once for credit. (CHAF-207 and CHAF-211 or equivalent)
Credit 2

CHAF-341  Watercolor Painting
Registration #0224-341
Basic study of watercolor media, methods, and techniques. Students receive individual, as well as group instruction with emphasis on composition, color, and personal expression. Media: watercolor, tempera, and casein. May be elected more than once for credit. (CHAF-201, 202, 203 or equivalents)
Credit 2
Sculpture

CHAF-247 Sculpture
Registration #0224-247
Study of basic theories of form and space utilizing sculptural processes and techniques. Solutions to problems, traditional and modern, are achieved through exercises using various materials such as clay, wood, plaster, plastic. Through discussion and practice, the student is introduced to the proper use of the sculptor's tool and methods. (CHAF-201, 202, 203; and CHAD-201, 202, 203 or equivalents)
Credit 2

CHAF-357 Sculpture Workshop
Registration #0224-357
An in-depth study of sculptural methods, techniques and materials (clay, wood, plaster, stone and welded metal). Students may concentrate in one material. May be elected more than once for credit. (CHAF-247)
Credit 2

Illustration

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

CHAF-362 Airbrush Techniques
Registration #0224-362
This course is designed to provide an opportunity for beginners to develop the basic skills and techniques of painting with an airbrush and allow experienced users to enhance their skills. Graphic artists, fine 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)
Credit 3

CHAF-263 Calligraphy
Registration #0224-263
Students will explore the history of the alphabet through slides, lectures, and projects. Italic handwriting with related variations and techniques will be taught.
Credit 2

CHAF-363 Calligraphy Workshop
Registration #0224-363
Further study in the methods and techniques of calligraphy. Students will be able to pursue study in a variety of styles and letter forms in a concentrated manner. May be elected more than once for credit. (CHAF-263 or equivalent)
Credit 2

Printmaking

CHAF-296 introduction to Printmaking
Registration #0224-296
An introduction to the methods, materials, tools, and techniques of printmaking. Areas covered may include woodcut, etching, engraving, stencil, collographs, and lithography. Students are required to pull an edition of print in one area. Additional fee required for supplies. (CHAF-201,202,203, and CHAD-201,202,203 or equivalents)
Credit 2

CHAF-397 Printmaking Workshop
Registration #0224-397
Further study of methods and techniques of etching, lithography and relief printing. Students may concentrate in one print medium. May be elected more than once for credit. Additional fee required for supplies. (CHAF-296)
Credit 2

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

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

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

CHAM-201 Introduction to Metalcrafts and Jewelry
Registration #0225-201
Emphasis will be placed on basic jewelry making techniques involving sawing, filing, soldering, hand and machine finishing techniques, simple stone setting and more. Design will be stressed throughout the course. May be elected more than once for credit.
Credit 2

CHAM-211 Intermediate Metalcrafts and Jewelry
Registration #0225-211
Work of a more complex nature will be introduced. Some techniques included will be surface treatment of metal, more sophisticated stone setting, basic hollowware, casting and more.
Independent and creative statements will be emphasized in keeping with the student's technical and aesthetic development. May be elected more than once for credit. (6 credits CHAM-201 or presentation of portfolio)
Credit 2

CHAM-301 Advanced Metalcrafts and Jewelry
Registration #0225-301
For advanced students in the arts or crafts interested in and capable of exploring a particular area. Content and method decided by conference between student and instructor and directed toward development of student's own creative ability. Advanced level academic credit is variable in proportion to class and outside assignments scheduled. May be elected more than once for credit. (Presentation of portfolio)
Credit 2

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

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

CHAT-201 Introduction to Weaving
Registration #0226-201
An introduction to the materials, processes and techniques of weaving. Emphasis on basic skills includes fiber analysis, yarn calculations, warping, loom dressing, 4 harness loom techniques, finishing, designing, drafting and color effects. May be elected more than once for credit.
Credit 2

CHAT-211 Intermediate Weaving
Registration #0226-211
A continuation in the development of weaving techniques and design skills through advanced study of color effects, drafting, 4 harness and tapestry techniques. The course will include samples of a particular technique plus home assignments and a final project to satisfy individual needs. May be elected more than once for credit. (6 credits CHAT-201 or presentation of portfolio)
Credit 2

CHAT-301 Advanced Weaving
Registration #0226-301
For advanced students in the arts or crafts interested in and capable of exploring a particular area. Content and method decided before registration by conference between student and instructor and directed toward development of student's own creative ability. Advanced level academic credit is variable in proportion to the class and outside assignments schedules. May be elected more than once for credit. (Presentation of portfolio)
Credit 2

CHAT-295 Independent Study: 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

International Studies

CHGI-211 Chinese Language and Culture: Contemporary Issues
Registration #0233-211
This course introduces 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-212 Chinese Language and Culture: Chinese Communism: Ideology and Practice
Registration #0233-212
This course will introduce basic Chinese culture as well as 100 daily conversational sentences. The emphasis in this quarter will be on Chinese culture characteristics, traditional philosophies and religions, beliefs, family structure, political life, economic system and trade practices, especially when these impact on contemporary practices.
Credit 4

CHGI-213 Chinese Language and Culture: China and the Chinese People
Registration #0233-213
This course will introduce basic Chinese culture as well as 100 daily conversational sentences. This quarter's emphasis is on 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

Woodworking

CHAW-201 Introduction to Woodworking
Registration #0227-201
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 an instructor, subject to the approval of the program director. Credit may vary from one to five quarter-credits. For information on independent study contact the Division of Business and the Arts.
Credit Variable

CHAW-298 Special Topics: Woodworking
Registration #0227-298
Special topics are experimental courses announced quarterly. Watch for titles in the course listing each quarter.
Credit Variable
This course examines deafness from a cultural perspective, focusing on the appropriate application of manual communication skills in communicating with deaf persons.

Credit 2

CHGD-212 Sign Language & Manual Registration #0234-212 Communications System II
This course is a continuation of conversational signing skill development. The course includes 300 additional basic signs, continued practice with the grammatical features of sign language, fingerspelling practice, and further sociolinguistic information regarding the appropriate use of manual communication skills between deaf and hearing persons. (CHGD-211 (minimum grade of B) or equivalent sign skill)
Credit 2

CHGD-213 Sign Language & Manual Registration #0234-213 Communications System III
The third in a series of basic conversational sign language courses. 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, lectures, 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

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

CHGH-210 Introduction to Art 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 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 aims to acquaint students with the methods of philosophical questioning and argumentation.
Credit 4

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

CHGH-323 Modern Europe Registration #0235-323
An examination of the development of Europe from the Seventeenth Century to the present time, with emphasis on theories and concepts of civilization, culture, government, and international relations. Also emphasized: the Industrial Revolution, 19th Century Democracies, World Wars I and II, governmental experiments of the Twentieth Century, and the Post (WWII) War Period.
Credit 4
Communications

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

CHGL-120 Basic Communication
Registration #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 clarty 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-298 Special Topics: Communications
Registration #0236-298
Special Topics are experimental courses announced quarterly. Watch for for in the course listing each quarter.
Credit Variable

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-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

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 survey course students learn how scientific methodology has been used to discover some of the causes and factors involved in sensation, perception, motivation, emotion, stress, learning, development, personality, psychological disorders, and social behavior. Students are encouraged to apply this information to their daily lives.
Credit 4

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

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

CHGS-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

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

Photography

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

CHGP-021  Introduction to Photography
Registration #0231-021
For the novice photographer who would like to learn how to produce aesthetically and technically acceptable photographs. Topics include cameras, lenses, films, developing, printing, enlarging, filters, flash photography and print finishing. The emphasis is on successful solution of practical photographic problems.
Credit none
CHGP-101 Photography Workshop
Registration #0231-101
A flexible course in the application of photography to create expression. Emphasis is on self-criticism and the development of the individual's ability to create meaningful and purposeful photographs. Class time devoted to developing and enlarging, as well as group and individual critique sessions. All shooting assignments are completed outside of class.
Credit 2

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

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

CHGP-201, 202, 203 Basic Professional Registration #0231-201,202,203 Photography
An introductory course to photographic principles and practice designed primarily for the inexperienced who aspire to enter photography as a profession, who would find such knowledge useful in a related field or who wish to improve personal knowledge. Both theory and practice are provided in a wide range of picture taking and darkroom techniques. Some background in photography is desirable but not absolutely necessary. This course is a prerequisite to all other courses in the professional photography program.
Credit 4/Qtr.

CHGP-211, 212, 213 Color Photography Registration #0231-211,212,213
Color theory and applied problems in color photography, processing and printing. Negative and reversal processing, color balance and correction, internegatives, duplication techniques, elements of masking and optimum reproduction methods. (CHGP-201, 202, 203 or equivalent)
Credit 4/Qtr.

CHGP-221, 222, 223 Illustrative Photography Registration #0231-221,222,223
The application of various specialized photographic techniques to creative image making. Special emphasis on single source studio lighting techniques to achieve desired visual effects. Novel and innovative camera methods and photographic design concepts are stressed. Particular emphasis on advertising photography applications and on the essence of the subject. Topics will include still life, food and consumable products, fashion assignments and some location photography. The 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. (CHGP-201, 202, 203 or equivalent)
Credit 3/Qtr.

CHGP-231, 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 principle size camera and film used, however, 16mm will be used toward the conclusion of the course. Included will be scripts and story boards, composition, continuity, cutting, editing, sound and presentation. The participants should have a personal Super 8mm camera available for use during the program.
Credit 3/Qtr.

CHGP-321, 322, 323 Commercial Retouching Registration #0231-321,322,323
Methods used in retouching commercial negatives and prints: bleaching, lettering, use of etching knife and abrasives. Last quarter includes color retouching and use of airbrush.
Credit 1/Qtr.

CHGP-331, 332, 333 Portrait Retouching Registration #0231-331,332,333
Retouching portrait negatives, using pencil, knife, abrasives and dyes. Last quarter includes Ektacolor negatives and major correction of anatomical features.
Credit 1/Qtr.

CHGP-351 Industrial Photography: Instrumentation Registration #0231-351
Fundamental applications of a variety of photographic techniques will be presented. Weekly projects will give students hands-on experience with methods such as high-speed flash, sequence, motion picture and streak photography; panoramic and peripheral photography; schlieren, shadow graph and thermal photography; infrared, ultraviolet and polarization photography; etc. Although mathematical concepts are utilized, emphasis is placed on understanding underlying photographic measurement principles rather than on absolute mathematical rigor. May be elected three times for credit. (CHGP-201, 202, 203 or equivalent)
Credit 3

CHGP-352 Industrial Photography: Audiovisual Techniques Registration #0231-352
You will have an opportunity to prepare audiovisual programs using current techniques and equipment. You will learn special photographic methods used for the production of programs that exhibit both technical excellence and visual impact. Also included are presentations on the use of the medium as a training, promotional and educational tool. May be elected three times for credit. (CHGP-201, 202, 203 or equivalent)
Credit 3

CHGP-353 Industrial Photography: Special Topics Registration #0231-353
Through guided individual study students have the opportunity for more comprehensive work in either the instrumentation or audiovisual areas. Also, specialized topics not covered in standard course may be scheduled with the consent of individual faculty members. For listing of special topics available any particular quarter consult department chairperson. May be elected more than once for credit. (CHGP-201, 202, 203 or equivalent)
Credit 3

CHGP-361, 362 Law Enforcement Photography Registration #0231-361, 362
Advanced photographic applications in various aspects of law enforcement photography. Fingerprints, infrared and ultraviolet photography. Forgery, surveillance and accident photography. (CHGP-201, 202, 203 or equivalent)
Credit 3/Qtr.
CHGP-366  Dye Transfer Printing
Registration #0231-366
The dye transfer color printing process is covered in its theory and
through practical laboratory assignments. Mordant, dye acidity and
contrast, color balance controls, dyeing, image transfer and reg-
istration. (CHGP-211, 212, 213 or equivalent)
Credit 3

CHGP-401, 402, 403  Fashion Photography
Registration #0231-401,402,403
A course designed to expand the photographer's vision and aware-
ness to the problems of fashion photography. Emphasis on sensi-
tivity to light, the beauty of the model, and most important, on
the development of the student's personal taste in expressing the in-
herent qualities of the garment. Students should bring to first class
examples of past work, whether it be fashion photography or not.
(CHGP-201, 202, 203 or equivalent)
Credit 3/Qtr.

CHGP-404, 405, 406  Architectural Photography
Registration #0231-404,405,406
Photographic interpretation and effective visual presentation of
buildings, both as structures for habitation as well as art forms in
themselves. Use and application of view camera included. Effective
use of small format equipment. Assignments to be completed out-
side of class time include exteriors, interiors, landscapes, details
and individual as well as group buildings. Students must make ar-
rangements for printing outside of class.
Credit 3/Qtr.

CHGP-411  Photography of the Natural
Registration #0231-411  World
Through lectures, field trips, class discussion, and critiques, the stu-
dent is offered an opportunity to develop an awareness and sen-
sitivity 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 ex-
pected 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 por-
tion of the assignments to be completed outside of class time.
Credit 2/Qtr.

CHGP-295, 298  Photographic Vision I and II
Registration #0231-295, 298
The Photographic Vision is a video-based two course sequence all
about photography, presented in a medium that enhances the power
of the photograph. The course covers the basic mechanical skills of
camera handling, the nomenclature of the tools and materials, the
history of photography, and the technical, artistic and commercial
dimensions of this craft. Photography is approached as an art form
and as unique means of human communication as well as a technical
skill. Students desiring darkroom experience should also register for
a Photography Workshop: CHGP-101 or 102. Completion of
CHGP-295 and 298, CHGP-101, 102 along with four credits of Pho-
tography electives, will satisfy the requirements of Basic Profes-
sional Photography. CHGP-201, 202 and 203.
Credit 3/Qtr.
CHGR-407, 408, 409  Optics
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
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 3 (CHGR-414, 415), Credit 4 (CHGR-416)

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

The main topics are: point-and-line-spread function of photo-optical systems; derivation of the line-spread function of photographic emulsions; one-dimension image formation and convolution integrals; Fourier analysis and Fourier transforms; auto-correlation and its applications; modulation transfer function of photo-optical systems (MTF). (CHGR-407, 408, 409 and CTAM-305, 328 or equivalent. Computer programming background also required)
Credit 3/Qtr.

CHGR-421  Mathematical Methods in Photographic Science
A survey of various mathematical techniques useful in devising or modeling photographic systems. Each method is applied to numerous problems and examples from photographic science after development of the pertinent mathematics. Topics selected from: linear spaces, transformations, dimensional analysis, information theory, system analysis, distributory theory, stochastic processes. (CTAM-251, 252, 253 or equivalents)
Credit 4

CHGR-520  Xerography and Electrophotographics
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

CHGR-527  Theory of the Photographic Process
An advanced course in photographic theory covering the underlying principles and mechanisms of the photographic process. Latent image formation, photographic sensitivity, emulsions, and development processes will be discussed in terms of the basic principles of solid state physics. The concepts of band structure, trapping levels, lattice defects, surface space charge layers, and interface electro-chemistry will be described and employed. (CHGR-217, 218, 219 and 224, 225, 226 or equivalent)
Credit 4

CHGR-528  Theory of the Color Process
The measurements of color photography, colorimetry, tone and color reproduction, spectrophotometry, and masking theory are treated in a common mathematical notation. (CHGR-217, 218, 219 and 224, 225, 226 and CHGR-414, 415, 416 or equivalent)
Credit 4

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

The course will emphasize the principles and methods of physics and chemistry which have been developed into non-silver photographic systems, rather than the extensive empiricism which has been characteristic of this field. The student will gain an understanding of the principle non-silver systems and today's research and product trends. Topics include: latent-image theory; exposure effects: mechanism of development and spectral sensitization; sensitometry; and image evaluation. (CHGR-527 or equivalent)
Credit 4

CHGR-557, 558, 559  Independent Research
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
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
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-121, 122, 123  Offset Layout and Stripping
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
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.
CHGT-141, 142, 143  Offset Presswork
Registration #0239-141,142,143
A study of the fundamentals of lithographic presswork. Emphasis is placed on principles, procedures, equipment and the relationship of materials.
Credit 2/Qtr.

CHGT-151, 152, 153  Color Stripping
Registration #0239-151,152,153
An advanced study of image assembly to include 4 color process stripping; pin register systems; proofing systems; contacting procedures. Students should have taken prerequisite course of offset layout and stripping. (CHGT-121,122,123 or equivalent experience)
Credit 2/Qtr.

CHGT-202, 203  Introduction to Printing
Registration #0239-202,203
Survey of the various phases of production employed in major printing processes, encompassing the major steps from design to finished printed product.
Credit 2/Qtr.

CHGT-207  Printing Design and Layout
Registration #0239-207
Fundamentals of layout and design as applied to commercial printing and advertising, including how to design with type, specify type and illustrations, and produce layouts from thumbnail sketches to a completed comprehensive design. Emphasis on technical and printing problems.
Credit 3

CHGT-211  Phototypesetting Procedures
Registration #0239-211
Study and analysis of phototypesetting procedures, emphasizing techniques of phototypesetting 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 handings for paste-up, separation mechanicals, and photographic copy; requirements of reproduction proofs; writing complete specifications for stripping and camera.
Credit 3

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

CHGT-237  Technology of Typesetting
Registration #0239-237
An introduction to machine typesetting including hot metal, tape and phototypesetting.
Credit 2

CHGT-241  Typography
Registration #0239-241
The typographical factors important to all phases of printing design from simple commercial work to books. Special attention is given to the logical selection of types, and their fitness for a variety of jobs.
Credit 2

CHGT-251, 252  Paper and Printing
Registration #0239-251, 252
A survey of kinds of paper and papermaking emphasizing the graphic arts processes and their relation to varieties of paper; instruction in utilizing paper characteristic for printing advantage. Attention given to the economics of paper buying, the problems of the pressroom, and the paper revolution.
Credit 2

CHGT-301, 302, 303  Reproduction Camerawork
Registration #0239-301, 302, 303
The photographic process as it relates to the printing of black and white and color reproductions. Emphasis on basic photography; line and half-tone photography; tone reproduction; and color separation photography. The theoretical approach is stressed; however, students will be involved in various photographic activities.
Credit 2

CHGT-314  Flexography
Registration #0239-314
A study of the theory and practice of flexographic printing, uses and development of flexography, plate and ink requirements, press principles and operation, experiments in printing on a wide variety of surfaces.
Credit 2

CHGT-317, 318  Computer Applications In
Registration #0239-317, 318
Printing
A basic course covering computers and how they are used in graphic arts applications. Characteristics and types of computers used are discussed as well as introduction to programming concepts.
Credit 2/Qtr.

CHGT-341  Printing Processes
Registration #0239-341
Introduction to Offset Press
A basic introduction to offset presses. Covering: lithographic theory, the applications of lithography, capabilities and limitations of process and basic press design and function. The material will be presented in the form of lectures and demonstrations. (CHGT-203)
Credit 2

CHGT-407  Ink and Color
Registration #0239-407
This course is designed to meet the needs of both management and production printing students. A two-hour lecture course on all facets of ink manufacturing and color matching; lab project participation by the student is strictly voluntary. Emphasis on technical and printing problems with offset (wet/dry) and letterpress inks.
Credit 2

CHGT-421  Imposition and Finishing
Registration #0239-421
Course is designed to understand imposition planning as related to and governed by folding and other finishing operations. Content deals with the concepts of pre-press planning, binding and finishing. Included are topics on preparing layouts, forms and folded paper material for binding. Laboratory experiments include operation of modern bindery equipment and the binding of a hardcover book.
Credit 2
Science and Technology
Mathematics

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

CTAM-101,102, 103
Registration #0240-101,102,103
A three-quarter sequence for students whose high-school mathematics background is insufficient to allow them to enroll in degree-level mathematics course. This is an accelerated intermediate high school algebra course with an introduction to trigonometry.
Credit 3/Qtr.

CTAM-201, 202
Registration #0240-201, 202
A two-quarter sequence to meet the needs of students enrolled in AAS degree programs. This is an introduction to college algebra and trigonometry covering basic algebraic concepts and operations, algebraic and transcendental (trigonometric, logarithmic, and exponential) functions. (CTAM-103 or equivalent)
Credit 4/Qtr.

CTAM-203
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
A continuation of CTAM-203, Calculus 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
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

Calculus for Technologists (See CTEM-420, 421.)

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

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/Qtr.

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-305
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
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
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
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
Registration #0240-341, 342
Designed to provide the student with a working understanding of the basic statistical strategies useful in the analysis and interpretation of data generated by problems of variation in the physical and applied sciences, and as such is a study of the concepts and techniques of mathematical probability and statistics and its role as the central core of all statistical strategies. (CTAM-305 or equivalent)
Credit 4/Qtr.

CTAM-407
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
CTBE-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 equivalent)  
Credit 4

CTBE-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  
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, polyphase circuits, complex frequency, pole-zero diagrams, resonance, magnetically coupled circuits, two-port theory. Fourier series analysis of circuits. LaPlace transform techniques of circuit solution. (CTCP-303 and CTAM-305 or concurrent with CTAM-306)  
Credit 4, Lec. 3, Lab 1

CTBE-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 (Communications)  
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 Damaugh 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  
Registration #0241-461, 462, 463  
Principles  
A course for non-electrical majors. Electric and magnetic circuits, electrical measurements, electronic devices, transformers, power systems, machines, and control circuits. (CTAM-305 and CTCP-303 or equivalent)  
Credit 4/Qtr.

CTBE-501 Electromagnetic Energy Conversion  
Registration #0241-501  
Conversion  
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 (Lec.); 354 (Lab) Strength of Materials I  
Registration #0242-344, 354  
Stress, strain, Hooke's Law, shear, torsion and bending in beams, moment diagrams and deflection of statically determinate beams. (CTBM-341 or equivalent)  
Credit 4, Lec. 3, Lab 1

CTBM-345 (Lec.); 355 (Lab) Strength of Materials II  
Registration #0242-345  
A continuation of the study of the way engineering materials behave. Slope and deflection of statically indeterminate beams, analysis of special beams, reinforced concrete beams, shear center, bending or torsion stresses combined with direct stresses, combined stresses for general types of loading. Mohr's circle, column analysis, energy of strain and impact, Castiglano'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)  
Credit 4, Lec. 3, Lab 1
CTBM-401 Thermodynamics I
Registration #0242-401
Fundamental properties of thermodynamic systems: perfect gases, state and energy equations, laws of thermodynamics, and properties of pure substances. (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 III
Registration #0242-553
Design of machine elements (shafts, springs, gears, bearings, clutches and brakes), vibration analysis, material selection, additional analytical and graphical solutions. (CTBM-552)
Credit 3

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-cogitate 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, chemical calculations, qualitative and quantitative analysis. (3 years of high school math or equivalent, including intermediate algebra)
Credit 3/2/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 2/2/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)
Credit 5, Lec. 3, Lab 2

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)
Credit 4, Lec. 3, Lab 1

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)
Credit 5, Lec. 3, Lab./Lab 2
CTCC-331 (Lec.) CTCC-317 (Lab) Analytical Chemistry—Separations
Inorganic and organic separations; Raoul and Henry Laws; phase rules; distillation; extraction; absorption and surface effects; electrophoresis; chromatography including gas, liquid, column, paper, thin layer, and ion exchange. (CTCC-231, CTCC-218 or equivalents; CTAM-210 or equivalent)
Credit 5, Lec. 3, Lec./Lab 2

CTCC-313 (Lec.) Introduction to Physical Chemistry
Properties of gases, kinetic-molecular theory; Boltzmann Distribution functions; non-ideal behavior; first law of thermodynamics; heat capacities; Euler’s theorem and homogeneous functions; thermochromy, 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)
Credit 5, Lec. 3, Lec./Lab 2

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

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 2

CTCC-511, 512 Instrumental Analysis
Registration #0244-511, 512
Instrumental techniques of analysis including spectrophotometry, conductance, potentiometry, and refractive index measurement, gas chromatography, mass spectroscopy, NMR, and electron spin resonance. Emphasis is placed on the uses of instrumental methods for structure determination, measurement of reaction, kinetics and mechanisms. (CTCC-313, CTAM-253 or equivalents)
Credit 4

CTCC-521, 522 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-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)
Credit 3, Lec. 1, Lec./Lab 2

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-201, 202, 203 (Lec.)  College Physics
CTCP-206, 207, 208 (Lab)
Registration #0245-201, 202, 203, 206, 207, 208
A basic course in physics using algebra and trigonometry; topics covered: statics, dynamics, harmonic motion, sound, heat, fluid-flow, wave motion, optics, electricity and magnetism. Emphasis on understanding of basic principles and problem solving. (CTAM-202. Students who have not taken CTAM-202 must take the math qualifying exam.)
Credit 4, Lec. 3, Lab 1

CTCP-301, 302, 303 (Lec.)  Physics
CTCP-306, 307, 308 (Lab)
Registration #0245-301, 302, 303, 306, 307, 308
Physics for engineering and science students. The following topics are covered: statics, dynamics, harmonic motion, wave motion, sound, thermodynamics, fluid-flow, optics, electricity and magnetism. Calculus is used freely. (CTAM-253 or equivalent)
Credit 4, Lec. 3, Lab 1

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

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

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

Contemporary Science

CTCS-221  Contemporary Science-Biology
Registration #0246-221
An introduction to the fundamental principles of biology for non-science majors and the application of these concepts to areas of interest and concern 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-Chemistry
Registration #0246-222
An introduction to the fundamental principles of chemistry for non-science majors and the application of those concepts to areas of interest and concern in our contemporary technological society. Topics to be discussed include the atomic theory, chemical periodicity, nuclear reactions and energy, physical states of matter, chemical compounds, chemical reactions, organic chemistry, biological chemistry and macromolecular chemistry. The course is presented in lecture-demonstration format. (CTAM-201 or CTAM-205 or CBCH-201 or equivalent)
Credit 4

CTCS-223  Contemporary Science-Physics
Registration #0246-223
An introduction to the fundamental principles of physics for non-science majors, and the application of these concepts to areas of interest and concern in our contemporary technological society. The conceptual basis for the phenomena of heat, light, sound, mechanics, electricity and magnetism are discussed and are related to such topics as astronomy, space exploration, lasers and environmental concerns. The course is presented in a lecture-demonstration format. (CTAM-201 or CTAM-205 or CBCH-201 or equivalent)
Credit 4

CTCS-224  Contemporary Science-Oceanus
Registration #0246-224
An introduction to the fundamental principles of oceanography for nonscience majors, and the application of those concepts to areas of interest and concern in our contemporary technological society. The marine environment will be investigated in terms of basic scientific concepts, and topics to be discussed will include plate tectonics and earthquake prediction, the impact of ocean pollutants, climate fluctuations, cetacean intelligence and resources from the sea.
Credit 4

Computer Programming

CTDP-200  Introduction to Microcomputers
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  Computer Techniques
Registration #0249-201
Programming in BASIC on RIT’s VAX computers. After an introduction to time-sharing and editing procedures the course deals with the computer as a tool for solving applied problems. Not for computer systems majors. (CTAM-202)
Credit 2

CTDP-208  Introduction to Programming
Registration #0249-208
Fundamentals of programming using the structured programming language PASCAL. Topics include basic problem-solving methods, algorithm development, elementary data types, expression evaluation, use of basic control structures and subprograms. Programming projects will be required. (CTDS-202 or permission of a computer systems advisor)
Credit 4
CTDP-210  Program Design and Registration #0249-210  Validation
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  FORTRAN Programming Registration #0249-215
A study of FORTRAN programming techniques and applications. Topics include FORTRAN constants, variables, expressions, functions, logical operations, storage allocations, statements. I/O manipulation and subprograms. Debugging and diagnostic methods. Programming projects will be required. (CTDS-202 or permission of advisor)
Credit 4

CTDP-301  COBOL Programming Registration #0249-301
COBOL programming techniques and applications. Topics include introduction to the concepts of modular and structured programming, COBOL coding methods, data processing, sequential file manipulation, table look-up SORT and SEARCH verbs. COBOL debugging and editing facilities. Documentation standards. Programming projects will be required. Not for computer systems majors. (CTDS-202 or similar course)
Credit 4

CTDP-304  Advanced COBOL Programming Registration #0249-304
Advanced COBOL programming techniques and applications with topics including magnetic tape and disk file processing techniques, subroutines, over-lay and segmentation, report writer, core dump, analysis and coding optimization techniques. Programming projects will be required. Not for computer systems majors. (CTDP-301)
Credits 4

CTDP-305  Assembly Language Programming Registration #0249-305
A study of assembly language programming methods with topics including magnetic tape and disk file processing techniques, 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-306  Advanced Assembly Techniques Registration #0249-306
A study of advanced techniques in assembly language programming. Topics include macro definition and invocation, conditional assembly, system macros and supervisor calls, program linkage, reentrant and recursive programs and I/O programming at the interrupt level. Programming projects will be required. (CTDS-315, CTDS-325)
Credit 4

CTDP-307  Business Applications Programming Registration #0249-307
The mastery of the techniques and concepts of programming within a business programming environment. Emphasis on algorithmic solutions to business problems, including report generation, sorting and table processing and generation, complex I/O processing. Students will also program against a data base in a host-embedded programming language. Programming projects are required. (CTDS-325)
Credit 4

CTDP-318  APL Programming Registration #0249-318
Techniques and Applications
Topics include APL programming and style, function definition and recursive programming, APL report formatting features, file I/O subsystem, graphic I/O and business systems applications. Programming projects will be required. (A high level programming language)
Credit 4

CTDP-320  Computer Programming for Registration #0249-320  Engineers
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  PL/I Programming Registration #0249-330
Topics include elementary data types and control structures, data structuring capabilities (arrays and records), run-time error handling, standard built-in functions, text processing, user written functions and subroutines. Emphasis on developing well-structured and modular programs. Programming projects are required. (A high level programming language)
Credit 4

CTDP-488  Programming Systems Workshop Registration #0249-488
A workshop for the mastery of the techniques and concepts of programming systems, design and implementation. Students will work with data modeling, both with and without a data-base management system product. 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 & Registration #0250-200  Programming
Basic concepts and overview of computer science. The topics include historical development, algorithms, flowcharting and programming in BASIC. Exposure to assembler language, hardware concepts, software concepts, binary and hex numbers and logic. Application of the computer to various disciplines. Not for computer science majors. (High School intermediate algebra)
Credit 4

CTDS-202  Introduction to Computer Registration #0250-202  Science
An introduction to the computer: information representation, instruction execution and the software interface to the user. Topics include integer and floating point arithmetic, logical operations, introduction to machine and assembly language, input/output operations, operating systems. (Three years high school mathematics, permission of advisor)
Credit 4

CTDS-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 HIPO charts, NS charts, etc. and to the structured design methods of Vourdon. (CTDS-325)
Credit 4

CTDS-340 Finite State Machines and Automata
Registration #0250-340
Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis and synthesis, sequential iterative systems and space-time transformations. (CTDS-315)
Credit 4

CTDS-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, multiplexers, 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

CTDS-520 Computer Architecture
Registration #0250-520
A study of computer architecture and design. Topics include review of basic theories, hardware technology, parallel and distributive logic, synchronous and asynchronous machines and analysis of commercial machines. Alternatives to classical machine structure. (CTDS-315)
Credit 4

CTDS-525 Assemblers, Interpreters, and Compilers
Registration #0250-525
A survey of three basic programming language processors; assemblers, interpreters, and compilers. The topics include design and construction of language processors, formal syntactic definition methods, parsing techniques and code generation techniques. (CTDS-320)
Credit 4

CTDS-530 Discrete Simulation
Registration #0250-530
Computer simulation techniques. Abstract properties of simulation modeling, analysis of a simulation run and statistics. The simulation language GPSS will be taught. Programming projects are required. (CBCH-351 or equivalent and programming experience)
Credit 4

CTDS-545 Processor Design Concepts
Registration #0250-545
A survey of bit-slice processor design and implementation techniques. Topics include microprogramming and emulation, comparison of microcode and hardwired logic, I/O processors and subsystems. (CTDS-315)
Credit 4

CTDS-550 Review of Computer Science
Registration #0250-550
Review of significant advances in computer science which have occurred in the last few years. Designed to give graduating students an overview of recent technological and theoretical advances. Reports on outside readings. (Senior year standing)
Credit 4

CTDS-565 Computer Systems Selection
Registration #0250-565
A study of computer systems design, evaluation and selection methodology. The design aspect deals with the problem of specifying physical systems on the basis of logical design specifications and performance analysis of existing and proposed computer systems. The selection aspect covers vendor proposal requests, evaluation and validation of proposals and procurement methods. (CTDS-315 and CTDS-320)
Credit 4

Lower Division Electrical Technology

CTEE-101, 102, 103 Basic Mathematics for Electronics
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
Lower Division Mechanical Technology

CTEE-361, 362, 363 (Lec.) Applied Electronics
CTEE-366, 367, 368 (Lab) Registration #0253-361, 362, 363, 366, 367, 368
Applications of electronic components and circuits which have become electronic building blocks; applications of oscillators, tuned circuits, amplifiers, power amplifiers, multi-vibrators, switching, waveshaping and other circuits; applications of integrated circuits including special purpose amplifier, operational amplifier, timers, regulators, zero voltage switches and other integrated circuits both linear and digital. The laboratory includes testing, troubleshooting and analysis of electronic circuits. (CTIL-203)
Credit 3

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

CTEE-322 Analog Systems Registration #0253-322
Introduction to all types of transducers; study of operational amplifiers and their uses in 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

Lower Division Manufacturing Technology

CTEF-201, 202, 203 Manufacturing Analysis Registration #0255-201, 202, 203
Introduction to current manufacturing processes, casting, forming, stamping, welding and chipless machining, to produce parts on a production basis. Selected pieces will be analyzed with respect to production sequencing and cost, including costs of material handling, manufacture, inspection, and assembly. Projects involving solution to production problems will be assigned. (CTIS-203 or equivalent)
Credit 3
CTEF-210  Industrial Plastics
Registration #0255-210
An introductory course in industrial plastics with emphasis on the practical aspects such as properties, identification, processing methods, design and suitability for given applications. Classwork will be supplemented with demonstrations, discussions of samples, and several field trips.
Credit 4

CTEF-211.212  Metallurgy
Registration #0255-211, 212
Review of chemical and metallurgical terms; manufacturing process; theory of constitutional diagrams; space-lattices, theory of hardening, heat treatment and general properties of ferrous and non-ferrous metals and alloys; effects of composition and mechanical working upon such properties as grain size, hardenability, machinability and weldability of metals. Some knowledge of chemistry and physics is desirable.
Credit 3

CTEF-314, 315  Materials Technology I, II
Registration #0255-314, 315
A two quarter course involving a study of materials, their structure and characteristics. Topics covered include atomic and crystal structure, phases and phase diagrams, physical properties, corrosion and oxidation, diffusion in metals, recovery, recrystallization and grain growth, age hardening and heat treatment of metals. The effect of processes such as welding on the metallurgy of the part will be examined. Organic and ceramic materials will also be studied.
Credit 3/3Qtr.

CTEF-328  Report Writing
Registration #0255-328
Principles of organizing data and information into clear and concise engineering reports; technique of library research; oral reports; minutes of meetings; business letters; short and formal reports.
Credit 2

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

CTEF-370  Tool Design
Registration #0255-370
The design of special tooling, jigs, and fixtures for economic production. The principles of positioning, locating and clamping are studied along with the analysis of cutting forces. Also covered are tools for inspection and gauging. (CTEF-202)
Credit 4

CTEF-380  Time Study
Registration #0255-380
The principles and applications of the basic techniques for improvement of the man-job-time relationship, job standards and recording, and work-space design for the efficient use of manpower. (CTEF-202)
Credit 3

CTEF-391  Production Control
Registration #0255-391
This course prepares the student to deal with production planning algorithms and inventory control models. Subjects such as forecasting, inventory control techniques, production planning and scheduling and material requirements planning will be presented. (CTEF-202)
Credit 4, Lec. 3, Lab 2
This course is a continuation of CTID-101 dealing with further study derived from the ANSI Y14.5 government standards. Dimensioning and tolerancing as used on all types of drawings as of machine detail and assembly drawings, however, the major emphasis of the course will be the application of modern geometric dimensioning and tolerancing as used on all types of drawings as derived from the ANSI Y14.5 government standards.

Credit 1

CTID-202, 203 Engineering Drawing Registration #0262-202, 203
This course is a continuation of CTID-201 dealing with further study of machine detail and assembly drawings, however, the major emphasis of the course will be the application of modern geometric dimensioning and tolerancing as used on all types of drawings as derived from the ANSI Y14.5 government standards.

Credit 1

CTID-204, 205, 206 Construction Contracting Registration #0262-204, 205, 206
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

CTID-211, 212, 213 Mechanical Blueprint Reading II Registration #0262-211, 212, 213
This course is a continuation of CTID-201 which covers in more detail elements and details of building construction. Study of fundamental design concepts, building codes, foundations, wood, steel and concrete construction, specifications and construction management. (CTIB-212 or equivalent)

Credit 2

CTID-214, 215, 216 Tool Design Registration #0262-214, 215, 216
Drafting and design of shop tools. Student designs drawing 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
CTID-213 Engineering Graphics
Registration #0262-213
The subject of graphical kinematics is introduced by first covering the principles of basic motion; namely velocity and acceleration. These concepts are then applied to the design and analysis of mechanisms such as linkages, cams, gears, pulleys, belts, etc. The graphical approach is emphasized where applicable throughout the course. (CTID-212 or equivalent)
Credit 2

Electromechanical
(Industrial Technology)

CTIL-201 (Lec.) CTIL-206 (Lab) Elements of Electricity and Registration #0264-201, 206 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)
Credit 4, Lec. 3, Lab 1

CTIL-202 (Lec.) CTIL-207 (Lab) Elements of Electricity and Registration #0264-202, 207 Electronics
This course and its mandatory associated laboratory provide an introduction to Basic Electricity and its application to alternating current circuitry. Included are principles relating to current, voltage, inductance, capacitance, inductive reactance, capacitive reactance, impedance, phase angle, power factor, sinusoids, power, etc. Applicable principles necessary to solve problems related to various circuit configurations are presented. (CTAM-103 or equivalent)
Credit 4, Lec. 3, Lab 1

CTIL-203 (Lec.) CTIL-208 (Lab) Elements of Electricity and Registration #0264-203, 208 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)
Credit 4, Lec. 1, Lab 3

CTIL-221, 222 Mechanical Components and Registration #0264-221, 222 Mechanisms
Introduction to mechanical elements of electromechanical systems; Study of individual components and mechanisms in terms of functions and operating characteristics. Topics covered are: Torque, inertia, work, power, efficiency, gears, (spur, bevel, helical, worm), gear trains, differentials and integrators, belt drives, chain drives, pins, couplings, cams, linkages, switches. Independent approach to practical problem solving is stressed. (CTCP-201, 202 and CTID-201, 202, 203 or equivalents)
Credit 4

Basic concepts and characteristics of D.C., synchronous and induction machines including transformer action, turns ratio, losses, power factor, waveforms and impedance matching; single phase and three phase operation; study of the machine in an electromechanical system including types of control (torque, speed, voltage, current) and associated devices (clutches, brakes, coupling, bearings, mounting); electrical and mechanical power transmission; specialized machines such as metadynes, amplitdynes, selsyns, synchro control transformers and their systems applications. Lab sessions develop a qualitative feel for characteristics and applications of power systems, machines and their control. (CTIL-201, 202, 203 and CTAM-201, 202 or equivalents)
Credit 4, Lec. 3, Lab 1

CTIL-303 (Lec.) CTIL-308 (Lab) Pneumatic and Hydraulic Registration #0264-303, 308 Systems
Introduction to pneumatic and hydraulic components; pneumatic and hydraulic power systems; compressors, pumps, efficiency and applications; integrated electromechanical power systems; Lab sessions develop a qualitative feel for characteristics and applications of power systems, machines and their control. (CTCP-201, 202)
Credit 4, Lec. 3, Lab 1

CTIL-351, 352, 353 Electromechanical Devices Registration #0264-351,352,353 and Systems Concepts and principles of electromechanical system components and systems; temperature, displacement, force, electropneumatic, electrohydraulic transducers, encoders, amplifiers and control elements and their applications to systems. Thermistor, thermocouple, pneumatic temperature 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 4/Qtr.

Machine Shop

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

CTIS-101, 102, 103 Precision Measurement Registration #0266-101,102,103
The care and use of all common inspection and gauging equipment. Techniques of inspecting various types of parts, quality control procedures and discussion and application on the use of tolerancing; blueprints and true positioning. Sine bar, contour projector, casting layout, surface finishes, thread gauging, common types of production gauging and the use of optical flats are used in the second and third quarters.
Credit 1/Qtr.

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.

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 4, Lab 15 Class 4, Credit 4
CTIS-131 to CTIS-139
Registration #0266-131, 132, 133 — Hand Screw Mach Op
Registration #0266-134,135,136 — Automatic Screw Mach Op
Registration #0266-137,138,139 — Automatic Screw Mach Op
Operation and set-up of both hand and automatic single and multiple
spindle automatic screw machines to produce parts using standard
and special tools. Constructional details and general maintenance.
Credit 2, Lab 5 hours per week

CTIS-151, 152, 153 Shop Mathematics
Registration #0266-151,152,153
Precision measuring instruments, calculations of feeds and speeds,
tapers, screw threads and gear ratios; indexing calculations, gear
percentages, figuring stresses, graphs and elementary algebra
designed to increase analytical ability to solve complicated shop
problems.
Credit 2/Qtr.

CTIS-154, 155, 156 Shop Trigonometry
Registration #0266-154,155,156
Elements of geometry designed to increase analytical ability in solv-
ing complicated shop problems; solving trigonometric equations and
their unknown dimensions or angles from data on practical working
drawings. (CTIS-153 or equivalent)
Credit 2/Qtr.

CTIS-157,158 Shop Mathematics
Registration #0266-157, 158
Identical to Shop Mathematics CTIS-151, 152, 153 except for dif-
fences in scheduling and credits per quarter. Offered Winter and
Spring quarter days and evenings.
Credit 3/Qtr.

CTIS-161, 162 Heat Treatment
Registration #0266-161, 162
Practical heat treatment of metals; Carburizing, cyaniding, nitriding,
annealing, normalizing and hardening of steels. Relation of tool
steels to particular applications and their resulting properties, in-
cluding hardness, toughness, wear resistance, machinability and
movement in hardening; treatment of nonferrous alloys including
aluminum, brass, bronze, zinc beryllium, copper, silver, monel, stain-
less less and magnetic steel. Several types of heat treating furnaces and
atmospheres are available for laboratory exercises and demonstra-
tions of these metals and alloys to prove out the theories of class
lectures and discussions.
Credit 2/Qtr.

CTIS-201, 202, 203 (Lec.) Machine Shop
CTIS-206, 207, 208 (Lab)
Registration #0266-201, 202, 203, 206, 207, 208
Machine shop theory and techniques involving basic machine tools,
machining theories and practices. Explanations, demonstrations and
working out of basic problems in measuring, layout and cutting tools,
with lathe, milling, drilling and grinding work. Must register for lecture
and lab.
Credit 2

CTIS-204 (Lec.) CTIS-209 (Lab) Machine Shop
Registration #0266-204, 209
A combination of CTIS-201, 202, 203 and 206, 207, 208. Offered
summer only.
Credit 6

CTIS-281 Numerical Control (Mili)
Registration #0266-281
This course is designed to offer the student the fundamentals and
techniques in Numerical Control Part Programming Explanations
and demonstration of EIA and ASCII punched tape coding. Point to Point
and Contour Programming, linear and circular interpolation, looping
and macros. Special canned cycles 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 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 or approval of
machine shop counselor)
Credit 3

CTIS-283 Computer Programming for
Registration #0266-283 Numerical Control
Course emphasizing programming for numerically controlled ma-
achine 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 orig-
inal 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-282 or program experience)
Credit 3

Machine Tool

CAIM-112 Principles of Blueprint
Registration #0270-112 Reading II
This course is a continuation of unit I, dealing with further study of
machine detail and assembly drawings. However, the major em-
phasis 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.
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 skilful use of precision measuring and
gauging equipment. Introduction to metal cutting machines such as
lathes, horizontal and vertical mills, bandsaws, and drill presses. Also
covered are the basic skills in layout and bench work.
Credit 4, Lab 15

CAIM-121 Basic Machine Shop I (DT)
Registration #0270-121
This course is intended to introduce the student with hands on ex-
perience performing such tasks as: tool grinding, thread cutting,
drilling layout and bench work. The techniques of precision mea-
surement is covered to a great extent. Safety and neatness of
projects is covered throughout the quarter.
Credit 2, Lab 5 hours per week

CAIM-122 Basic Machine Shop II (DT)
Registration #0270-122
In this course the student will be introduced to more advanced type
of machining, such as, horizontal mills, precision grinding, layout,
drilling and tapping, and additional bench work projects. Safety and
neatness of work is stressed throughout the quarter. (0270-121 or
equivalent)
Credit 2, Lab 5 hours per week
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAIM-123</td>
<td>Machine Shop (AET)</td>
<td>#0270-123</td>
<td>This course is designed to introduce the student to hands-on experience. Explanation and techniques are demonstrated to the student in precision measurement, tool grinding, engine lathe, drill press, layout and sawing. Safety and neatness of work is stressed throughout the quarter. Credit 2, Lab 5 hours per week</td>
</tr>
<tr>
<td>CAIM-210</td>
<td>Materials and Methods</td>
<td>#0270-210</td>
<td>Machine shop theory and techniques involving the basic machine tools, the practical application of cutting material, tool geometry, measurement and inspection, turning and milling, threads and threading, drilling and grinding work. Introduction of plastic and powder metal, its properties and processing method. Class 3, Credit 3</td>
</tr>
<tr>
<td>CAIM-214</td>
<td>Numerical Control Programming and Machining</td>
<td>#0270-214</td>
<td>An introduction to the field of numerical control and N/C programming. Techniques for both manual and computer assist 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</td>
</tr>
<tr>
<td>CAIM-218</td>
<td>Tool and Gage Making</td>
<td>#0270-218</td>
<td>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 tool fixtures. The actual development of a workable jig and fixture design. (CAIM-110, CAIM-120) Class 3, Credit 3</td>
</tr>
<tr>
<td>CAIM-220</td>
<td>Diemaking</td>
<td>#0270-220</td>
<td>Introduction to the manufacturing process of diemaking and related to the production process of stamping sheet and plate materials primarily but not necessarily metals. Empirical (experience) and technical data is used to develop the details, techniques, and theories of cutting and forming processes of pressworking (stamping) dies. Guidelines for the manufacture of die components, selection of proper die sets, and economical materials use is maximized. (CAIM-110, CAIM-231.) Class 3, Credit 3</td>
</tr>
<tr>
<td>CAIM-222</td>
<td>Metallurgy and Heat Treating</td>
<td>#0270-222</td>
<td>An introductory course in physical and mechanical characteristics of metals and alloys, crystal structure. Heat treating of steels and the use of the iron-carbide equilibrium diagram, transpiration diagram, hardenability of tool steels and alloy steels. Class 3, Lab 3, Credit 3</td>
</tr>
<tr>
<td>CAIM-231</td>
<td>Industrial Machine Shop II</td>
<td>#0270-231</td>
<td>Extensive use and refinement of machine tools, such as engine lathes, turret lathes, vertical mills, and surface grinders. Explanation and demonstrations on more difficult problems, assemblies and temporary tooling. Emphasis on neatness, time, quality and accuracy are stressed. (CAIM-120, CAIM-106 or equivalent) Credit 4, Lab 15</td>
</tr>
<tr>
<td>CAIM-232</td>
<td>Intermediate Machine Tool Technology</td>
<td>#0270-232</td>
<td>Complex part and assembly machining involving more advanced techniques on turning and 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) and numerical control (N/C) are introduced and applied. (CAIM-231) Credit 4, Lab 15</td>
</tr>
<tr>
<td>CAIM-233</td>
<td>Advanced Machine Tool Technology</td>
<td>#0270-233</td>
<td>This course teaches the manufacturing and assembly processes involved in building a die, jig or fixture needed to produce a piece 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 to insure print specifications and tolerances are correct. Credit 4, Lab 15</td>
</tr>
<tr>
<td>CAID-110</td>
<td>Principles of Blueprint Reading</td>
<td>#0271-110</td>
<td>To aid the student in reading, visualizing and interpreting basic blueprints in the industrial environment. Class 3, Credit 3</td>
</tr>
<tr>
<td>CAID-147</td>
<td>Blueprint Reading (EMT/PKG)</td>
<td>#0271-147</td>
<td>An introductory course which develops the concept of how and why engineering drawings exist. Drawings are sketched and interpreted. Mechanical, electrical, and hydraulics are studied including working with tolerances and geometric tolerancing. Class 1, Lab 2, Credit 2</td>
</tr>
<tr>
<td>CAID-208</td>
<td>Introduction to Computers</td>
<td>#0271-208</td>
<td>Presents computers terminology, functions and commands. Programs will be developed. Class 5, Lab 5, Credit 3</td>
</tr>
<tr>
<td>CAID-210</td>
<td>Manufacturing Processes</td>
<td>#0271-210</td>
<td>Manufacturing Processes will acquaint students with methods of fabricating which are used to convert ideas into usable products and/or machines. Class 5, Credit 5</td>
</tr>
<tr>
<td>CAID-211</td>
<td>Materials Selection</td>
<td>#0271-211</td>
<td>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</td>
</tr>
<tr>
<td>CAID-215</td>
<td>Drafting Mechanics I</td>
<td>#0271-215</td>
<td>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</td>
</tr>
</tbody>
</table>
CAID-216 Engineering Drawing for
Registration #0271-216 Machinists
The course is intended to aid the student in understanding machine shop drawings. After completing this course, the student will have proper knowledge of Geometric Construction, Sketching, Multiview Projection, Sectional Views, Auxiliary Views, and the use of Drafting instruments and Equipment. (CAID-110)
Class 3, Credit 3

CAID-217 Drafting Mechanics II
Registration #0271-217
This course will investigate the operation of different components in a mechanical system. Also the rational understanding to choose specific components for specific application.
Class 5, Credit 3

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

CAID-225 Drafting Mechanics Lab
Registration #0271-225
A hands-on experience with demonstrations of the laws of physics and the collection of data as a result of these experiments.
Lab 3, Credit 1

CAID-238 Descriptive Geometry
Registration #0271-238
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.)
Credit 4

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 III
Registration #0271-240
Will enable the student to interpret an engineer’s design layout. The student individually and in a team setting will draw a complete set of working detail drawings, including a listing of manufacturing methods, materials, specifications, heat treatment and parts listed. (CAID-239)
Class 1, Lab 6, Credit 3

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

CAID-245 Introduction to Computer Aided Drafting
Registration #0271-245
The course includes an overview of the architecture and components of various CAD systems. A CAD system will be used to gain operator skills. (CAID-238 or equivalent)
Class 1, Lab 3, Credit 2

CAID-247 Computer-Aided Drafting
Registration #0271-247
The purpose of this course is to develop a set of working drawings with advanced system commands. Flowcharting and file management techniques will be required as supporting documentation for each project. The course will also include the digitizing board as an electronic input device for existing drawings and/or sketches. (CAID-245)
Class 2, Lab 4, Credit 3

CAID-249 Fundamentals of Designing
Registration #0271-249
Printed Circuits
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

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 covered include math, physics, mechanics, electricity and magnetism, electronics, vibration, and materials science. (CAIE-101)
Class 3, Lab 2, Credit 3

CAIE-102 Applied Physical Principles II
Registration #0271-102
An extension of CAIE-101 this course proceeds to examine the world around them in terms of physical laws. Areas of study to be covered include math, physics, mechanics, electricity and magnetism, electronics, vibration, and materials science. (CAIE-101)
Class 3, Lab 2, 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, universal, differentials, bearings, cams, lubrication and friction, speed changes and braking.
Class 3, Lab 3, 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, Lab 4, Credit 4

CAIE-203 Electricity/Electronics I
Registration #0272-203
To introduce the electrical circuit, basic principles of circuit action, and experience with circuit components and devices. Proper use of instruments needed to power and measure electrical circuit values will be taught. Analysis of series, parallel, and complex DC circuits will be conducted. Comparisons and contrast between electrical circuits are conducted. Comparisons and contrast between electrical circuits and other types of circuits encountered by the electromechanical technician, e.g., magnetic, hydraulic, mechanical will be pointed out.
Class 3, Lab 2, Credit 3
CAIE-205 Electricity/Electronics II
Registration #0272-205
Introduce the concept of alternating current. Study the generation of AC, analyze the action of AC resistive and reactive circuits, use appropriate equipment and instruments to analyze and diagnose AC circuits. Values peculiar to AC circuits will be studied (i.e., reactance, impedance, phase angle, etc.). Both lab and mathematical techniques requisite to the analysis of AC will be taught. (CAIE-203)
Class 3, Lab 2.5, Credit 3

CAIE-211 Rotating Electrical Machinery
Registration #0272-211
Study will be made of AC and DC generators; of DC and AC motors, and of single and polyphase transformers. Basic generators and motors actions will be studied. Regulations, efficiency and power factor will be addressed. (CAIE-205)
Class 1.5, Lec./Dem. 1.5, Lab 3, Credit 3

CAIE-212 Transducers & Control Systems
Registration #0272-212
Operation of input and output transducers (mechanical, fluid-mechanical, acoustic, thermal, optical, magnetic, chemical) and the interface and feedback systems they function within. She/he will be able to identify normal and abnormal operation of open and closed loop systems utilizing these transducers. (CAIE-211)
Class/Dem. 3, Lab 4, Credit 4

CAIE-215 Electrical Control Systems
Registration #0272-215
Students will examine basic methods of Electrical control circuits. Both Electro-mechanical and programmable controller devices will be examined. Safety features in control will be stressed, forward and reverse control, jogging, plugging, sequential control will be some of the features. (CAIE-205)
Class 1.5, Lec./Dem. 1.5, Lab 3, Credit 3

CAIE-221 Electricity/Electronics III
Registration #0272-221
Operation of basic electronic circuits (rectifiers, amplifiers, oscillators, switching, wave shaping, timing) utilizing semi-conductors. Students will add, subtract, divide and multiply binary numbers and be able to construct logic circuits to perform logical operations. (CAIE-205)
Class/Dem. 4.5, Lab 4, Credit 4

CAIE-231 Automated Equipment Systems Troubleshooting
Registration #0272-231
Experiences in diagnosing and correcting faults introduced into electromechanical systems. Emphasis will be placed upon the development of a systematic approach to troubleshooting. Students will be exposed to such items as logs, machine history, flow charts, and other reports generated by maintenance systems. (Units I, II, III)
Class 1.5, Lab 4, Credit 3

CAIE-298 Special Studies
Registration #0272-298
A flexible course designed to permit the Automated Equipment Technology student to pursue, in depth, some aspect of the technical fields. To be conducted in either the class or independent study mode. The credit will be based on the nature and extent of the study undertaken.
Credit 1-4

Packaging Mechanics

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

CAI-205 Packaging Machinery Systems I
Registration #0273-205
Product Filling: Types and methods of container filling. Bottle closing; capping, sealing, can closing; double seaming. (CAI-201, 202)
Class 3, Lab 2, Credit 2

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

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

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

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

Communication

CAIG-104 Communication Skills
Registration #0274-104
A review of basic skills in reading, writing, listening, speaking, study skills and time management.
Class 2, Recitation 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, filing out forms, practicing interpersonal communications in simulated job scenes. (CAIG-104)
Class 3, Recitation 1.5, Credit 3

CAIG-200 Communication Skills
Registration #0274-200
An emphasis on developing the college essay and on adopting the writing process to oral presentations. Topics include reasoning and persuasion, planning and organizing, using rhetorical devices, and revising. A documented, library research project is required. (CAIG-104)
Class 4.5, Credit 4

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

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. (0274-105)
Class 2, Credit 1
Mathematics

**CAIG-106 Industrial Mathematics**
Registration #0240-420
Topics include fractions and decimals; measurement; introduction to algebra; ratio and proportion; speeds and feeds, tapers, pulleys and gears; introduction to geometry and trigonometry with applications to machine tool and drafting.
Required of all first quarter students in Machine Tool Technology and Drafting Technology programs.
Credit 3, Recitation 4.5, Credit 3

**CAIG-107 Algebra and Trigonometry I**
Registration #0274-107
A concentrated review of elementary algebra and trigonometry. Topics include properties of real numbers; order of operations, operations with real numbers and polynomials; factoring and algebraic fractions; linear equations; graphing; exponents and radicals; quadratic equations; solution of right and oblique triangles with applications to numerical control and vectors.
Class 3, Recitation 4.5, Credit 3

**CAIG-207, 208 Algebra and Trigonometry II, III**
Registration #0274-207, 208
A standard pre-calculus sequence.
207: Topics include a review of the fundamentals of algebra; 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, Recitation 2, Credit 4

**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-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

**Computer Service**

**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-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-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-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-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-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
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; meaning 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; 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, 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 by Design
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 I CQAS-801 and 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 I CQAS-801 and Design of Experiments II CQAS-802)
Credit 3
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 II 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, highway 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 II
Registration #0280-822
Continuation of CQAS-821. Topics: supporting theory for and derivation of sampling distribution models; applications and related material; point estimation theory and applications; the multivariate normal probability model, its properties and applications; interval estimation theory and applications. (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 I CQAS-801 and 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; nonlinear estimation; and model building. (Regression Analysis I CQAS-841)
Credit 3

CQAS-851  Nonparametric Statistics
Registration #0280-851
Distribution-free testing and estimation techniques with emphasis on applications. Topics: sign tests; Kolmogorov-Smirnov statistics; runs tests; Wilcoxon-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 nonconforming; 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 thorough appropriate experimental design and analyzed 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

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

CQAS-896, 897, 898 Thesis
Registration #0280-896, 897,898
For students working for the MS degree in applied and mathematical statistics who use a research project and thesis for three, six, or nine credits. (Consent of the department)
Credit 3, 6, or 9
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 0 (F)

**EECC-341 Systems for Computer Engineers**

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

Class 3, Lab 3, Credit 4 (W)

**EECC-452 Linear Control Systems**

Registration #0306-452

This course provides a comprehensive introduction to the essential theories and techniques for the analysis and design of both continuous and discrete linear systems. The modeling and control of dynamic systems will be studied using the classical topics of the frequency domain approach which has proven to be so useful in practice. Students will be required to verify their linear control system design projects using computer simulation techniques. (EEEE-352 and SMAM-306)

Class 4, Credit 4 (S, SR)

**EECC-550 Computer Organization**

Registration #0306-550

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

Class 4, Credit 4 (S, SR)

**EECC-551 Computer Architecture**

Registration #0306-551

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

Class 4, Credit 4 (F, W)

**EECC-553 Digital Control Systems**

Registration #0306-553

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

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

**EECC-560 Interface and Digital Electronics**

Registration #0306-560

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

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

**EECC-561 Digital System Design**

Registration #0306-561

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

Class 4, Credit 4 (S, SR)

**EECC-630 Introduction to VSLI Design**

Registration #0306-630

An introduction to the design and implementation of Very Large Scale (VLSI) systems. Basic NMOS devices and circuits are described. From this base, a variety of methods for designing both combinational and sequential systems will be considered, with emphasis on the use of regular structures such as programmed logic arrays. System architecture and use of Computer Aided Design (CAD) tools will be stressed. (EECC-341 or ICSS-400 or EEEE-340; Basic Electronics; 4th or 5th year standing)

Class 4, Credit 4 (S, SR)

**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**

Registration #0306-694

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-620  Design Automation of Digital Systems
Registration #0306-620
Design automation deals with the use of computers as a tool or aid in the design and manufacturing of digital systems. Topics covered will include methods for digital design, hardware description languages, simulation techniques at system level, register-transfer level, and logic element level. Partitioning of digital systems, placement, routing, and fault test generation. (EECC-550 or ICSS-520, or 720)
Class 4, Credit 4 (F, W)

EECC-631  Advanced VLSI Design
Registration #0306-631
A second course in the design and implementation of Very Large Scale (VLSI) systems. CMOS devices will be studied. System architecture and the use of Computer Aided Design (CAD) tools will be stressed. Extensive laboratory projects will be required, including the testing of chips fabricated in the first course. (EECC-630)
Class 4, Credit 4 (F, W)

EECC-722  Advanced Computer Architecture
Registration #0306-722
This course will emphasize the impact of VLSI and communication issues on computer architecture. Topics covered will include highly concurrent, multiprocessor and fault-tolerant computer systems as well as data flow architectures. Modeling techniques for system verification will also be included. (EECC-551 or ICSS-720)
Class 4, Credit 4 (F, W)

EECC-730  VLSI Design Projects
Registration #0306-730
An introduction to the design and implementation of Very Large Scale (VLSI) systems. Basic NMOS devices and circuits are described. From this base, a variety of methods for designing both combinational logic and state machines is developed, with emphasis on the use of regular structures such as programmed logic arrays. System architecture and use of Computer Aided Design (CAD) tools will be stressed. Extensive laboratory projects will be required.
Class 4, Credit 4 (S, VR)

EECC-731  VLSI Design Projects
Registration #0306-731
A second course in the design and implementation of Very Large Scale (VLSI) systems. CMOS devices will be studied. System architecture and the use of Computer Aided Design (CAD) tools will be stressed. A major laboratory design project will be required. In addition the students will test chips fabricated in the first course. (EECC-730 or EECC-630)
Class 4, Credit 4 (F, W)

EECC-756  Small Systems Workshop
Registration #0306-756
This course will cover the general guidelines, methodology, and approaches for the design, development, and use of single and multi, micro or minicomputer systems. The 16-bit microprocessors have vast address spaces and virtual memory capability, incorporate complex I/O facilities, and permit rapid execution of cost-saving, high-level languages. The hardware and software support available for 16-bit microprocessors also makes them a cost-effective alternative to minicomputers. Distributed systems based on microcomputer technology will be investigated with emphasis on interconnect structures, telecommunications, software and hardware. The course will include a laboratory workshop in which each student will be required to design, implement, and test one or more parts of a practical system. Emphasis will be placed on engineering ability and management skill to meet proposed technical goals on time and within budget. (Graduate standing in Computer Engineering with at least three core courses completed or permission of instructor)*
Class 3, Lab 3, Credit 4 (S)

EECC-758  Fault-Tolerant Digital Systems
Registration #0306-758
Formal models and concepts in fault diagnosis. Test generation and minimization. Redundant and self-checking systems. Fault-tolerant hardware- and software-based computer systems. (ICSS-400 or EECE-650 or EECE-750, EECC-550 or ICSS-720)
Class 4, Credit 4 (S)

EECE-759  Digital Interface Circuits
Registration #0306-759
Standard bus interface—parallel and serial. LSI interface devices. Interface design—peripherals and memory. Data acquisition—A/D & D/A converters, multiplexing. Remote control. Error detection and correction. (EECC-560 or permission of instructor)
Class 4, Credit 4 (S)

Electrical Engineering

EEE-200  Electrical Engineering Graphics
Registration #0301-200
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
Registration #0301-240
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)

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

EEE-351  Circuit Analysis I
Registration #0301-351
Voltage, current, power, and energy; linearity; Kirchhoff's Laws; series circuit; parallel circuit; series-parallel circuits; ladder networks. Branch current method of circuit analysis. Nodal analysis, network topology; loop and mesh analysis. Thévenin's and Norton's theorems; maximum power transfer; superposition and reciprocity theorems. Inductance; RL circuit with a step input. Capacitance; RC circuit with a step input; pulse response of RC circuits. RLC circuit response with step input. sinusoidal Steady State time domain solution of simple circuits. Instantaneous and average power; RMS values. Complex Exponential Functions; Phasor concepts; impedance to admittance conversions; impedance bridges; power.
Class 4, Recitation 1, Lab 2, Credit 4 (S, VR)
EEE-352 Circuit Analysis II
EEEEE-462: Class 3, Lab 3, Credit 4 (F, W)
Class 3, Recitation 2, Lab 2, Credit 4 (F, W)

EEE-365 Introduction to Microcomputers
EEE-441, 442 Electronics I, II
EEE-531 Electromechanical Energy
EEE-534 Introduction to Communication Systems
EEE-535 Introduction to Power Electronics
EEE-544 Physics of Electronic Devices
EEE-545 Digital Electronics

EEE-372 Electromagnetics Field I, II
EEE-471 Class 4, Credit 4 (S, SR)
EEE-472 Class 3, Lab 3, Credit 4 (F, W)

EEE-513 Introduction to Automatic Control
EEE-530-531 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. Analog computation techniques are studied and used, in laboratory, as a means of verifying the analysis and design of complex systems. (EEE-453, 554)

EEE-365 Introduction to Microcomputers
EEE-441, 442 Electronics I, II
EEE-531 Electromechanical Energy
EEE-534 Introduction to Communication Systems
EEE-535 Introduction to Power Electronics
EEE-544 Physics of Electronic Devices
EEE-545 Digital Electronics

EEE-372 Electromagnetics Field I, II
EEE-471 Class 4, Credit 4 (S, SR)
EEE-472 Class 3, Lab 3, Credit 4 (F, W)

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EEE-441, 442 Electronics I, II
EEE-531 Electromechanical Energy
EEE-534 Introduction to Communication Systems
EEE-535 Introduction to Power Electronics
EEE-544 Physics of Electronic Devices
EEE-545 Digital Electronics

EEE-372 Electromagnetics Field I, II
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EEE-472 Class 3, Lab 3, Credit 4 (F, W)

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EEE-372 Electromagnetics Field I, II
EEE-471 Class 4, Credit 4 (S, SR)
EEE-472 Class 3, Lab 3, Credit 4 (F, W)

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EEE-365 Introduction to Microcomputers
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EEE-534 Introduction to Communication Systems
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EEE-544 Physics of Electronic Devices
EEE-545 Digital Electronics

EEE-372 Electromagnetics Field I, II
EEE-471 Class 4, Credit 4 (S, SR)
EEE-472 Class 3, Lab 3, Credit 4 (F, W)

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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, the transfer function, transforms of common sequences, basic theorems, partial fraction expansions. "Frequency response" of discrete systems sinusoidal input/output, frequency response, relations between Z plane and S plane, frequency response in Z plane, aliasing effects. Inversion to continuous systems; difference equations and transfer functions, block diagram realizations FIR and MR 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 quantatization, arithmetic quantization, signal scaling and overflow. (EEE-453)
Class 4, Credit 4 (F, 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 sample-data systems. The stress in the 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)
Class 3, Lab 3, Credit 4 (S)

EEE-621 Microwave Circuits and Devices
Registration #0301-621
Review of basic electromagnetic theory. TEM transmission lines. Microwave waveguides. Microwave passive components. Ferrite components. Microwave solid-state devices. Microwave integrated circuits. (EEE-472)
Class 4, Credit 4 (offered on sufficient demand)

EEE-622 Antenna Theory and Analysis
Registration #0301-622
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 (S)

EEE-623 Piezoelectricity and Pyroelectricity
Registration #0301-623
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 (PVF2) (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, PUT, and Triac are discussed in some detail along with typical power conversion applications. Auxiliary services like the UJT and optocouplers are included. The use of bipolar power transistors and power MOSFETS in switching applications, especially as switching regulators, is described; and the performance of these devices is compared with that of the four-layer devices. The laboratory portion of the course consists of experiments to delineate the devices along typical applications. Following this, each student team designs and evaluates a switching power supply, then constructs and tests a design project of his/her choice. (EEE-545)
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, synchronism, and synchronous sequential design. (EEE-240)
Class 4, Credit 4 (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, W)

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, 665)
Class 3, Lab 3, Credit 4 (W, S)

EEE-670 Microelectronics
Introduction to
Registration #0301-670
Microelectronics
Introduction to the physics and chemistry of fabricating integrated circuits. Topics include mask making, epitaxial layer growth, diffusion, oxidation, ion implantation, and metallization. The course includes a design project where the student designs an integrated circuit including the circuit layout and process specification. Students will also use computer modeling and simulation programs such as SPICE, BISIM, and SUPREME. This course is a prerequisite for EEEE-676, IC processing, laboratory, in which integrated circuits are actually made.
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-314, 315, EEEE-471, 472, concurrently)  
Class 3, Lab 3, Credit 4 (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 of fiber optics. Fundamentals as well as design applications will be discussed: light wave characteristics; fiber optical waveguide fundamentals and selection; fiber optical coupling. Source and detector characteristics and selection will be considered. Examples of practical optical systems will be analyzed. A project lab assignment will be part of the course.  
Class 3, Lab 3, Credit 4 (S)

**EEE-676** I. C. Processing Laboratory  
Registration #0301-676  
This is a laboratory course designed to introduce the student to integrated circuit processing. The following topics will be investigated: safety, vacuum technology and evaporation of metals, art work generation, photoreduction, photomask technology, water characterization, water cleaning metal semiconductor fabrication, diffusion, MOS device fabrication, I. C. fabrication, wire bonding and packaging. Each laboratory exercise requires extensive preparation on the part of the student, in the form of research, reading, computations and device design. (EEE-670)  
Class 2, Lab 6, Credit 4 (S)

**EEE-677** Digital Filters and Signal Processing  
Registration #0301-677  
This course is an extension of Discrete Signals and Systems (EEE-564). Topics include the design of digital IIR filters, and the analysis of digital filters in 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.  
Class 4, Credit 4

**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 (offered on sufficient demand)

**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-554, 554, 472, SMAM 351)  
Class 4, Credit 4 (S)

**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 or suitable equivalents)  
Class 4, Credit 4

**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 computed antenna patterns are generally the end products. (EEE-442, 554, 472)  
Class 3, Lab. 3, Credit 4 (F, W)

**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 inprocess 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-728  IC Operational Amplifiers  
Analysis of operational amplifier circuits using the ideal op amp; development of circuit models to predict non-ideal op amp characteristics; study of feedback systems, stability (using Bode plots), and compensation; direct coupled amplifiers and operational amplifier design; interpretation of manufacturers’ specifications and basic applications with emphasis on practical aspects. (EEE-442, 754, 755)  
Credit 4

EEE-730  Advanced Analog I. C. Design  
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 convenors, 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  
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-665 or a high-level programming language)  
Credit 4

EEE-744  Advanced Microprocessor Systems Design  
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-665)  
Credit 4

EEE-745  Topics In Digital Systems  
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  
A selection of topics on various theoretical aspects of switching circuits will be presented. Topics such as decomposition of combinational *witching functions, experiments on sequential circuits, and regular expressions will be covered. (EEE-650)  
Credit 4

EEE-748  Microcomputers In Control 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 convenors, 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  
Complex variable theory including conformal mapping; the Laurent expansion; residues; and the evaluation of contour integrals. The Nyquist stability criterion. The LaPlace transform, its existence and convergence; use in the solution of differential equations; the transfer function and its properties. The Z transform and the solution of difference equations. Relationship between the LaPlace and the Z transforms.  
Class 4 (F)

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

EEE-756  Analytical Techniques III  
Vector Analysis: Gauss’s law and Stoke’s theorem; curvilinear coordinates. Random variables. Probability densities and distributions; functions of random variables; moments; parameter estimation; statistical decision theory.  
Credit 4 (S)

EEE-762  Nonlinear Control Systems  
An introduction to the physical nature and mathematical theory of nonlinear control systems’ behavior using phase plane techniques. Lyapunov 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  
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  
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-754, 755)  
Credit 4

EEE-765  Optimal Control  
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; 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 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-775,776, 777)
Credit 4

EEE-779 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 deburring. Several extensive computer assignments are required. (EEE-754, 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
Registration #0301-785
Advanced and current topics in electromagnetic theory. Topics vary each time and may include; array theory, electromagnetic compatibility, numerical methods, propagation and radiation in ionized media, moving media, and random media. May be repeated for additional credit. (Permission of 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
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
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-401 Introduction to Operations Research I
An introduction to the methodology of mathematical problem formulation. Investigation of mathematical programming techniques including linear programming and special types of linear programming problems such as the transportation and assignment algorithms. (SMAM-308 or consent of instructor)
Class 4, Credit 4 (F)

EIEI-415, 516 Human Factors I, II
A survey of elementary mathematical models within the field of systems and industrial engineering. Areas of study include queueing theory, network analysis, and inventory theory. (SMAM-351, SMAM-306)
Class 4, Credit 4 (F)

EIEI-420 Work Measurement and Analysis I
Methods of measuring and analyzing work, human capabilities, micromotion, memomotion study, process and operation analysis. Emphasis placed on methods of operation analysis as applied to the design and evaluation of man-machine systems. (Permission of instructor)
Class 3, Lab 2, Credit 4 (F-516, SR-415)

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

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

EIEI-545  Techniques of Systems Engineering  
Registration #0303-545  
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-550  Safety Engineering  
Registration #0303-550  
To acquaint students with practical aspects of safety engineering. Students will acquire a working knowledge of legal and technical aspects of safety. Recent developments in this area will be stressed, such as OSHA, Consumer Product Safety Commission, and the Federal Highway Safety Act. Students will also be exposed to research methodology and ways of evaluating safety programs and related research. Reference sources will be outlined.  
Class 4, Credit 4

EIEI-599  Independent Study  
Registration #0303-599  
A supervised investigation within an industrial engineering area of student interest. (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, applications and availability of current systems. Topics include Numerical Control Language, Group Technology, Flexible Manufacturing Systems, Robotics, Automatic Process Planning and Adaptive Control. (Permission of instructor)  
Class, 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 Application  
Registration #0303-690  
Integrated Manufacturing  
This course is designed to provide a broad overview of current technology and management practice and trends related to the evolving factory of the future. It is designed as a multi-disciplinary offering for upper-division undergraduate and graduate students enrolled in any RIT program. The course follows a seminar format. Topics of discussion include Quality Assurance, Robots, CAD, Group Technology, MRP, Flexible Manufacturing Systems, Material Handling, and Systems Integration through Computer Application.  
Class 3, Credit 3
Graduate Courses

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

EIEI-620 Engineering Economy Registration #0303-620
Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting.
Credit 4

EIEI-715, 716 Statistical Analysis for Engineering I & II
A basic two-quarter course in probability and statistics designed to give the student a foundation for further study in areas such as design of experiments, stochastic systems, and simulation.
Credit 4

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

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

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

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

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

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

EIEI-718 Inventory Design Registration #0303-718
Overview of inventory problems. Single period models under risk and uncertainty, dynamic models under certainty, dynamic models under risk and uncertainty. Forecasting, inventory system analysis.
Credit 3

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

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

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

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

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

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

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

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

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 3
This course is intended for students majoring in electrical and in-
sicles, direct shear, torsion, and bending. (SPSP-311, Corequisite:
strains, statically indeterminate problems, thin-walled pressure ves-
and friction. Introduction to strength of materials: axial stresses and
emption from this course.

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

EIEI-771, 772, 773, 774, 775 Special Topics in Industrial
Registration #0303-771, 772, 773, 774, 775
This is a variable credit, variable topics course which can be in the
form of regular courses or independent study under faculty supervi-

Credit variable (maximum 4 per course number)

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

Credit variable

EENG-801 Design for Manufacture
Registration #0302-801
This is a required course in the manufacturing option of the master of
degree program. This course is offered jointly by the Departments of
Industrial and Mechanical Engineering and presents an overview of
the factors influencing product design and the manufacturing cycle.
Topics include component design and analysis, design for function
and manufacturability, design for manual and automated assembly,
methods and systems for computer-aided design and manufacturing,
simulation of manufacturing systems, and the role of robotics in
manufacturing. Students will gain hands-on experience with the RIT
computer facilities, robots, and CAD/CAM laboratories as these re-
late to modern trends in the design for manufacture.

Class 4, Credit 4 (W)

Mechanical Engineering

EMEM-201 Mechanical Engineering Graphics
Registration #0304-201
This freshmen course is designed to introduce the student to en-
gineering in general and also to develop skills in engineering graphic
communications. The use of computer graphics is introduced.
The course is intended for students with little or no engineering
drawing. Students having two years of engineering or drawing in
school or equivalent may take a qualifying examination for an ex-
emption from this course.

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

EMEM-331 Mechanics I
Registration #0304-331
This course is intended for students majoring in electrical and in-
dustrial engineering. Statics: Newton’s Laws, the principle of trans-
missibility of forces, couples, centroids, trusses, frames, machines,
and friction. Introduction to strength of materials: axial stresses and
strains, statically indeterminate problems, thin-walled pressure ves-
sels, direct shear, torsion, and bending. (SPSP-311, Corequisite:
SMAM-253)

Class 4, Credit 4 (F, W)

EMEM-332 Mechanics II
Registration #0304-332
This course is meant for students majoring in industrial engineering.
Topics include dynamics of particles and rigid bodies with an in-
troduction to mechanical vibrations, kinematics and kinetics of par-
ticles and rigid bodies, work, energy, impulse momentum, and vi-
brations. 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. (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 con-
cepts of force and moment, trusses, frames, machines, shear force
and bending moment diagrams and equations, friction, fluid statics,
centroids and moments of inertia. (SPSP-311, Corequisite:
SMAM-253)

Class 4, Credit 4 (F)

EMEM-337 Strength of Materials I
Registration #0304-337
This basic course in statics of deformable bodies integrates funda-
mentals 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-340 Mechanical Engineering Graphics II
Registration #0304-340
The objective of this course is to study intermediate engineering
graphics. The laboratory sessions are devoted to working drawings,
shop processes, mechanical elements, tolerances and fits, assem-
bly and detail drawings. (EMEM-201 or equivalent)

Class 2, Credit 2 (W, S)

EMEM-341 Introduction to FORTRAN Programming
Registration #0304-341
This course introduces the students to the fundamentals of pro-
gramming through the learning of the FORTRAN language. Topics
covered include structured programming techniques using sequen-
tial 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 sub-
programs is stressed. Proper documentation techniques along with
efficient usage of the computer systems is also covered.

Class 2, Credit 2 (W, S)

EMEM-343 Materials Processing
Registration #0304-343
This course involves a study of the application of machine tools and
fabrication processes to engineering materials in the manufacture of
products. Topics covered include cutting processes, casting, form-
ning, powder metallurgy, welding, and processing of plastics.

Class 3, Lab 2, Credit 4 (F, W)
EMEM-344 Materials Science Registration #0304-344
This course deals with the structure and properties of metallic, organic, and ceramic materials as related to structural imperfections, atom movements, and phase changes. The intent of the course is to develop a basic understanding of the structure/properties relationship in materials and their behavior in service environments. (SCHG-208)
Class 3, Lab 2, Credit 4 (W, 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 coordinate systems. Also, the students are introduced to the properties of pure substances, and open systems. (SMAM-306, EMEM-336)
Class 4, Credit 4 (F, W)

EMEM-414 Thermodynamics II Registration #0304-414
The second thermodynamics course begins with a study of phase space and the properties of real gases, liquids and solids. Using a control volume analysis, we use the basic fluid properties, the first and second law of thermodynamics to study and design gas turbine power plants, steam power 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 — Extended 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-308)
Class 4, Credit 4 (S, SR)

EMEM-440 Numerical Methods Registration #0304-440
This course involves a study of the numerical methods for modelling and solving engineering problems using computers, and 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 statistics, 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 Mechanical Engineering Laboratory Registration #0304-501
A course in instrumentation and measurement methods, with emphasis on laboratory experiments to verify and extend the lecture material. Topics include generalized configuration and functional characterization of measuring instruments, measurement standards, and static and dynamic instrument response. A survey of the principal techniques and devices for measurement of temperature, flow, strain, motion, force, vibration, and pressure is included. Laboratory work emphasizes equipment calibration, instrument response characterization, statistical analysis of experimental errors, error analysis and the presentation of results in engineering reports. (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)
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<th>Course Code</th>
<th>Course Title</th>
<th>Registration Code</th>
<th>Class</th>
<th>Lab</th>
<th>Credit</th>
<th>Notes</th>
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<tbody>
<tr>
<td>EMEM-618</td>
<td>Computer-Aided Engineering</td>
<td>#0304-618</td>
<td>Class 4</td>
<td>Credit 4</td>
<td>F, W</td>
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<tr>
<td>EMEM-635</td>
<td>Heat Transfer II</td>
<td>#0304-635</td>
<td>Class 4</td>
<td>Credit 4</td>
<td>S, SR</td>
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<tr>
<td>EMEM-652</td>
<td>Fluid Mechanics of Turbomachinery</td>
<td>#0304-652</td>
<td>Class 4</td>
<td>Credit 4</td>
<td>S, SR</td>
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<tr>
<td>EMEM-658</td>
<td>Engineering Vibrations</td>
<td>#0304-658</td>
<td>Class 4</td>
<td>Credit 4</td>
<td>F, W</td>
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<tr>
<td>EMEM-660</td>
<td>Refrigeration and Air Conditioning</td>
<td>#0304-660</td>
<td>Class 4</td>
<td>Credit 4</td>
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<tr>
<td>EMEM-672</td>
<td>Dynamics of Machinery</td>
<td>#0304-672</td>
<td>Class 4</td>
<td>Credit 4</td>
<td>S, SR</td>
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<tr>
<td>EMEM-694</td>
<td>Stress Analysis</td>
<td>#0304-694</td>
<td>Class 4</td>
<td>Credit 4</td>
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**Group I Courses**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration Code</th>
<th>Class</th>
<th>Lab</th>
<th>Credit</th>
<th>Notes</th>
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<tr>
<td>EMEM-599</td>
<td>Independent Study</td>
<td>#0304-599</td>
<td>Class variable</td>
<td>Credit variable</td>
<td>F, W, S, SR</td>
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<tr>
<td>EMEM-601</td>
<td>Alternative Energy Sources</td>
<td>#0304-601</td>
<td>Class 4</td>
<td>Credit 4</td>
<td>TBA</td>
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<tr>
<td>EMEM-605</td>
<td>Applications in Fluid Mechanics</td>
<td>#0304-605</td>
<td>Class 4</td>
<td>Credit 4</td>
<td>F, W</td>
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<tr>
<td>EMEM-615</td>
<td>Robotics</td>
<td>#0304-615</td>
<td>Class 4</td>
<td>Credit 4</td>
<td>F, W</td>
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</tbody>
</table>

**Class variable, Credit variable**
Group II Courses

**EMEM-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, EMEM-516, EMEM-652)  
Class 4, Credit 4 (F, W)

**EMEM-610**  
Thermal Fluids Design & Optimization  
The course consists of an open-ended thermal fluids system design project and classroom lectures and discussion of the optimization of thermal fluid systems both from a design and operational viewpoint. (EMEM-414, EMEM-516, EMEM-635)  
Class 4, Credit 4 (S)

**EMEM-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, S)

**EMEM-625**  
Creative Design of Mechanical Devices and Assemblages  
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 VA/VE 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**  
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 is responsible for a part of the 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.  
Class 4, Credit 4 (F, W, S)

Elective Courses

These are offered at least once every three years.

**EMEM-612**  
Gas Kinetics and Vacuum Engineering  
A basic course in the principles of statistical thermodynamics and the kinetic theory of gases with applications to the science and design of vacuum systems. Topics to be covered include the kinetic theory of gases, transport phenomena, molecular flow, and sorption of gases and vapors by solids. Following this introduction to the nature of gases, the course will focus on high-vacuum engineering. Topics will include vacuum pumps, vacuum system design and performance, vacuum measurements, and leak detection. Current applications of vacuum technology will be treated and correspond to the areas of interest expressed by the class. (EMEM-413 or equivalent)  
Class 3, Lab/Rec. 2, Credit 4 (TBA)

**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.  
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  
Hydraulic 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.  
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 Environment and the Environment and the Environment and the Engineer  Engineer  Engineer  Engineer  Engineer
This course will study the role of engineers in society and their particular responsibilities in the analysis and solution of problems facing the environment in an increasingly technological society. Problems to be studied from a ‘case study’ standpoint will include such things as air, water, and noise pollution, thermal pollution, and the effects of population growth. The course will include field trips, outside expert speakers, and each student will be expected to participate in the in-depth study of one problem of particular interest to him or her and to submit a formal report to the class. Use of the digital and analog computing facilities as a systems simulation tool will be encouraged.
Class 4, Credit 4 (TBA)

EMEM-692  Analysis for Engineers Analysis for Engineers Analysis for Engineers Analysis for Engineers Analysis for Engineers
Partial differentiation, chain rule, total differential and optimization problems; multiple integration and manipulation of multiple integrals; line and constant coefficient ordinary differential equations; matrix algebra; and vector calculus or complex variables.
Credit 4 (F)

EMEM-698  Independent Study Design Independent Study Design Independent Study Design Independent Study Design Independent Study Design
This is a design-oriented independent study requiring a major design project.
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 Design for Manufacture Design for Manufacture Design for Manufacture Design for Manufacture
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, design for manual and automated assembly, and the role of robotics in manufacturing. Students will gain hands-on experience with the Boothroyd/Dewhurst system to quantify design efficiency. 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 Mechanics Mechanics Mechanics Mechanics Mechanics
A rigorous basis for the study of advanced fluid mechanics and theory of elasticity is presented. Cartesian tensors. Analysis of stress and deformation. Solution 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 Theory of Elasticity Theory of Elasticity Theory of Elasticity Theory of Elasticity
Class 4, Credit 4 (TBA)

EMEM-812  Theory of Plates and Shells Theory of Plates and Shells Theory of Plates and Shells Theory of Plates and Shells Theory of Plates and Shells
Class 4, Credit 4 (TBA)

The analysis of stress and strain. Criteria for yielding. Stress-strain relations of the theory of plasticity. Elastoplastic problems of spheres and cylinders. Torsion, Creep. (Graduate standing)
Class 4, Credit 4 (TBA)

EMEM-815  Experimental Stress Analysis Experimental Stress Analysis Experimental Stress Analysis Experimental Stress Analysis Experimental Stress Analysis
Experimental methods of analysis of structural machine members, including strain gages and instrumentation, photoelastic methods, brittle coating, Moire fringe method, holographic techniques; and the hydrodynamic, electrical, and membrane analogs. Different methods will be demonstrated. (EMEM-694 or equivalent)
Class 4, Credit 4 (TBA)

EMEM-816  Finite Elements Finite Elements Finite Elements Finite Elements Finite Elements
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 Advanced Optimal Design Advanced Optimal Design Advanced Optimal Design Advanced Optimal Design
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)

Class 4, Credit 4 (TBA)

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 multi-dimensional graphic display, pre- and post-processing modelers for finite element analyses, and three-dimensional solids modeling. (Graduate standing)
Class 4, Credit 4 (TBA)

EMEM-828  Special Topics in Applied Mechanics Special Topics in Applied Mechanics Special Topics in Applied Mechanics Special Topics in Applied Mechanics Special Topics in Applied Mechanics
In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of regular courses will be presented. These courses will be structured as ordinary courses with specified prerequisites, contact hours, and examination. A listing of topics for special courses is found at the end.
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 multiple pass shell and tube heat exchangers; compact baffled, direct contact, plate, and fluidized bed heat exchangers; radiators, recuperators, and re-generators. (EMEM-514)
Class 4, Credit 4 (TBA)

EMEM-838  Ideal Flows
Registration #0304-838
This graduate course introduces the students to the analysis of ideal flows from an advanced mathematical as well as engineering viewpoint. Steady acyclic motion, superposition of flows, vorticity dynamics; the theory of complex variables; airfoil and wing theories. (EMEM-871, EMEM-516 or equivalent)
Class 4, Credit 4 (TBA)

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 regular 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.
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 engineering option in the master of engineering degree program. 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 (TBA)

EMEM-865  Applications of the Finite Element Method Using NASTRAN
Registration #0304-865
This is a course in the core group, CAD, of the manufacturing engineering option in the master of engineering degree program. This course emphasizes the application of the finite element method to problems in the area of static and dynamic structural analysis, heat transfer, and analogous solutions. The industrial software package, NASTRAN, is used for these applications where the general structure, operating characteristics, and use of this complex program is presented. Topics include: the finite element method; shape factors, element formulations, and the NASTRAN element library; NASTRAN sequencing; general modeling methods (loads, constraints, material factors, mesh generation, interactive graphics, model conditioning, etc.); convergence, error analysis, and the "patch" test; vibration and heat transfer analysis, and analogous analysis such as acoustics, illumination, etc. (EMEM-816)
Class 4, Credit 4 (W)

EMEM-870  Mathematics for Engineers I
Registration #0304-870
A concise introduction to the concepts of matrix and linear algebra, including determinants, eigenvalues, systems of linear equations, vector spaces, linear transformations, diagonalization, orthogonal subspaces and the Gram-Schmidt orthonormalizing procedure. (Graduate standing)
Class 4, Credit 4 (TBA)

EMEM-871  Mathematics for Engineers II
Registration #0304-871
Topics covered are orthogonal functions including Fourier Series, Fourier Integrals, Bessel functions, Legendre Polynomials, Sturm-Liouville problems and eigenfunction expansions; An introduction to calculus of variations, including problems with constraints; vector analysis including the directional derivative, the gradient, Green's Theorem, the Divergence Theorem and Stokes' Theorem. (Graduate standing)
Class 4, Credit 4 (TBA)

EMEM-872  Mechanics
Registration #0304-872
Variational principles are developed and applied to the area of solid mechanics. Exact and approximate solution techniques are applied to the solutions of static and dynamic structural problems. 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 (TBA)

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. These methods are developed for: Algebraic and transcendental equations in single variable; system of linear algebraic equations by both direct and iterative techniques; system of nonlinear 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.
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.
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)

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 Lab Registration #0305-650
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 Design
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 and television. No special sequence required. Prerequisite for major in Graphic Design.
Lab 9, Credit 4 (offered each year)

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

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

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

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

FADC-520 Professional Design Business Practices and Ethics
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)

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

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

FADD-411, 412, 413 Design Applications
Registration #0403-411,412,413 An elective that provides basic instruction in three dimensional computer graphics applications for designers.
Lab 6, Credit 3

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

FADD-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)

FADD-210, 211, 212 Drawing
Registration #0404-210,211,212 A basic foundation in drawing as a form of creative expression and a means to communicate information. Through the use of organic and inorganic materials attention is given to individual response to "seeing" as interspersed with all sensory conditioning. The figure is utilized in the analysis of action, structure, and gesture through quick sketches.
Lab 9, Credit 4 (offered each year)
FADF-221, 222, 223 Design for Photo I
Registration #0404-221,222, 223
Study of principles of two- and three-dimensional design as a means of communication and expression.
Class 1, Lab 2, Credit 2 (offered each year)

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

FADF-241, 242, 243 3-D Design Registration #0404-241,242,243
The elements of design and color and their structural relationship as applied to problems in three dimensions. A variety of media are used.
Lab 6, Credit 3 (offered each year)

FADF-261, 262, 263 Drawing (Crafts Majors)
Registration #0404-261,262,263
Drawing in a variety of media. Introduction to line form, and color as elements of pictorial expression. Organic and inorganic materials are used.
Lab 6, Credit 3 (offered each year)

FADF-321, 322, 323 Design for Photo II Registration #0404-321,322,323
Emphasis upon problems which are related to visual phenomena, fundamentals, and communications. Expression through image making, viewing and discussion.
Class 1, Lab 2, Credit 2 (offered each year)

FADF-301, 302, 303 Drawing and Painting Registration #0405-301,302,303 (Sophomore Core)
Emphasis is placed upon drawing and the objective mastery of form and space from a variety of visual sources including the human figure. Development of basic techniques, materials and concepts of painting media. Prerequisite for major in Painting; 301 and 302 for Medical Illustration.

301 - Drawing — Media
302 - Drawing — Composition
303 - Drawing — Illustration
Lab 9, Credit 4 (offered each year)

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 during fall and winter quarters. For spring quarter carbon dust illustration techniques will be introduced, thus beginning a sequence of illustrative techniques leading to mastery of medical illustration.
Lab 6, Credit 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-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 Option Registration #0405-404,405,406 (Junior Major)
A three quarter sequence painting and illustration, (one day of each per week). Painting: Development of painting media and concepts. Emphasis placed upon individual solutions and expression. Illustration: Specific and structured problem solving offers the student the opportunity to develop skills and concepts in illustration, including scientific and technical illustration.
Lab 12, Credit 6 (offered each year)

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)

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 6, Credit 5 (offered each year)

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)
FADR-511, 512, 513  Printmaking
Registration #0406-511,512, 513
An elective that provides further exploration of printmaking with emphasis on personal statement.
Lab 6, Credit 3 (offered each year)

FADS-411, 412, 413  Sculpture
Registration #0407-411,412,413
The course develops formal sculptural concepts through a variety of processes and materials. Studio practice involving work in paper, wood, fabrics, metal, stone, clay, and plastics.
Lab 6, Credit 3 (offered each year)

FADK-401, 402, 403  Packaging Design II
Registration #0440-401,402,403  (Junior Major)
The course progresses through a series of interrelated experiments, covering analysis and visual translation of package form and function, package structure, production processes, package trends, materials, and package graphics.
Lab 12, Credit 6 (offered each year)

FADK-501, 502, 503  Packaging Design III
Registration #0440-501,502,503  (Senior Major)
The course will further investigate analysis and visual translation of package form and function, package structure, production processes, package trends, construction, materials and package graphics. A strong emphasis will be placed on preparation of a portfolio.
Lab 18, Credit 9 (offered each year)

School for American Craftsmen

FSCC-200  Ceramics Materials and Processes (Freshman Major)
Registration #0409-200
Sequential course for three quarters providing fundamentals of the preparation and use of clay. Methods of fabrication such as hand building, application of glazes. Stacking and firing of kilns. Ceramic Sculpture. The organization of the ceramic shop. Survey of pottery.
Lab 15, Credit 5 (offered each year)

FSCC-251, 252, 253  Ceramics Elective I
Registration #0409-251, 252,253
An elementary course in design and techniques in ceramics. Each quarter different techniques are taught including wheel, hand building, glaze, and decorating.
Lab 6, Credit 3 (offered each year)

FSCC-300  Ceramics Materials and Processes (Sophomore Major)
Registration #0409-300
Sequential course for three quarters providing intensive work on the potter's wheel and individual clay and glaze problems. Emphasis on function and decorative techniques, ceramic raw materials, sources of supply, use and maintenance of equipment and glaze chemistry.
Lab 15, Credit 5 (offered each year)

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

FSCC-400  Ceramics Materials and Processes (Junior Major)
Registration #0409-400
Lab 15, Credit 5 (offered each year)
FSCF-500 Ceramics Techniques and Registration #0409-500 Thesis (Senior Major) Sequential course for three quarters, treating problems related to ceramic production culminating in a research and thesis project. Lab 24, Credit 8 (offered each year)

FSCF-225, 226, 227 Art and Civilization Registration #0410-225, 226, 227 Survey of the history of art from prehistory to the present, with particular attention given to the social and cultural backgrounds of art production and to the relationship between the arts: architecture, sculpture, painting, and decorative arts and crafts. Lectures, independent study, discussion groups, assigned gallery visits, papers, reports. Class 3, Credit 3 (offered each year)

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

FSCF-310 History of Crafts Registration #0410-310 Explores creative thinking and designing in the area of crafts through the ages with special emphasis on clay, fibers, glass, metal and wood. The course highlights the artistic achievements of the craftsmen of the past to enable present students to view their own time in its historical perspective and thereby understand more thoroughly their creative heritage and the efforts of contemporary craftsmen. Class 3, Credit 3 (offered each year)

FSCF-320 History of Art Criticism Registration #0410-320 A study of what makes art "good," (philosophical theories of art and the aesthetic experience) and what art criticism is and does (types and principles of art criticism) with direct applications to the life and work of the artist and craftsman/designer. Class 3, Credit 3 (offered each year)

FSCF-330 Philosophy in Art Registration #0410-330 Traces the historical changes that art has undergone. Traces the interaction between philosophic thought and artistic styles throughout art history. Explores art as a reflection of human values. Class 3, Credit 3 (offered each year)

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

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

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

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

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

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

FSCG-200 Glass Materials and Registration #0411-200 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 Registration #0411-300 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 Registration #0411-400 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 Registration #0411-500 (Senior Major) A sequential course for three quarters providing individual research in technical problems culminating in a thesis. The student will organize and present a senior exhibition of work related to the thesis, papers, lectures and demonstrations. Lab 24, Credit 8 (offered each year)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Lab/Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSCG-520</td>
<td>Stained Glass</td>
<td>An elective relating advanced individual exploration using structural elements of color design and visual expression. Fabricating techniques involve cutting, shaping, soldering, leading, foiling, glazing stained glass.</td>
<td>Lab 6, Credit 3</td>
</tr>
<tr>
<td>FSCM-200</td>
<td>Metalcrafts Materials and Techniques</td>
<td>Sequential course for three quarters, introducing basic exercises in the use of equipment and metalcrafts techniques through hollowware and jewelry design in various metals. Included will be the discussion and metal design utilizing the techniques of fabrication, forging, raising and casting.</td>
<td>Lab 15, Credit 5</td>
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<td>FSCM-251, 252, 253</td>
<td>Metalcrafts Elective I</td>
<td>An elective course providing an opportunity for introductory study in metals either hollowware or jewelry.</td>
<td>Lab 6, Credit 3</td>
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<td>FSCM-300</td>
<td>Metalcrafts Materials and Processes</td>
<td>Sequential course for three quarters, introducing basic exercises in the use of equipment and metalcrafts techniques through hollowware and jewelry design in various metals. Included will be the discussion and metal design utilizing the techniques of fabrication, forging, raising and casting.</td>
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<td>FSCM-351, 352, 353</td>
<td>Metalcrafts Elective II</td>
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<td>FSCW-200</td>
<td>Woodworking Materials and Processes</td>
<td>Sequential course for three quarters, introducing basic exercises in the use of equipment and metalcrafts techniques through hollowware and jewelry design in various metals. Included will be the discussion and metal design utilizing the techniques of fabrication, forging, raising and casting.</td>
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<td>FSCT-200</td>
<td>Textile Materials and Processes</td>
<td>Sequential course for three quarters, providing an analysis of new developments 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.</td>
<td>Lab 15, Credit 5</td>
</tr>
<tr>
<td>FSCT-300</td>
<td>Textile Elective I</td>
<td>An elective course providing an opportunity for more advanced study in textiles. Each quarter a different area of study is undertaken in basketry, stitchery, and other non-loom processes.</td>
<td>Lab 6, Credit 3</td>
</tr>
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<td>FSCT-400</td>
<td>Textile Materials and Processes</td>
<td>Sequential course for three quarters, providing an analysis of new developments 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.</td>
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<td>FSCT-500</td>
<td>Textile Techniques and Processes</td>
<td>Sequential course for three quarters, introducing basic exercises in the use of equipment and metalcrafts techniques through hollowware and jewelry design in various metals. Included will be the discussion and metal design utilizing the techniques of fabrication, forging, raising and casting.</td>
<td>Lab 24, Credit 8</td>
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<td>FSCT-520</td>
<td>Business Practices for the Craftsperson</td>
<td>Fundamental craft business practices, including setting up a business, basic record keeping, banking, pricing, government regulations, insurance, marketing, and studying operations.</td>
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<tr>
<td>FSCW-251, 252, 253</td>
<td>Wood Elective I</td>
<td>An elective course in design and techniques in woodworking. Hand and power tools will assist in the small scale making of wood objects.</td>
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<td>FSCW-351, 352, 353</td>
<td>Wood Elective II</td>
<td>An elective course providing an opportunity for more advanced study in woodworking. Hand and power tools will assist in the small scale making of wood objects.</td>
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</tbody>
</table>
Graduate Courses, School of Art and Design

Beginning September 1982, the Communication Design program name has been changed to Graphic Design, and Environmental Design has been changed to Industrial and Interior Design.

Courses for the education concentration of the MST program are offered through the College of Liberal Arts, and course descriptions are given under that heading with a Liberal Arts call number.

Art Education

FADA-701, 702 (MST) Methods and Materials in Art Education (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 (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 Education (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-750 Graphic Design (Minor, Elective)
Advanced creative problem-solving experiences in graphic design imagery. Professional problems in visual techniques for communication media. Media Center facility available for extension of studio problems.
Lab 6, Credit 3 (offered every quarter)

FADC-780 Graphic Design (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 (MFA Major)
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 every year)

FADG-781 Two-Dimensional Computer Graphics Design (MFA Major)
Registration #0432-781
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 every year)

FADG-782 Three-Dimensional Computer Graphics Design (MFA Major)
Registration #0432-782
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 every year)

FADG-783 Visual Semiotics/Graphic Design (MFA Major)
Registration #0432-783
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 every 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 phototype setting 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)

FADG-785 Computer-Generated Slide Design (MFA Major)
Registration #0432-785
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.
Lab 9, Credit 3*(offered each year)

FADG-787 Advanced Computer Graphics Design (MFA Major)
Registration #0432-787
Advanced explorations of computer graphic applications. Projects include such topics as computer generated layout, digital type development, computer-aided instruction lessons, TV and electronic mail promotions and computerized animation.
Lab 18, Credit 6 (offered each year)
**Industrial and Interior Design**

FADD-750  Industrial and Interior Design  
Registration #0403-750  (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-751  Illustration  
Registration #0405-751  (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-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 6, Credit 3 (offered each year)

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, phototching, 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  
Registration #0408-782  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  Anatomical Studies (MFA Major)  
A study of pathological specimens and human dissection using colored pencil, pen and ink, carbon dust, and airbrush. Emphasis will be on rapid but accurate sketching and observation in the laboratory with a representation of form and structure in living tissue for the preparation of surgical procedures.  
Lab 6, Credit 3 (offered each year)

FADM-784  Medical Illustration 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 year)

FADM-785  Medical Illustration Operative  
Registration #0408-785  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 year)

FADM-786  Medical Illustration Operative f  
Registration #0408-786  Procedures II (MFA Majors)  
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)
Graduate Courses, School for American Craftsmen

Ceramics and Ceramic Sculpture

FSCC-750 Ceramics and Ceramic Sculpture (Minor, Elective)
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)
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)
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)
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 is placed on personal, independent development encouraging contemporary thought and concept.
Lab 6, Credit 3 (offered every quarter)

FSCG-780 Glass (Major)
Registration #0411-780
A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. All technical processes and techniques are to be considered relevant. The course is structured to provide a foundation for professional activity and to encourage exploration of personal concepts relating to the presentation of a body of visual work. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.
Lab 9-27, Credit 3-9 (offered every quarter)

Metalcrafts and Jewelry

FSCM-750 Metalcrafts and Jewelry (Minor, Elective)
Registration #0412-750
A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. Both holloware 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

FSCT-750 Weaving and Textile Design (Minor, Elective)
Registration #0413-750, 85, 86 Craftsperson (Elective)
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)

FSCT-750 Business Practices for the Craft (Elective)
Registration #0413-750, 85, 86 Craftsperson (Elective)
Fundamental craft business practices, including setting up a business, basic record keeping, banking, pricing, government regulations, insurance, marketing, and studying operations.
Class 3, Credit 3 (offered every other year)

FSCT-780 Weaving and Textile Design (Major)
Registration #0413-780
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, fenn- weave, ikat, multiple layer, dyeing, non-loom, pile rug, printed surface, silk-screen, tapestry, and soft sculpture. Design concepts are complements to the techniques. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.
Lab 9-27, Credit 3-9 (offered every quarter)

Woodworking and Furniture Design

FSCW-750 Woodworking and Furniture Design (Minor, Elective)
Registration #0414-750
This is a course in woodworking techniques and procedures. It enables the student to gain design competency through wood and an individual solution to wood projects based on suggested needs.
Lab 6, Credit 3 (offered every quarter)
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**

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-301, 302, 303  
History and Aesthetics of Photography  
Registration #0921-301,302,303

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. Credit 1, Class 3

PPHA-313  
Introduction to Fine Art  
Registration #0921-313

The meaning of fine art photography will be discussed and then explored by doing various fine art assignments which will lead the student to discover personal solutions to personal concerns. The faculty will provide surveys of fine art photographers, their work and the non-silver processes sometimes used. The class will be supplemented with field trips to museums, galleries, and artists' studios. Class 3, 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 2, Lab 8*, Credit 4

* Lab hours may not be scheduled and are to be completed in available time.

PPHA-460  
Photography for Printers  
Registration #0921-460

A workshop in black-and-white and color photography for non-photography majors. Technical and aesthetic information will be given to enhance the students' use of their equipment. Darkroom work will be limited to the black-and-white negative and print. Color work will emphasize improvement of camera techniques. Class 2, Lab 4, Credit 4

PPHA-501, 502, 503  
Photography as a Fine Art II  
Registration #0921-501,502,503

Emphasis is placed on the student's setting of goals, selection of assignments and projects, and expansion of work on his or her own terms. Lectures and experiences are oriented to encourage awareness of shared concepts in the other arts, goals set by working artists, and the relevance of the history of the visual arts to the student's work. (PPHA-403) Class 2, Lab 8, Credit 4

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 prerequisite) 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 photography is used in communications; to establish what pictures are needed, to discover how they may be found (or produced), and to make arrangements. A personal picture researching project will be produced by each student. Class 4, Credit 4

PPHA-535  
Gallery Management  
Registration #0921-535

A workshop involvement in the various aspects of a gallery operation including the preparation and display of photographs, arrangement for announcements and publicity and financial considerations. Credit 1

PPHA-538  
Photographic Careers Seminar  
Registration #0921-538

This seminar examines career options available to photography graduates. Students develop skills in resume preparation, interview practices and techniques, and personal goal setting. Students attend three special sessions offered by the Center for Cooperative Education and Career Services. 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  
Registration #0921-560

An introductory course which emphasizes the application of selected semiotic principles to the practice of photography. Semiotics is the study of signs and symbols and what they signify. Class 4, Credit 4

PPHA-599  
Independent Study  
Registration #0921-599

Learning experiences not provided by formal course structure may be obtained through use of an independent study contract. 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 siedcle 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-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/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-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, eel, ink and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is not required. No prerequisites.
Class 2, Discussion 1, Lab 2; Credit 4 (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
Principles and practices of photographic museum work are provided in a seminar with direct applications in a museum/gallery setting. Areas covered include collections management, gallery/exhibitions management, curatorial practices, and critical writing.
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  Teaching Photography
Registration #0903-753
A graduate course concerned with the art and craft of teaching photography in a formal and informal setting. Emphasis is on the practice of teaching photography based on accepted learning principles.
Credit 4

PPHG-754  Photographic Workshop for Teachers
Registration #0903-754
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
Biomedical Photography

PPhB-201, 202, 203
Biomedical Photography I
Registration #0901-201,202, 203
Basic photography course for biomedical photographers with emphasis on theory, craftsmanship and visual communication. Patient photography, close-up and other photography as a foundation for future biomedical photography.
Class 4, Lab 8, Credit 6

PPhB-211
Survey of Biomedical Photography
Registration #0901-211
Career opportunities, typical biomedical photography settings, types of photography performed. Ethical, professional, and personal relationships with patients, physicians, research and staff personnel.
Class 1, Credit 1 (S only)

PPhB-301, 302, 303
Biomedical Photography II
Registration #0900-301, 302,303
Further study and practice of theory and principles used in biomedical photography, including photomicrography, 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
Registration #0901-331,332,333
Study of basic principles of effective visual communication and design. Student will produce slide presentations and exhibition displays as well as anatomical demonstrations using cell animation techniques.
Lab. F-4, W-4, S-6, Credit 3

PPhB-401, 402
Advanced Photography in Biomedical Communications
Registration #0901-401, 402
Sophisticated and creative applications of photography serving the needs of the scientific community. Students explore a variety of specialized photographic techniques and a variety of philosophies. Assignments are performed which are similar to those encountered in biomedical and research institutes. (PPhB-303)
Class 2, Lab 4, Credit 4

PPhB-404
Microcomputer Applications
Registration #0901-404
in Biocommunications
This course is designed to introduce the student to numerous current microcomputer applications in biocommunications including elementary programming, computer graphics, spread sheet formats, word processing, inventory control, hardcopy methods, and modern 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.
Credit 4

PPhB-421
Scanning Photomicrography
Registration #0901-421
Scanning photomicrography is a technique which provides a universal depth of field in a photomicrograph while producing an axonomic 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 photomicrographs in the biological sciences.
Class 1, Lab 6, Credit 4
PPHB-501, 502, 503  Senior Thesis Production
Registration #0901-501, 502,503
An investigation, planning, organization and production of an audiovisual presentation, a learning package or an informational program for a biomedical communications client.
Class 2, Lab 8, Credit 4

PPHB-551, 552, 553  Special Topics in Registration #0901-551,552, 553 Photography
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper-level students.
Credit variable

PPHB-599  Independent Study Registration #0901-599
A student proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.
Credit variable

PPHB-781  Medical Illustration Advanced Registration #0901-781 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, photomicrography 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 4

Master of Science in Color Science, Appearance, and Technology
Approval of program pending before State Education Department.

PPHC-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

PPHC-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

PPHC-751  Special Topics: Color Perception Registration #0923-751
This course describes how we see color and what measurements of color mean. It includes information about the anatomy and physiology of the mechanism of vision and relates activities in that mechanism to the appearances of perceived colors. Methods for measuring and specifying color appearances are discussed. The implications and limitations of various kinds of color measurement are emphasized. Laboratory work includes measuring certain visual functions and using the data to make colorimetric specifications. (Permission of department)
Class 2, Lab 3, Credit 3

PPHC-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 or permission of instructor)
Class 3, Credit 3

PPHC-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. (PPHS-702 and CQAS-712 or permission of instructor)
Class 2, Lab 6, Credit 4

PPHC-803  Computer Colorant Formulation Registration #0923-803
This course explores modern methods of colorant formulation predictions for the coloring of polymers, textiles, paper (impact and non-impact), 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

PPHC-890  Thesis Registration #0923-890
Thesis based on experimental evidence obtained by the candidate in an appropriate topic as arranged between the candidate and the director of the program.
Credit 9, minimum for MS

PPHC-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

Film and Video

PPHF-201  Introduction to Film Production Registration #0902-201-01 (Film majors only) Registration #0902-201-02 (Elective/non-majors only)
A fundamental course in film production. Each student will plan and produce his/her own short film while participating in the productions of fellow students, the basics of all aspects of film making from developing the idea through final edited film will be covered.
Production will be in non-sync (Super 8) format. Students furnish film and processing; equipment is furnished by the department. (Elective to all undergraduate 3rd and 4th year Professional Photographic Illustration students, and other students by special permission)
Class 3, Lab 4, Credit 5 (F)

PPHF-202  Documentary and Non-Fiction Film Production Registration #0902-201-01 (Film majors only) Registration #0902-201-02 (Elective/non-majors only)
A fundamental course in Documentary and Non-Fiction Film Production. Students will plan and produce their own short films while also participating in the productions of fellow students. Production will be in non-sync (Super 8) format. Students furnish film and processing; equipment is furnished by the department. (PPHF-201 or a satisfactory equivalent or by permission of instructor)
Class 3, Lab 4, Credit 5 (W)
A technical survey of the tools and materials used in video production. (PPHF-202 or a satisfactory equivalent)

Class 3, Lab 4, Credit 5 (S)

PPHF-204 History and Aesthetics of the Moving Image (Film majors only)
Registration #0902-204-01 (Fiction Feature) Credit 3 (F)
Registration #0902-204-02 (Elective/non-majors only)

PPHF-205 History and Aesthetics of the Moving Image (Documentary) (Film majors only)
Registration #0902-205-01 Credit 3 (W)
Registration #0902-205-02 (Elective/non-majors only)

PPHF-206 History and Aesthetics of the Moving Image (Animated and Experimental) (Film majors only)
Registration #0902-206-01 Credit 3 (S)
Registration #0902-206-02 (Elective/non-majors only)

PPHF-207 Introduction to Portable Video
Registration #0902-207 Video I
A basic course for novices. Emphasis is on video as an interpretive and expressive medium. There is no restriction on the choice of image, style or content. Learning will take place in a communal, participatory environment so that ideas and experiences can be shared.

Two short video projects are required. 1/2" beta equipment, including editing facilities, is provided by RIT. Students must purchase a minimum of two 60-minute, 1/2" video cassettes.

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

PPHF-208 Introduction to Portable Video II
Registration #0902-208 In this course the student applies the basic video skills acquired in PPHF-207 to the design and realization of mature narrative imagery (1/2" beta). Progress is supervised by the instructor through regular screenings and conferences with the student. (PPHF-207)
Class 3, Lab 3, Credit 4 (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.
Credit 2 (F)

PPHF-311 Portable Video Production
Registration #0902-311 An examination of the practical, technical and aesthetic considerations of portable video production. Work involves single system 3/4" shooting and editing. Skills are developed in visual continuity, storyboarding, graphics, camera work, lighting, sound and offline insert editing. Viewings and discussion of the works of video artists and documentarians, critiques of student work, application workshops, outside readings and viewings supplement lecture presentations and production work.
Class 2, Lab 4, Credit 4 (F)

PPHF-312 Documentary and Multi-Camera Video
Registration #0902-312 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 mini-camera 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
Registration #0902-313 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
Registration #0902-321 This course explores the writing of non-fiction and fiction for theatrical and non-theatrical films and television. Experience in writing of fiction concentrates on the elements of dramatic construction. The exploration of non-fictional writing examines information gathering techniques and methods of investigation. Both non-fiction and fiction are treated as expository, story-telling forms. Students are responsible for writing film or television scripts on subjects of their own choosing and for completing several brief written exercises in areas such as character, dialogue, the interview, suspense, and plot. Although this course is designed primarily to meet the needs of film and television majors, it is not restricted to those students.
Class 2, Lab 3, Credit 3 (W)

PPHF-322 Writing for Film and Television II
Registration #0902-322 Continuation of PPHF-321. (PPHF-321 or consent of instructor)
Class 2, Lab 3, Credit 3 (S)

PPHF-323 Introduction to Animation
Registration #0902-323 An introduction to the techniques and practices of graphic and animated film production. This course provides training and practical experience in a wide variety of approaches to single frame motion picture production. Students produce a number of short film exercises utilizing both existing and original artwork. Some techniques covered in the course are: direct modification of the film surface, cell, ink, and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is not required. No prerequisites.
Class 3, Lab 2, Credit 4 (F)
PPHF-325 Introduction to Animation and Graphic Film Production
Registration #0902-325
A course in the techniques and principles of motion picture animation.
Class 2, Lab 4, Credit 4 (W)

PPHF-326 Animation and Graphic Film Production
Registration #0902-326
This course provides practice in all phases of single frame film production. Students produce a 16mm 60-second film with sound utilizing one or more techniques learned in the preceding two quarters. (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 computer, rather than with traditional motion picture techniques. A survey of 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-410 Materials and Processes of the Moving Image III
Registration #0902-410
The course introduces the student to 16mm film technology and production systems that apply to other media production as well. (PPHF-203, 310)
Class 1, Lab 2, Credit 2 (F)

PPHF-411 Visualization and Commercial Film Production
Registration #0902-411
A general overview 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. (PPHF-411 or permission of the instructor)
Class 2, Lab 6, Credit 5 (W)

PPHF-413 Film Project with Sound
Registration #0902-413
A short (5-10 min. suggested) film is produced by student teams. Advanced sound editing, sound mixing and A&B roll conforming are included. Cameras, lighting and editing equipment are provided but students are expected to provide sensitized goods and processing. Class 2, Lab 6, Credit 5 (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. Class 3, Credit 3 (F)

PPHF-432 Film Directing
Registration #0902-432
An in-depth penetration into the role of the film director as a specialization and a profession in the film making process. Included will be the related organic nature of the structure and function of the film crew and the film; the emerging role of the contemporary director, the categorization of the roles of the film crew; the director's relationship to each category; the director as a creative artist; viewing of films of famous directors and observation of a director in action. (PPHF-203, 313, 413 or equivalents)
Class 3, Credit 3 (S)

PPHF-434 Advanced Video
Registration #0902-434
A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing & store, computer imaging and animation are some of the topics covered. (PPHF-203, 310)
Class 3, Credit 3

PPHF-442 Film/Video Internship
Registration #0902-442
This course is designed to provide the students with on-the-job experience in the field of Film/Video. The student will seek and acquire a school approved internship position in a business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the internship coordinators will assist the student in evaluating the experience. The coordinator should be the faculty member most familiar with the student's internship field.
Credits 1-6/Qtr. (F, W, S)

PPHF-511 Motion Picture Workshop I
Registration #0902-511
Filmmaking as a means of interpretation and expression. 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. Production will be in non-sync (Super 8 format). Students furnish film and processing; equipment is furnished by the department.
Suggested prerequisite: A basic course in photography such as 0903-290 or equivalent experience.
Credit 9

PPHF-512 Motion Picture Workshop II
Registration #0902-512
Continuing from Motion Picture Workshop I, an introduction to advanced narrative and dramatic structure in the moving image. Work in the course includes the development of ideas in the combining of sound elements and includes further study of the fundamentals of continuity. Production will be in Super 8 format. Students furnish film and processing. Equipment is furnished by the department. (Motion Picture Workshop I or equivalent)
Credit 9
PPHF-541  Senior Production I  (Film/Television)  Credit 6  (F)
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)

PPHF-542  Senior Production II  (Film/Television)  Credit 6  (W)
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)

PPHF-543  Post Production  (Film/Television)  Credit 4  (S)
Completion of senior projects. Includes a review of post production techniques. (PPHF-542)

PPHF-551, 552, 553  Special Topics In Film & Video  Credit variable
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.

PPHF-599  Independent Study  Credit variable (F, W, S)
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.

General Photography

PPHG-200  Photography I  Credit 12
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- & PPHT-201,202,203. Since this course is such an intensive offering, some previous photographic experience is highly advisable.

PPHG-207, 208, 209  Still Photography  Credit 3
In the first quarter the students become familiar with the 35mm camera, processing and printing. The work is restricted to black-and-white photography. The aesthetics and basic understanding of photographic practice is covered. The second and third quarters deal with more advanced techniques and principles of photography. This series of courses is available for students who are not majoring in photography.

PPHG-290  Introductory Photographic Workshop  Credit 6
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.

Professional Photographic Illustration

PPHL-201, 202, 203  Applied Photography I  Credit 6 (W)
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  Credit 3
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  Credit variable
A one-quarter course introducing color as a new element in making photographs. The course will offer a theoretical, technical and aesthetic foundation in color photography. The student will gain familiarity with the materials through shooting assignments. Emphasis will be placed on developing printing skills.

Class 2, Lab 4, Credit 3

PPHL-300  Photography II, BFA Transfer  Credit 15 (SR)
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.

Class 4, Studio 5, Credit 5

PPHL-311, 312, 313  Applied Photography II  Credit variable
Advanced applied photography in black and white and color with emphasis on craftsmanship, problem solving, and visual communications. Major technical emphasis and introduction to studio electronic flash and large format photography. Further emphasis is placed on the development of the student's ability to apply creative thinking and contemporary techniques in executing meaningful and effective photographs.

Class 4, Studio 5, Credit 5

PPHL-315  Colloquia  Credit 1
A lecture/presentation offering the specific interests and passions of the faculty. The range is academically wide and varied.

Class 1, Credit 1
PPHL-340 Narrative/Documentary/ Registration #0904-340 Editorial Workshop
A major course in photojournalism and editorial photography. Emphasis will be placed on the development of intuitive photographic responses.

The objective of this five-week workshop will be to orient as well as challenge the students to photographically explore the nature of their subject matter and to visually communicate in a contemporary editorial spirit those responses and feelings to daily and weekly assigned projects that will be made in color slides and black-and-white prints.

A majority of these projects will be photographed on locations throughout Western New York and perhaps other not so distant environments including NYC. The educational direction of the workshop will be to visually explore photographic attitudes in approaching and solving photographic/photojournalism problems. The historic and aesthetic nature of photojournalism through documentation, recording, and personal responses will be applied as well as discussions through slide presentation and lecture on the nature of editorial magazines in the United States, Europe, and South America.

Critiques will be held after each project is edited and presented, enabling the student to obtain direct 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 Editorial Photography I
This course will explore the use of the photographic image in narrating, documentary and editorial form. The emphasis of the course will allow the students a variety of experiences. There will be emphasis on publication and public need.
Class 4, Field 5, Credit 5

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-203, 311)
Class 2, Lab 7, 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/Qtr.
* 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.
Class 4, Studio 5, Credit 5

PPHL-451, 452 Portrait Photography I & II Registration #0904-451, 452
Introduction to contemporary and commercial studio portraiture. Lighting with electronic flash (strobe) will be emphasized. Posing individuals and groups, coordinating clothing, props and background. Camera techniques and composition will be discussed. Prerequisite: (PPHL-313 or equivalent)
Lec 2, Studio 4, Credit 4 (F, W)

PPHL-453 Advanced Portrait Registration #0904-453 Photography
This course brings together the skills of the first two terms and encourages the student to develop a personal approach to portrait photography through a term long self-directed project. Prerequisite: (PPHL-452 or equivalent)
Lec 2, Studio 4, Credit 4 (S only)

PPHL-505 History of Applied Registration #0904-505 Photography
A chronological investigation into many areas of applied photography, including advertising, documentation, illustration, news, portrait, scientific, and travel. The works of major photographers and the influence of specific publications and events upon the style and use of photography will be examined.
Class 3, Credit 3

PPHL-516, 517, 518 Narrative/Documentary/ Registration #0904-516,517,518 Editorial Photography II
This course will explore and expand the use of the photographic image in the narrative/documentary and editorial point of view. Emphasis will be upon publication and professional use of the image.
Class 4, Field 5, Credit 5

PPHL-535, 536 Advanced Color Seminar Registration #0904-535, 536
This is a portfolio preparation course. It concentrates on the shooting, structure, and presentation of a body of work. Completion of a four part thematic assignment and three individual photographic assignments are required. All assignments are non-specific in nature, allowing the student the freedom of his or her own direction. As part of the course requirements, each student will choose an appropriate portfolio format and will begin to show a portfolio. (Four year standing or instructor's permission)
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 towards the application of the acquired skills through a series of professionally oriented assignments.
Class 4, Studio 5, Credit 5

PPHL-551 Registration #0904-551 Special Topics
Advanced topics of current or special interest, varying from quarter to quarter, selected from the field of professional photographic illustration. Special topics announced in advance. (Not offered every quarter. Consult coordinator of the Professional Photographic Illustration Program.)
Credit variable

PPHL-599 Independent Study Registration #0904-599
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper level students with a GPA of 3.0 or greater.
Class, Credit variable

Photographic Processing and Finishing Management

PPHM-201, 202, 203 Basic Principles of Registration #0905-201,202,203 Photography
The program of study is designed to provide photographic marketing students with a thorough knowledge of the basic photographic process in order that they may have an understanding of how photographs 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 4, Lab 4, Credit 4
PHEM-204 Orientation to Production Photographic Processing and Finishing

This course is designed to provide the photo management freshman with an orientation to the facilities, equipment, practices and procedures of the Processing and Finishing Management Lab prior to having to assume responsibility of working in the lab. This course will also introduce the freshman to some of the basic problems of the processing and finishing industry. Prerequisite: freshman standing in the Photographic Processing and Finishing Management program.

Class 1, Credit 1 (F only)

PHEM-211, 212, 213 Introduction to Photofinishing Technology

This course is designed to provide Photographic Processing and Finishing Management students with a thorough knowledge of the basic photographic process so that they will have an understanding of how photographic products work. Included will be units of study on film characteristics, optics, photographic chemistry, sensitometry and color theory. Each of these areas will be related to the practice of picture making.

Class 2, Lab 4, Credit 4

PHEM-300 Production Processing and Finishing

A 10-week summer course which provides an opportunity for students who have completed basic photography to gain an understanding of all aspects of production processing and finishing. They will be involved with machine processing on a full production basis. A hands-on-type of learning experience will be the method most often employed in this course. (Permission of the instructor)

Class 2, Lab 30, Credit 12 (SR)

PHEM-301 Film Processing

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

Class 2, Lab 8, Credit 4

PHEM-302 Automated Printing

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. (PHEM-213, PPHS-203, or PPH-213)

Class 2, Lab 8, Credit 4

PHEM-303 Custom and Professional Finishing

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

Class 2, Lab 8, Credit 4

PHEM-310 Survey of Production Processing and Finishing

Provides the non-photographic processing and finishing major with an opportunity to become knowledgeable in the operational procedures and services of a processing and finishing laboratory. (PHEM-203)

Class 2, Credit 2 (S)

PHEM-313 Introduction to Color Science and Appearance

A survey course exploring the basic principles of color perception, the interaction of light and objects, the effects of illumination on color appearance, the specification of illuminating sources, colorimetry, and instrumentation used for colorimetry and photographic quality control.

Class 4, Credit 3

PHEM-320, 321 Mechanics of Photographic Hardware

The course will cover causes, effects and benefits of the application of basic principles of optics, mechanisms and electronics embodied in the type of hardware handled by retail and wholesale photographic establishments catering to the general public. (PHEM-203)

Class 4, Credit 4 (W, S)

PHEM-401, 402 Photographic Process Control

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. (PHEM-303 or PHEM-300)

Class 2, Lab 6, Credit 4

PHEM-410, 411, 412 Training and Supervision of Photographic Processing and Finishing Laboratory Personnel

Provides an opportunity for the processing and finishing management students to experience supervisory and training techniques as they prepare and use training aids and techniques in the actual supervision of the various work areas in the processing and finishing laboratory. (PHEM-303, or PHEM-300)

Class 2, Lab 8, Credit 4

PHEM-420 Applied Statistical Quality Control

An introduction to the use of applied statistics for the purpose of controlling repetitive manufacturing processes. Topics to be addressed include: process capability studies, conformance to specification, control charts for variables and attributes, process control and product and sampling plans. Emphasis will be placed on the use of these techniques in the photofinishing industry.

Class 2, Lab 2, Credit 3

PHEM-430 Technical Writing

This introduction to technical writing will review the fundamentals of good syntax, punctuation and usage as well as provide the student with writing exercises designed to increase the student's proficiency in technical report writing. In addition to stressing the structural elements of scientific and technical literature, each student will learn to use the RIT VAX system for word processing.

Class 2, Lab 2, Credit 3

PHEM-501, 502, 503 Senior Seminar in Production Processing and Finishing Management

This course is designed to help the photo management student make last minute preparations for entering the world of work. Procedures for obtaining employment, i.e., preparing resumes, taking interviews, plant visitations, etc., will be covered in detail. Information on the latest business practices and procedures will be discussed in depth as well as the current condition of the processing and finishing market. (Senior standing)

Class three times a quarter for three quarters. Credit 1

PHEM-506 Theory of Corrective Color Printing

A study of characteristics of color negatives as they relate to corrective color printing. Theory and methods of color and density correction levels will be discussed. Various approaches to automatic classification will be studied. The students will be introduced to matrix control of color printing as utilized in digital computer controlled printing equipments. (PHEM-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, workflow, layout, and equipment complements which lead to efficient operation. Cost analysis of a laboratory operation will be presented and optimization techniques for cost reduction and scheduling will be discussed.
Class 4, Credit 4

PPHM-511, 512, 513 | Advanced Production Processing and Finishing | Registration #0905-511,512,513
This course takes place over the last year of study and 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-551, 552, 553 | Special Topics in Photographic Processing and Finishing | Registration #0905-551, 552, 553
A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered in the regular curriculum. Available to upper level students.
Credit variable

PPHM-599 | Independent Study | Registration #0905-599
A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper level students with a GPA of 3.0 or greater.
Credit variable

Imaging and Photographic Technology

PPHT-201, 202, 203 | Photography I | Registration #0920-201, 202, 203
A study of the fundamentals of photography with emphasis on the development of the necessary creativity, craftsmanship, theory and visual communications to undertake advanced study in the medium. The theory and technical aspects are taught as they relate to solving photographic problems.
Class 4, Studio 4, Lab 4, Credit 7

PPHT-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.)
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-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.
Class 2, Lab 3, Credit 3

PPHT-302 | Technical Photographic Chemistry | Registration #0920-302
An introduction to the chemical concepts of photographic processing. Investigations of processing methods and variations are carried out in the laboratory. Report preparation and a lab notebook are required. (PPHT-213 and PPHT-301)
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 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
Study 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/Design | Registration #0920-311
The exploration of images through the application of visual elements, principles and attributes, including the key and quality of light in the making of photographs, color contrast and rendition, and comparison of rendition from different materials.
Class 2, Lab 4, Credit 4

PPHT-312 | Color Printing/Theory | Registration #0920-312
The theory and practice of color photographic systems including the study of color vision, principles and photographic materials, with practice in printing from separation negatives, color negatives and transparencies. Topics include color analysis and synthesis, additive and subtractive systems, color measurement, color filters, the Ostwald, Munsell, and CIE color notation systems, illumination for color, color coupling, dye bleaching, instant color photography, masking, color scanners, color television, metamerism, visual effects, and permanence of color images.
Class 2, Lab 4, Credit 4
Class 1, Lab 4, Credit 4

PPHT-313 Color Measurement
Registration #0920-313
Equipment and methods used for the measurement of color will be discussed and demonstrated in the laboratory. Topics covered include light sources, radiometry, spectrophotometry, color order systems, and reproduction of color. Pascal programming will be presented and programming assignments will be required. (PPHT-321 or equivalent)
Class 3, Lab 4, Credit 5

PPHT-321 Applied Computing for
Registration #0920-321 Technical Photography
Current timesharing computer facilities will be introduced with emphasis on specific hardware and software packages available on these facilities including word processing. Introductory material on Pascal programming will be presented. Programming assignments will be required. (Limited to Imaging and Photographic Technology students or by the permission of the instructor)
Class 2, Credit 2

PPHT-340 Introduction to Scientific and
Registration #0920-340 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, velocity and time measurement cameras, polarization, time lapse, astrophotography, and others. Firsthand experience is encouraged by participation in simulated and simplified approaches to more complex specialties.
Class 2, Lab 4, Credit 4

PPHT-341 Introduction to Photography for Publications
Registration #0920-341
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 from the basis of the course content. (PPHL-313, PPHT-312 or the permission of the instructor)
Class 2, Lab 8*, Credit 4
* Lab hours may not be scheduled and are to be completed in available time.

PPHT-395 Photo Electronics Workshop
Registration #0920-395
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 Seminar
Registration #0920-401,402,403
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
Registration #0920-404,405,406
A survey of this type of publication with particular emphasis on the photographic problems involved. Skill-building assignments to improve competence and an introduction to the problems of the art director, editor, printer, layout person, and writer from the basis of the course content. (PPHL-313, PPHT-312 or permission of the instructor)
Class 2, Lab 4, Credit 4

PPHT-410 Architectural Photography
Registration #0920-410
An image-making course for advanced students with a specific interest in interior and exterior architectural photography. Assignments are designed to emphasize the development and exploration of professional attitudes and techniques while providing a comprehensive study of the subject. All required work will be on color transparency materials. (PPHL-313, PPHT-312 or permission of the instructor)
Class, Credit 9 (SR only)

PPHT-411 Preparation of Visuals
Registration #0920-411
Study of the basic principles and techniques of effective visual communication and design; including charts, graphs, creative 35mm slide techniques, graphic design, and mechanical art requirements for printing. Assignments are compatible with situations in graphic design and AV studio facilities.
Class 2, Lab 2, Credit 3

PPHT-412 Photomacography/Photomicrography
Registration #0920-412
Basic principles of photomacography and photomicrography with major emphasis on illumination techniques and image formation, with lectures, demonstrations, and projects.
Class 2, Lab 4, Credit 3

PPHT-421 Holography I
Registration #0920-421
This course is intended to be an introduction to holography theory and techniques. Lectures and demonstrations will cover the materials, processes, and applications of the fundamental types of holograms. Labs will give hands-on experience with the construction and playback of transmission, reflection, and focused image hologram types. (Algebra and physics)
Class 2, Lab 4, Credit 4

PPHT-425, 426, 427 Nature Photography
Registration #0920-425,426,427
Student 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 electronic flash, adapting to adverse weather conditions, sale of photographs, copyright law, free-lancing and more.
Class 2, Field 4, Lab 4*, Credit 4
* Lab hours may not be scheduled and are to be completed in available time.

PPHT-441 Introduction to Dye Transfer
Registration #0920-441
An introduction to the Dye Transfer process using pan matrix film with emphasis on the understanding of its theoretical principles, and on the mastery of basic transfer techniques. This includes the preparation of transfer prints from the student’s color negatives. (PPHT-312 or equivalent)
Class 1, Lab 6, Credit 4

PPHT-442 Advanced Dye Transfer I
Registration #0920-442
A continuation of the Dye Transfer Process with emphasis on the understanding and mastery of masking and color separation (analysis) of a color transparency. The synthesis is accomplished by the making of a dye transfer print. (PPHT-441, PPHT-312 or equivalent)
Class 1, Lab 6, Credit 4
PPHT-443  Advanced Dye Transfer II  Registration #0920-443
This quarter of the Dye Transfer program is devoted to the variations of standard techniques and further extension of improvement of procedures. Difficulty of procedure will determine number of assignments required. (PPHT-442 or equivalent)
Class 1, Lab 6, Credit 4

PPHT-444  Reversal Color Printing  Registration #0920-444
A one-quarter course on reversal color printing procedures, printing and processing. The student will gain proficiency in using reversal print material. (PPHT-312 or permission of the instructor)
Class 1, Lab 4, Credit 3

PPHT-446, 447, 448  Advanced Color Printing I, II, III  Registration #0920-446, 447, 448
This course is designed to give the student an advanced study in color techniques and theory in relation to quality and creative use of photographic materials. The student may choose a section for intensive study such as the dye transfer process, quality control methods in printing and processing and special masking. (PPHT-312 or equivalent and permission of the instructor)
Lecture 1, Lab 6, 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  Senior Project  Registration #0920-503
Investigation of a topic in the area of applied, technical, or scientific photography, involving camera and/or laboratory work, evaluation, oral presentation of the results, and a written report in a standard format. (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

PPHT-520  Color Photography Workshop  Registration #0920-520-01
A creative color workshop with the goal to produce visually effective color photographs. The student is free to choose from a large variety of assignment suggestions or to structure a program individually as an independent study. Besides creativity, principles of design and photographic controls will be important. Most photographs will be produced on color transparency material. The last two weeks can be spent color printing for those wishing this experience.
Students are expected to furnish their own small or medium format cameras and supplies. Large format cameras and chemicals are furnished. Color film and paper expenses can be expected to run as high as $75 to $100. (Some previous photographic experience required. Registration limited; permission of the instructor)
Credit 9 (SR)

PPHT-551, 552, 553  Special Topics in Imaging and Photographic Technology  Registration #0920-551, 552, 553
A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered in the regular curriculum. Available to upper-level students. Credit variable

PPHT-599  Independent Study  Registration #0920-599
A student-proposed advanced project sponsored by a faculty member. Approval of the proposal by the department chairman and the school director required. Available to upper level students with a GPA of 3.0 or higher.
Credit variable

Storage Applications Design

PPHV-731  Storage Applications Design I  Registration #0922-731
An exploration of the technology, psychology, and aesthetics of modern storage applications with their massive image-information-delivery capacities, including an analysis of the hardware and software of videodiscs and optical discs as image banks with attendant databases and the effects of interactivity on system design. (Completion of undergraduate degree or equivalent; some background in computers or communication arts or science)
Class 4, Credit 4
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.

PIMG-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)

PIMG-201, 202, 203 Photography for Scientists and Engineers
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

PIMG-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 photosist systems, sensitometry, tone reproduction, image quality, geometrical optics and photographic instrumentation.

Class 2, Lab 2, Credit 2

PIMG-210 Fundamentals of Imaging Science II
Registration #0925-210
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 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 (Transfer)
Registration #0925-215
This course contains the material in PIMG-205 which deals with the physical and chemical properties of radiation and chemistry and sensitometric behavior of silver-halide, diazo and photosist 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 (Transfer)
Registration #0925-216
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)
Registration #0925-225
This course contains the material in PIMG-433 and PIMG-434. For transfer students.

Class 5, Credit 5

PIMG-303 Photographic Instrumentation
Registration #0925-303
Introduction to the use of photographic recording methods to obtain space and time information from object fields; principles for selection of camera, lens parameters, recording material and recording rate; the use of time and space references to facilitate data retrieval. (PIMG-203)

Class 2, Lab 6, Credit 4

PIMG-312 Applied Processing
Registration #0925-312
Problems in applied processing and the application of analytical chemical techniques to the control of black-and-white and color processing solutions. Processing faults, and image restoration, trouble shooting, archival permanence, ecology and processing machine operation. Statistical techniques application to machine control. (SCHG-206, PIMG-203)

Class 2, Lab 6, Credit 4
PIMG-313  Introduction to Colorimetry
Registration  #0925-313
An introduction to how the interaction of light, matter, and the visual system create the sensation of color. Topics include color physics; color measurement including spectrophotometry, spectroradiometry, and colorimetry; color perception including introductory color vision theory, color mixing principles, and color order systems; the CIE system; and instrumental and visual color difference evaluation. Accompanying laboratory will concentrate on instrumental measurements.
Class 3, Lab 3, Credit 4

PIMG-401  Radiometry
Registration  #0925-401
The course serves as an introduction to the physics of light, its general properties, its interaction with materials, and the general techniques used to measure the effects of viewing and illuminating conditions on color appearance. The course will include colorimetry, glossimetry, color tolerancing, metrology principles, and the use of scientific literature in the field of colorimetry. The course will be divided into two parts: the theoretical part will be taught by a panel of experts from the industry, and the practical part will be taught by a group of students.
Class 3, Lab 6, Credit 4

PIMG-402  Image Microstructure
Registration  #0925-402
Introduction to image formation and structure: mathematical models for spread functions of image-forming elements and detectors; superposition and convolution; noise; sinusoidal response functions; figures of merit; characteristics of instruments used for small-scale image measurements. Laboratory work in microdensitometry and subjective image evaluation. (SMAM-305, PIMG-203, SPSP-313)
Class 3, Lab 5, Credit 5

PIMG-404  Introduction to Scientific Research
Registration  #0925-404
A course for third-year students in imaging and photographic science designed as preparation for the fourth-year research project. Project selection and the use of scientific literature; preparation of proposals; research notebooks; patents; consideration in data collection and analysis; written and oral presentations. (Third-year status in Imaging and Photographic Science or permission of the instructor)
Class 2, Credit 2

PIMG-409  Color Appearance and Technology
Registration  #0925-409
An in-depth course dealing with the proper methodologies to quantify the chromatic and surface properties of objects. Topics stressed include colorimetry, glossimetry, color tolerancing, metrology problems, visual scaling techniques using color order systems, and the effects of viewing and illuminating conditions on color appearance. Accompanying laboratory will concentrate on visual measurements and experimental techniques. (PIMG-313 or PPHT-313 and instructor’s approval)
Class 3, Lab 4, Credit 4

PIMG-411  Statistical Inference
Registration  #0925-411
An introduction to the theory and application of statistical methods. The course begins with a discussion of events and sample spaces along with fundamental probability concepts. The mathematical foundations of discrete probability functions and continuous probability density functions are developed. The concept of moments is presented along with moment generating functions as a means for studying the properties of probability functions. The concepts of central tendency and dispersion of probability functions are introduced. Fundamental examples of random processes encountered in imaging systems are used to illustrate the mathematical and statistical techniques developed. FORTRAN programming assignments are required. (SMAM-305, SMAM-306, ICSP-220)
Class 2, Lab 2, Credit 3

PIMG-412  Design of Experiments
Registration  #0925-412
Introductory hypothesis testing of means and variances is developed in the context of developing an evaluation of experimental objectives. The concepts and fundamental theoretical background behind linear regression analysis is presented. Techniques of analysis of variance are introduced as a method for evaluating the precision of a regression model. Analysis of variance is then developed as a general experimental tool. Methods of experimental error propagation are developed. Programming assignments are required. Statistical software packages are presented and analysis problems using the BMDP system are assigned. Advance topics such as spline fitting, simplex analysis, and principal components are discussed. (PIMG-411, FORTRAN experience)
Class 3, Credit 3

PIMG-413  Statistical Quality Control
Registration  #0925-413
The statistics of process control are introduced using examples from the photographic and imaging industries. Techniques such as control charts are examined from both a theoretical and a practical point of view. Attribute and acceptance sampling techniques are discussed including MILSTD-105D and CSP-1 sampling statistical techniques are developed including techniques to measure subjective image quality. Programming assignments may be required. (PIMG-412)
Class 3, Credit 3

PIMG-421, 422, 423  Photographic Chemistry
Registration  #0925-421,422,423
The chemistry and photographic properties of photographic emulsions and developer solutions at the intermediate level; topics in physical, organic, and analytical chemistry necessary to the continued study of photographic science. (PIMG-312, SCHG-207)
Class 3, Lab 3, Credit 4

PIMG-433, 434  Statistics I, II
Registration  #0925-433, 434
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-441  Advanced Micro lithography
Registration  #0925-441
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 Registration #0925-521,522,523 Evaluation
An analytical approach to analysis and evaluation of photo-optical and other images recording systems; objective and subjective evaluation techniques and their correlation. The use of convolution, correlation, autocorrelation, and Fourier methods in the analysis of the image-recording systems. Laboratory work in the design of photo-optical systems. (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 Registration #0925-531,532,533 Process
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
An introduction to the principles of optics which form the basis for further study in the field, topics include one- and two-dimensional vibrations, wave motion, superposition of waves, interference and interferometry, single, double, and multiple slit diffraction, and polarization. Lenses, mirrors, prisms, diffraction gratings, lasers and other radiation sources are described as fundamental components in optical systems. (SPSP-313)
Class 3, Lab 3, Credit 4

PIMG-543  Optical Engineering Registration #0925-543
An introduction to the characteristics of optical components and their combination into instrument and imaging systems. Radiation Sources. Refracting and reflecting optical components. Stops, pupils and the propagation of energy through optical systems with both image forming and image recording elements. Radiation measurement techniques and apparatus. Discussion of lenses, cameras, collimators, telescopes, alignment and measurement apparatus, and other instruments. Limitations on system performance. (PIMG-541)
Class 3, Lab 3, Credit 3

PIMG-551, 552, 553  Special Topics in Imaging Registration #0925-551,552,553 Science
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 silver-halide, 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-600  Principles of Imaging Science Registration #0925-600
A course intended for students who have completed their undergraduate programs in engineering or the sciences and who desire to prepare themselves for entry into the graduate program in imaging science or who desire a working knowledge of this field at an undergraduate level. It is an intensive course, assuming working knowledge of undergraduate mathematics, physics and chemistry. Course topics include radiation and radiometry, properties of radiation-sensitive materials, chemistry of photographic processing, sensitometry, tone reproduction, principles of color measurement, color photographic systems, image microstructure, and photographic instruments. The course includes both lectures and laboratory work. (Registration requires consent of the graduate coordinator.)
Credit 15 (SR only)
(Not applicable to the 45 required graduate credits in the Imaging Science graduate program)

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-711, 712, 713  Theory of the Photographic Registration #0925-711,712,713 Process
Physical structure and optical properties of the silver-halide emulsion and their relations to the characteristic curve; chemistry and preparation of emulsions; treatment of theory of sensitivity and latent image formation; chemistry and kinetics of processing; chemistry and physics of selected non-silver processes.
Class 3, Credit 3

PIMG-721, 722  Mathematics and Statistics Registration #0925-721,722 for Photographic Systems
A special graduate course in mathematics and applied statistics involving those areas of direct concern in design, analysis, and evaluation of photographic systems.
Credit 4

PIMG-731, 732, 733  Instrumental and Registration #0925-731,732,733 Photographic Optics
The principles of geometrical and physical optics with application to photographic instrumentation systems. First-order imaging, aberrations and geometrical image evaluation, mirror and prism systems, basic insta lment systems, electromagnetic waves, polarization, interference and function description of imaging performance.
Class 3, Credit 3

PIMG-741, 742, 743  Analysis and Evaluation of Registration #0925-741,742,743 Imaging Systems
Complex variables and Fourier analysis with application to imaging of images; 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 Registration #0925-751,752,753 Photographic Science
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 Registration #0925-761 Analysis (Introduction)
An introduction to radiometric concepts as they relate to remote sensing. The emphasis is on aerial imaging systems, photo interpretation and photogrametry. Techniques for quantification of air photos are introduced.
Class 3, Lab 4, Credit 4
School of Printing

All courses in the School of Printing are offered at least once annually, except as noted.

Management Courses

PPRM-201 Introduction to Technical Writing
Registration #0910-201
Basic approach to fundamentals of modern technical writing; review of English and writing skills; consideration of principles, techniques, form and style.
Class 3, Credit 3

PPRM-210 Financial Controls I
Registration #0910-210
Gives the line manager an understanding of a company’s financial accounting system so that he or she can work with the accounting group to use the system effectively. Includes preparation of the Income Statement and the Balance Sheet and discussion of inventory valuation, depreciation, financial ratios, financing considerations, and financial statement analysis. The course requires students to complete a computerized practice set simulating record keeping and analysis of an accounting cycle.
Class 3, Credit 3

PPRM-301 Application of Computers in the Graphic Arts
Registration #0910-301
An introduction to structured thinking and problem solving with a special emphasis on problems related to the graphic arts. The Pascal programming language will be the major vehicle for teaching these concepts. Application programs such as database systems, spreadsheets, word processing, typesetting systems, electronic pre-press systems and control systems will also be discussed.
Class 4, Credit 3

PPRM-302 Personnel Relations I
Registration #0910-302
An introductory study of human relations in the printing industry, emphasizing the personnel management aspects of a supervisor’s job. Students study problems of individual behavior and how workers are affected by organizational influences. Case analysis is used extensively.
Class 3, Credit 3

PPRM-305 Magazine Writing and Design
Registration #0910-305
A discerning look at what goes on in the competitive world of magazine publishing. An overview of the history, the business side, and the production side of the magazine industry. The first week will be devoted mainly to writing techniques, and the second week to the design techniques.
Credit 3 (SR)

PPRM-310 Industrial Organization and Management
Registration #0910-310
An introductory level course which includes such main topics headings as management fundamentals, planning, controlling, organizing, the behavioral environment and managerial adaptation to changing circumstances. Although some emphasis is put on newspaper industry applications, the fundamentals apply to all organizations. Currently this course meets with PPRM-403 and has exactly the same contents. Students cannot receive credit for 0910-310 and 0910-403.
Class 3, Credit 3

PPRM-320 Introduction to Magazine Publishing and Management
Registration #0910-320
A survey course designed to give the student insights into the Editorial, Production, Management, Fulfillment and Distribution processes vital to success of any magazine. 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 plant, commercial, and quick print installations, cost factors, quality, and profitability in comparison to offset. Ink jet printing theory, types of basic equipment, limitations, and quality will also be discussed as well as electronic printing using lasers. Each student will have a training session on a modern high-speed, high-quality copier.
Class 3, 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 3, Credit 4

PPRM-402 Estimating II
Registration #0910-402
Continuing study of sheet-fed offset lithography estimating; obtaining and interpreting specifications; design and use of estimating forms; pricing for a profit margin; preparing quotations; printing trade customs; multi-color offset presses and signature-related bindery operations; signature imposition; camera, flat layout, stripping and plate processing production standards; phototypesetting and mechanical artwork costs; the application of the computer to 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
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 electrophotographic printing. New types of inks such as acrylic ink, water based inks, etc. New ideas in inks such as IR drying. Study of materials used in ink manufacturing and the effects on printing processes and print qualities. Study of color with emphasis on color gamut system and problems in process color printing. Study of ink-paper relationship. Further study of ink rheology and other physical properties. The course will deal with inks for all the processes. (PPRT-315 or permission of instructor)

Credit 4

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. (1016-304 College Algebra & Trigonometry)

Class 4, Credit 4

PPRM-450  
**Expense & Capital Project Budgeting & Control**  
Registration #0910-450  
Studies plant accounting systems as a tool for improving production management decisions. Topics include inventory, equipment, job cost, standard cost and analysis of variance, budgeting and control techniques, financial analysis of projects, proposal development.

Class 4, Credit 4

PPRM-460  
**Conference Management and Leadership**  
Registration #0910-460  
Leadership and leadership skills are considered the foundation stones for good management. This course is designed to examine the principles and apply them. There is a concentration of the priority skills of communications, motivation, and conference management. The course is structured as a "Conference on Leadership" with the details of managing a seminar running in parallel. The "Case Method" of study is followed. A review of three books and a short term paper are required.

Credit 4 (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

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 benefiting both students considering a career in sales and those who will otherwise work with salesmen, either by supporting their company's salesmen in plant action or by buying from outside salesmen.

Class 4, Credit 4

PPRM-514  
**Newspaper Management**  
Registration #0910-514  
Consideration of personnel, organization, finance, maintenance, advertising, circulation, and other sources of revenue as they pertain to the metropolitan press; problems and practices of plant supervision.

Class 4, Credit 4

PPRM-515  
**Legal Problems in Publishing**  
Registration #0910-515  
A comprehensive review of United States Law Supreme Court decisions as they relate to the unique rights granted to the graphic arts industry. Cases cover Article I, section 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 4, Credit 4

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 design 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, squeegees, 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-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. Font management 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 sensitometry, 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 capabilities 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 prepress imposition systems are covered in form of slide-lectures.
Class 2, Lab 3, Credit 3

PPRT-313 Copy Preparation
Registration #0911-313
Preparation of copy for camera, working from layouts, making analysis of requirements; pastedup 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 color correction; use of color comparator and spectrophotometer; the study of color systems and color matching systems; theory and application of various ink systems; practice in standard ink mixing and color matching emphasizing offset and letterpress processes; correlation of ink properties with applications; emphasis on relationship of ink to paper and press; study of ink problems and their correction.
Class 2, Lab 3, Credit 4

PPRT-317 Calligraphic Forms
Registration #0911-317
An introduction to the basics of calligraphy, exercises in use of broadedge pen to develop primary forms of Italic, Roman Capitals, and Uncial letter styles. Evolution of letter forms. Consideration of historical origins of letters, use of basic tools, understanding of methods and disciplines stressed.
Class 3, Credit 3

PPRT-319 Newspaper Design
Registration #0911-319
A study of the methods of designing modern newspaper pages; a look at a variety of front page design methods as well as inside pages; placement of editorial content and ads; problems involved in designing section pages and special pages and editions; the standard format vs. the tabloid format; page sizes, column widths, and space between columns; how a computer can be used in creating designs for newspaper pages.
Class 2, Lab 3, Credit 3
PPRT-320  Newspaper Production I  
Registration #0911-320  
A study of the methods of producing a newspaper by the use of photocomposition systems and the offset process. Students organize a staff, design a newspaper, set type, paste up paper, go to camera, make plates and go to press. 
Class 2, Lab 3, Credit 3  

PPRT-321  Web Offset  
Registration #0911-321  
An analytical study of the technological development in web offset. Emphasis on the interrelationship of procedures, materials, and equipment. Practical laboratory projects on a commercial four-unit perfecting web offset press. (PPRT-208) 
Class 2, Lab 3, Credit 3  

PPRT-322  Circulation and Mailroom  
Registration #0911-322  
A study of the organization and functions of newspaper circulation departments. An overview of equipment and techniques used in modern newspaper mailrooms. A study of readership and how it relates to newspaper circulation. 
Class 3, Credit 3  

PPRT-323  Newspaper Color  
Registration #0911-323  
A study of the basic theory, materials and methods used in the graphic arts for the reproduction of color for newsprint. Open to students in the Newspaper Production Management program only. 
Class 2, Lab 3, Credit 3  

PPRT-329  Introduction to Book Design  
Registration #0911-329  
A course intended to give the student an understanding of how a book designer functions within a book publishing firm. Emphasis is placed upon the many factors involved in book design decisions, including the important relationship between book design and book production in producing a readable, functional book. (PPRT-301, PPRT-303) (Offered once each year) 
Class 2, Lab 3, Credit 3  

PPRT-330  Newspaper Production II  
Registration #0911-330  
The production of a newspaper by photocomposition methods and the offset process. A continuation of PPRT-320, Newspaper Production I, in more depth, with special emphasis on pre-press operations, and the production of special inserts. Also, emphasis will be made on the use of color in newspaper production. (PPRT-320) 
Class 2, Lab 3, Credit 3  

PPRT-331  Bookbinding  
Registration #0911-331  
An introductory course to the skills of bookbinding and contemporary preservation procedures used to save our printed heritage. Content will cover methods and techniques used in hand bookbinding, including sewing, adhesive binding, gliding and boxmaking. Basic conservation skills are taught. Library binding and enduse requirements of bound products are studied and tested in order to obtain thorough knowledge of the physical requirements of bound books. Course is designed for those who value good craftsmanship and have an interest in binding books. No prerequisite is required. However, a good dexterity is desired. Students should bring several books of their own for rebinding. 
Credit 4  

PPRT-333  Introduction to Book Production  
Registration #0911-333  
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  
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
Techniques in Hand Papermaking

This course offers a practical introduction to the many techniques used in hand papermaking. The class will begin by collecting natural raw materials that can be used in papermaking, and then proceed 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

Quality Control in the Graphic Arts

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 sensitive 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 FIPPI on color printing, use of quality control devices, and case studies on implementing quality improvement programs in various printing environments.

Class 3, Credit 3

Development of Printing Types

Historical Development, Identification, and Classification. A lecture course that looks at the historical development of the typefaces that we use everyday. Classification methods are discussed and analyzed. With slides we look at representative typefaces, learn their visual characteristics for identification. Who the designers are and the foundries, etc., that created them.

Class 3, Credit 3

Electronic Color Imaging and Color Control

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

Special Topics-Printing

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

Chemistry Preparation for Printing Graduate Study

Basic principles of chemistry intended for students who have had no previous chemistry and who are making up deficiencies prior to entering the MS program. Not for credit for undergraduates of School of Printing.

Credit 4

Reproduction Photography

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

Printing Presses-Lithographic

Course offered for photography students; theory and practice of the methods of planographic processes.

Class 2, Lab 3, Credit 3

Printing Presses-Screen

Course offered for photography students; theory and practice of the methods of screen processes.

Class 2, Lab 3, Credit 3

Graduate Courses, Master of Science in Printing Technology

Computers in Management

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

Research Methods in the Graphic Arts

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

Graphic Reproduction Theory

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 electrophotography, electrolys, magnetism and lasers; study of hybrid systems and the significance and application of interdisciplinary methods. The Neugebauer and color correction equations.

Credit 4

Statistical Inference

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

Design of Experiments

Analysis of variance, components of variance, crossed vs. nested experiments, studying individual effects, introduction to matrix algebra, regression analysis, planning experiments from a statistical point of view, basic experimental designs, factorial experiments, fractional factorials, determination of optimum conditions, introduction to non-parametrics and quality control concepts (as time allows).

Credit 4

Introduction to Systems Analysis

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 administration of public institutions, will be offered to the student. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-206 Administrative Concepts in Law Enforcement
Registration #0501-206
The course is intended to provide the student with an overview of the fundamental concepts of organization and administration, and to provide also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively. (GCJC-203, 303)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-207 Corrections
Registration #0501-207
The course is designed to introduce the student to the basic organizations of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, will be discussed within the context of historical and contemporary philosophy. Attention will also be focused on decision making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness will be surveyed. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-301 Concepts in Criminal Law
Registration #0501-301
The subject matter of this course consists of an introduction to the fundamental principles upon which substantive criminal law is based. The basic characteristics and requirements of criminal conduct are examined. Included in the scope of this course are the following topics: the nature of criminal conduct, the meaning of criminal mental state, the requirement of concurrence between action and intent, and the requirement of legal causation. The elements of the principal defenses to criminal liability, such as insanity, entrapment, and self-defense, are also discussed. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-302 Organized Crime
Registration #0501-302
This course provides a critical assessment of the structures of organized crime, its historical development, and the areas in which organized crime operates. Special emphasis will be placed upon how the character of organized crime has changed during the last 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)
GCJC-403, 404 Field Experience and Field Registration #0501-403, 404 Seminar
This course is an internship practicum for all preservice criminal justice students. The course is designed to give the student firsthand experience in the field of criminal justice in an appropriate organization which meets the needs of the student's career objectives. Students will be closely supervised at selected organizations developing their pre-professional skills while learning the organization's programs and methods. The student also will be required to attend a seminar which will run concurrently with field work.
Class variable, Credit 4 each (offered annually)

GCJC-405 Major Issues in the Criminal Registration #0501-405 Justice System
This course will focus on contemporary issues and topics not otherwise distinctly incorporated in established criminal justice courses. The course will concentrate on student discussion and interaction surrounding required readings on topics such as deviance, crime prevention, issues in the prosecution/court system, deterrence, female criminality, and computer applications. Topics may vary from offering to offering.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-408 Constitutional Law Registration #0501-408
This course has been designed to provide the student with a basic understanding of the constitutional principles frequently encountered in the criminal justice profession. Landmark court decisions, relating to due process, equal protection, unlawful arrest, unreasonable search and seizure, compulsory self-incrimination, the assignment of counsel and fair trial guarantees are discussed and critically evaluated. (GCJC-201, 301)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-409 Legal Rights of Convicted Registration #0501-409 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-410 Correctional Administration Registration #0501-410
This course presents the history and development of the principles of management and organizational theory as they developed the field of corrections. This developmental evaluation is followed by a presentation of certain principles and philosophies concerning agency administration which have proved effective in business, industry, and many elements of government, with the intention of discussing their applicability to prisons, probation, parole, and other community correctional programs. (GCJC-201, 207)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-411 Seminar in Corrections Registration #0501-411
This course is a sequel to Corrections. It presents a critical evaluation of the contemporary correctional programs in the United States. Programs discussed include: jails, prisons, probation, parole, halfway houses, study release, work release, prison furloughs and various community-based correctional techniques. Emphasis is placed upon the theories of penology and rehabilitation, which provide direction to the correction system today, and the theoretical positions which may affect the future corrections. (GCJC-201, 207)
Class 3, Credit 4 (offered occasionally)

GCJC-412 Social Control of Deviant Registration #0501-412 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 Registration #0501-413 Criminal Justice
A survey of the philosophy and history of civil disobedience, civil disobedience as a political tactic, differentiation between civil disobedience and "ordinary crime," civil disobedience and "non-criminals," civil disobedience within the criminal justice system, and the role of riot commissions. (GCJC-201, 203)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-415 Domestic Violence Registration #0501-415
This course is designed for social work students, criminal justice students, and professionals who are interested in examining the problems related to domestic conflict and violence. Included will be a study of the dynamics of violence as reflected in child abuse, incest, marital rape, spouse and parental abuse, and violence among siblings.
Credit 4 (usually offered summers for one week)

GCJC-416 Forensic Photographic Registration #0501-416 Evidence
Basic photographic techniques applicable to the law enforcement profession or other investigative applications. The course will cover photographic fundamentals as they apply to the investigative photographer. This will lead to the more involved techniques of the police and fire photographer. Topics include photographing homicides and other deaths, tool mark and document photography, court presentations, surveillance and identification photography, and arson investigation.
Class 3, Credit 4 (offered annually)

GCJC-505 White Collar Crime Registration #0501-505
An examination of the extent and character of white collar crime, with special emphasis upon business and professional deviance. (GCJC-201, 203)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-506 Evidence Registration #0501-506
This course is designed to provide the student with an awareness of what types of evidence are admissible in a criminal trial. The course includes a comprehensive analysis of the most frequently used rules of evidence. There are readings and discussions pertaining to the nature of real, testimonial, hearsay, and circumstantial evidence. The course examines rules concerning the cross-examination of witnesses, exceptions to the exclusion of hearsay evidence, the burden of proof, the provinces of the judge and of the jury, legal presumptions and the exclusion of illegally obtained evidence. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-507 Computer Crime Registration #0501-507
This course examines the multifaceted issues associated with computer crime from a variety of perspectives. Topics include: techniques employed by offenders, etiology of behaviors, crime prevention, techniques of investigation, epidemiology, current and proposed legislation, civil/criminal statutory, and evidentiary issues. Computer crime, computer criminals, and victims are analyzed from a criminological foundation.
Class 3, Credit 4 (offered annually)
GCJC-510 Counseling in the Criminal Justice System
Registration #0501-510
This course is designed to instruct the student in the various, accepted contemporary dynamics of interviewing and counseling criminal justice and related human service agencies. Issues to be discussed will revolve around counseling and supervision strategies and conflicts among agencies, between administrators and staff, and clients. This course will present both the practical and theoretical aspects of these issues as well as devote attention to surveying prospective counseling strategies for accomplishing desired behavioral change. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-511 Alternatives to Incarceration Registration #0501-511
The course analyzes possible sentencing options available to the criminal courts as well as pre-adjudicatory alternatives for both adults and juvenile offenders. The variety of dispositions evaluated include probation, halfway houses, work-release, study-release, prison furloughs, pre-trial release, pre-probation alternatives (fines, suspended sentences, conditional discharge, and a variety of diversion programs). Special emphasis is placed on a critical evaluation of the alternatives as they compare to the more traditional methods of handling offenders. Field trips and guest lecturers from non-traditional programs are typically included in the course. (GCJC-207, 411)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-512 Minority Groups and the Criminal Justice System
Registration #0501-512
The course will examine the role traditionally attributed to the members of minority groups as criminals and analyze their interaction with the criminal justice system. Heavily relying on the conflict perspective, the course will review the literature on the creation of laws, the breaking of laws, and the processing of minority members in the criminal justice system (GCJC-201, 203)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-514 Planning and Change in the Criminal Justice System
Registration #0501-514
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-203, 401)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-516 Court Administration Registration #0501-516
A course designed to explore the management aspects of the court and court process. There is a focus on the structure of the several levels of court that typically exist in modern urban America. Related to this structure are the various other criminal justice agencies that interact with the court at various stages of the process. In addition, operational problems such as the bail process, record keeping, jury service and selection methods, and calendar management will receive significant attention.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-517 Comparative Criminal Law Registration #0501-517
The course examines, in a comparative analysis, the criminal system and the penal methods of Europe and the United States. Major emphasis will be given to the issues of intent, criminal responsibility, individual and public interests, purposes and modes of prevention, repression and punishment, methods of trial, punishment and pardon. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-518 Criminal Justice/Community Relations
Registration #0501-518
This course examines the goals and objectives of agencies operating within, or directly related to, the criminal justice system in relation to mutual expectations, the community and the agency, in the delivery of services. Emphasis will be on intergroup responsibilities in exploring strategies to reduce conflict in the solving of public problems within the sphere of the criminal justice system. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-520 Sentencing Process Registration #0501-520
This course is intended to provide the student with a broad overview of the law of sentencing and the alternatives presently available in this area. Emphasis will be placed on the traditional methods of punishment now available in the courts, including, but not necessarily restricted to: fines, imprisonment, probation and suspended sentences. The course will also look to the power of the court in exercising its discretion in the sentencing process. (GCJC-201, 207, 304)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-522 Victimless Crime and the Law
Registration #0501-522
The course is designed to familiarize the student with many of the implications and ramifications of efforts to control "victimless" crimes. Course discussions concentrate on the illegal activity associated with prostitution, gambling, homosexuality, drug use and pornography. In this course the social, moral, legal and practical consequences of legalizing such activities are examined and evaluated. (GCJC-201, 203, 301)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-523 Crime and Violence
Registration #0501-523
This course focuses on the outbreak and increase of violent crime and criminal trends in the United States as one of the more serious realities of this century. In addition to an historical review, contemporary problems are explored, covering such topics as violence in the streets, terrorism, riots, vigilantism, and the role of various criminal justice agencies in attempting to control these problems. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-526 Seminar in Law Enforcement
Registration #0501-526
A critical analysis of some of the current issues, problems and concerns in the area of law enforcement; emphasis on basic police functions in regard to the courts, corrections and the community. Conflicts between theory and practice are examined and analyzed, and future trends in law enforcement will be explored. (GCJC-303)
Class 3, Credit 4 (offered annually)

GCJC-527 Advanced Criminal Law
Registration #0501-527
The course will investigate assumptions and concepts of criminal law. The course will emphasize major crimes against the person and major crimes relating to property. (GCJC-201, 203, 301)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-528 Etiology of Crime
Registration #0501-528
This course is a comprehensive survey of the sociological, psychological, and psychiatric views of the etiology of crime and other forms of deviant behavior. With major emphasis on the sociological forms of explanation, the course will undertake a historical review of criminality theory and progress to present-day concerns of both etiological origins. (GCJC-201, 203)
Class 3, Credit 4 (offered annually)
GCJC-529 Physical Security and Safety
Registration #0501-529
The course examines, through survey techniques, the complex problems confronting business and industry in the protection of assets. The use of electronic and non-electronic anti-intrusion systems and other hardware is examined and evaluated. Safety and accident prevention, health hazard prevention methods, and fire prevention and control, are also examined. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-530 Women and Crime
Registration #0501-530
This course will deal with women as criminal offenders and as victims of crime, focusing upon theories about women in crime, types of crimes committed, patterns of criminality, and the treatment of women offenders. The course, also, will examine the role of women as law enforcement officers, judges, lawyers, and correctional officers in the criminal justice system.
Class 3, Credit 4 (offered annually)

GCJC-532 Retail Security
Registration #0501-532
This course provides an analysis of major security problems found within retail operations. Subjects examined include internal and external theft prevention and detection, shoplifting techniques, the use of undercover personnel and shopping services, security audit, and training of security and non-security personnel. Warehousing and cargo controls are examined. Emphasis will be placed upon methods, techniques and programs to protect assets.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-535 Security Management
Registration #0501-535
This course will focus on the management skills required in the security function and the corresponding administrative, legal and technical problems. Emphasis will be given to purchasing, cost benefit analysis, proprietary versus contract guard forces, personnel management and the relationship between security and non-security employees, and security awareness training programs.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-536 Seminar in Security
Registration #0501-536
This course, designed for seniors completing criminal justice degree requirements with a concentration in security, will focus on critical issues, problems, and concerns in the area of security that are not otherwise covered directly or in depth in established security courses. Topics are expected to vary from offering to offering.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-537 Legal Aspects of Security
Registration #0501-537
An examination of the federal and state case law and statutory provisions that regulate the private security field. The distinction between public and private enforcement; as well as the possible criminal and civil liabilities of private security personnel under the law of Willful Torts including: false arrest and imprisonment; nuisance; defamation; and invasion of privacy.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-541 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, analyzing data and prepare a report on a topic from Human Services, Criminal Justice or Public Policy. (GCJC-401)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-599 Independent Study
Registration #0501-599
A combined student/faculty member effort on a chosen topic beyond the normal sequence of course selections. It provides the qualified self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.
Class variable, Credit variable (offered annually)

Social Work

Core Courses

GSWS-210 The Professional Social Work Role
Registration #0516-210
This course explores social work as a profession, the various fields in which social workers practice and the differing philosophies of human services and social work approaches. Also covered are strategies for developing self-awareness and professional self-assessment.
Class 3, Credit 4 (F)

GSWS-211 Structure and Function of Social Welfare
Registration #0516-211
Examines the provision of social services in five major fields of social welfare: public welfare, traditional voluntary agencies, voluntary social movements, mental health and the legal system. Course will also explore organization theory as it applies to the structure of these services, as well as major patterns and sources of funding. (GSWS-302 or concurrent)
Class 3, Credit 4 (W)

GSWS-212 Self-Awareness in the Helping Role
Registration #0516-212
This course helps to develop students' helping skills in essentially three broad areas: 1) Skills in noticing or observing; 2) Observing one's professional use of self in the helping relationship and evaluating the appropriateness of such behavior; 3) Observing the client and evaluating the effect one's response has on him/her.
Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills. (GSWS-210)
Class 3, Credit 4 (W)

GSWS-215 The Family From a Social Work Perspective
Registration #0516-215
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-216  Community Services I
Registration #0516-216
This course is designed as a beginning social work practice course. Its purpose is to introduce social work students to basic generalist helping skills and 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 acquired during the previous quarter in the course The Professional Social Work Role. Representatives from five different social work settings will discuss their agencies and services with the class. Students will then observe in each of the agencies some of the work done and 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 II
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, 215, 217)*
Class 3, Credit 4 (F)

GSWS-315  Assessing Community Needs
Registration #0516-315
A study of assessment techniques for identifying the strengths and weaknesses of services provided within a community. Involves analysis of data using 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. (Third-year standing; GSWS-356; GSWS-534, or concurrent; GSSS-210)
Class 3, Credit 4 (S)

GSWS-356  Group Theory In Social Work
Registration #0516-356
This course covers the theoretical foundations of group dynamics and group behavior within the context of social work. Such concepts as types of groups (prevention, rehabilitation), group development, composition, group processes (problem-solving, decision-making, affection), program, leadership, communication, structure and mode of intervention are covered. The course provides the knowledge and initial experiential base for the development of practice skills in working with groups. (Third-year standing; GSWS-215)
Class 3, Credit 4 (W)

GSWS-411  Interviewing and the Helping Relationship
Registration #0516-411
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-356, 534)
Class 3, Credit 4 (S)

GSWS-412  Assessment and Problem-Solving
See GSWS-411 (GSWS-411, 534; corequisite with GSWS-421, 433, 535)
Class 3, Credit 4 (F)

GSWS-413  Social Intervention
Registration #0516-413
See GSWS-411 (GSWS-412, 421, 433, 535; corequisite with GSWS-422, 434)
Class 3, Credit 4 (W)

GSWS-421  Field Instruction I
Registration #0516-421
Field Instruction I and II comprise a 20-week, 30-hour-per-week supervised field placement. Under the guidance of an instructor the student is placed in a cooperating social, governmental, health or educational agency in order that he or she may gain direct experience with its organization, programs and client services. Closely supervised work at the agency is supplemented by seminars designed to integrate theory and practice. (GSWS-411,534; corequisite with GSWS-412, 433, 535)
Field 300, Credit 5 (F)

GSWS-422  Field Instruction II
Registration #0516-422
See GSWS-421 (GSWS-412, 421, 433, 535; corequisite with GSWS-413, 434)
Field 300, Credit 5 (W)

GSWS-433  The Supervisory Process
Registration #0516-433
A seminar taken during the first term of field placement. Topics include staff structure, work distribution, the responsibilities of supervisor and supervisee, the ethics of supervision and professional growth. Students will focus on the supervisory processes within their field placement agencies. (GSWS-411, 534; corequisite with 412, 421, 535)
Class 3, Credit 4 (F)

GSWS-434  Managing Community Services
Registration #0516-434
A seminar taken during the second term of field placement. Topics include special management concerns of governmental and voluntary organizations, the relationship of management to effective service delivery and the relationship of the individual social worker to management and decision-making. Students will discuss these issues by exploring the management procedures of their field placement agencies. (GSWS-412, 421, 433, 535; corequisite with GSWS-413, 422)
Class 3, Credit 4 (W)
GSWS-330 Rural Social Services
Registration #0516-330
Class 3, Credit 2 or 4 (every other year)

GSWS-340 Deafness: Fundamental Aspects
Registration #0516-340
Class 3, Credit 4 (W)

This course is designed to provide the student with a basic understanding of deafness. This overview includes how we hear, techniques for diagnosis, the etiology of deafness, as well as an historical perspective on how education for the deaf has developed with its various philosophies. Language acquisition and modes of communication are explored as well as the social, psychological and vocational development of deaf persons.

This is the first course in a sequence that will provide a knowledge base for the development of generalist social work practice skills. (GSWS-302; GSHH-547; GSSP-210, 440; GSSS-210, 526, 527; SBIG-211, 212)

For social work students who have completed field instruction. The course will identify the historical development, cultural makeup, family life styles and work habits of the nation's migrant population and the rural poor. The course will examine and critically analyze the differences between migrants and the rural poor and compare them to the characteristics of the urban poor found in contemporary American cities. The course considers governmental rural policies and service-delivery systems directed to the rural areas reflect the economic, political and social conditions during the time they were developed. The skills of generalist social work as applied in the rural setting are compared to application in urban settings.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-314 The Social Worker as Advocate
Registration #0516-314
Class 3, Credit 4 (offered on sufficient demand)

This course will examine the role of social workers in advocating with and on behalf of clients and others for negotiating or bringing about needed change in institutions or policies of our society. Discussion of the forces in the social, economic and political environment today that directly affect poverty, racism and other issues will be related to examining techniques for achieving change.

GSWS-320 Alcoholism: Physiology and Psychology
Registration #0516-320
Class 3, Credit 2 or 4 (W, every other year)

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)

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 education and to facilitate the integration of all content areas in professional development of deaf persons.

Class 3, Credit 4 (S)

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-413, 422, 434)

Class 3, Credit 4 (S)

This course develops an understanding and appreciation of the necessity of a scientific, analytic approach to knowledge building and practice. Course covers using the library as a professional research tool, and how to critically read published research. Also, the basic use of computers to create and edit data files, communicate electronically, and for report writing, editing, and text-formatting is considered. Content includes problem formulation, research design, proposal writing, hypothesis testing, collection of data, levels of measurements, and the evaluation of students’ own practice. (SMAM-204)

Class 3, Credit 4 (W)

This course analyzes symptoms and diagnosis of the alcoholic and current methods of rehabilitation. Explores structure, function and use of community resources including the increasing role played by Employee Assistance Programs (EAP’s). (GSWS-302; GSHH-547; GSSP-210, 440; GSSS-210, 526, 527; SBIG-211, 212)

Class 3, Credit 2 or 4 (every other year)

This is the first course in a sequence that will provide 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 so as to cover the inter-relationships between: 1) values and ethics of the profession, 2) human behavior and the social environment, 3) needs assessment and research techniques, 4) methods of intervention, and 5) 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-413, 422, 434)

For social work students who have completed field instruction. This 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-341 Psychosocial Implications of Deafness
Registration #0516-341

The purpose of this course is to provide the student with an in-depth examination of the psychosocial implications of deafness for the individual. The various systems with which the deaf individual interacts will be examined for their relevance to the development and functioning of the individual. The course also examines how the individual and these systems impact and influence each other. These systems will include family, school, service-delivery systems and society. (GSWS-340)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-342 Deafness: Intervention Strategies
Registration #0516-342

The purpose of this course is to build skills in applying the knowledge base developed in the prerequisite course to case situations. Students demonstrate collection and recognition of pertinent information, and development and implementation of appropriate intervention plans. Legal and political issues as well as methods of assessing local resource networks are considered. Professional roles and intervention goals are discussed as they relate to interfacing systems, including individual, family, school, medical, mental health, rehabilitation and employment. (GSWS-340)

Class 3, Credit 4 (offered on sufficient demand)

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 also be given a general understanding of our current mental health systems. The medical model and alternative systems of diagnosis are considered. (GSWS-302; GSSH-547; GSSP-210, 440; GSSS-210, 526, 527; SBIG-211, 212)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-360 Social Work with the Disabled
Registration #0516-360

This course provides an examination of the psychosocial aspects of disabilities. The course emphasizes the effects of disability on the individual's development and functioning and the accompanying stress on the family and society in attempts to respond to her/his needs. Interventive strategies and critical times for intervention by the social worker are examined. (GSWS-302; GSSH-547; GSSP-210, 440; GSSS-210, 526, 527; SBIG-211, 212)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-370 Child Protective Services
Registration #0516-370

This course examines the concepts and knowledge base of child abuse and neglect. Topics will include: definition of abuse and neglect, an historical perspective, possible causes and effects of abuse, intervention strategies, statutes and legislation, preventive approaches, child abuse services in New York State, provision of service, role of the social worker, and future concerns in this problem area.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-380 Social Work and the Law
Registration #0516-380

The main purpose of the legal orientation of the course is to provide the student with the opportunity to develop a workable vocabulary and understanding of some of the basic legislative processes and laws that affect the practice of social work. Focus centers around significant issues and points of law that have affected the delivery of services.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-401 Social Work Management
Registration #0516-401

The 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.

Class 3, Credit 4 (offered on sufficient demand)

GSWS-432 Supervision in Social Work
Registration #0516-432

This course identifies and teaches the supervisory skills required in social work and related agencies. Different methods and techniques are explored.

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; GSSH-547; GSSP-210, 440; GSSS-210, 526, 527; SBIG-211, 212)

Class 3, Credit 4 (offered on sufficient demand)

GSWS-466 Employee Assistance Programs: Treatment Approaches
Registration #0516-466

An overview of Employee Assistance Programs: planning, development, program implementation, policy and procedures, on-going monitoring and evaluation. Includes comparisons of various program models with corresponding advantages and disadvantages.

The course is designed specifically for professionals whose knowledge of EAP's would be of benefit in their present positions.

Class 3, Credit 2 (offered on sufficient demand)

GSWS-467 Employee Assistance Programs: 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.

Class 3, Credit 2 (offered on sufficient demand)

GSWS-509 Services for Children and Their Families
Registration #0516-509

This course is designed to give social work students a beginning knowledge of social work services to children and their families. Specific services included are preventive services, homemakers, day care, protective services, foster care, adoption, unmarried parents, institutional care and mental health services. The development of each type of service will be discussed as well as the reasons why each service is needed and for what type of situation. The social worker's role in each area will also be considered. (GSWS-302; GSSH-547; GSSP-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-413, 422, 434).

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 where it is assumed that they 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-413, 422, 434)

Class 3, Credit 4 (offered annually)
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-413, 422, 434)

Class 3, Credit 4 (offered on sufficient demand)

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-413, 422, 434)

Class 3, Credit 4 (offered on sufficient demand)

This course is designed to provide the student with a series of readings and experiential exercises necessary for writing a grant proposal. Focus will be on funding sources which provide money for social welfare programs and for research into social work. (GSWS-535)

Class 3, Credit 4 (offered on sufficient demand)

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; GSPP-210, 440; GSSS-210, 526, 527; SBIG-211, 212) (May also be taken for Liberal Arts elective credit. See GSWS-508)

Class 3, Credit 4 (SR, F)

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 GSWS-515)

Class 3, Credit 4 (W)

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 their parents by adolescents, and the abuse of the elderly by their adult children. Also, the 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)

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 areas 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)

This course develops the language skills needed to write effectively. It should be taken in the freshman year.

Class 3, Credit 4 (offered quarterly)

This course is an overview of the field of communication, including the contexts of interpersonal, group, mass, and public communication. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

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)

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)

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-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-503 History of the English Language
Registration #0502-503
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.
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-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-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-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-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)

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 annually)

GLLC-518 Creative Writing /Prose
Registration #0502-518
Fiction
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)
Class 2, Credit 4 (offered annually)

GLLC-520 College Vocabulary Skills
Registration #0502-520
Application to the process of vocabulary building of the various disciplines of language study will be provided. Included among these will be applications of dictionary study, etymology, semantics, and structural linguistics. In addition, literary works, periodicals, and newspapers will be examined to strengthen the student's awareness of the contextual variation in the meaning of words. Ineffective and faulty devices of language usage will also be discussed.
Class 3, Credit 4 (offered annually)

GLLC-521 Intercultural Communication
Registration #0502-521
This course is an examination of the role of culture in face-to-face interaction. There are no prerequisites, but students may find a basic background in communication, anthropology, or psychology useful.
Class 3, Credit 4 (offered annually)

GLLC-522 Rhetoric of Social Change
Registration #0502-522
Readings and analysis of selected public speeches and essays advocating or opposing major issues of social change in the United States from the 18th century through contemporary advocacy.
Class 3, Credit 4 (offered occasionally)

GLLC-530, 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, II, III
Registration #0502-537, 484, 485
This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is 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-539 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-542 or permission of the foreign language coordinator)
Class 2, Credit 4 (offered annually)

GLLC-553 Creative Interpretation in Sign
Registration #0502-553
Creative approaches to the interpretation of selected literary classics (prose, poetry, fiction, drama) through the visual medium of sign (sign language and sign-mime).
Class 3, Credit 4 (offered annually)

GLLC-554, 555, 556 Literature
Registration #0502-554, 555, 556
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 (W)

GLLL-338 Literature: Prose Fiction  
Registration #0504-338  
The students study some of the great literary works of our culture to enrich their lives and reinforce their analytical abilities. The students read representative prose fiction drawn from the Ancient, Medieval-Renaissance, and Modern Periods. This two credit course and the companion two credit course GLLL-337 are the only required literature courses in the student's career.

Class 2, Credit 2 (S)

GLLL-440 Western Drama/Theatre  
Registration #0504-440  
The Western Drama/Theatre course studies Drama as a genre and Theatre as a performing art. Intensive study of at least one major playwright or period complements a general survey of Drama/Theatre from Ancient Greece to Modern Broadway. This course is part of the Literature Concentration and may also be taken as an elective.

(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 The Short Story  
Registration #0504-442  
The course is a study of a collection of short stories with critical commentary in order to provide source materials on the nature and development of this genre. This course is part of the Literature Concentration and may also be taken as an elective.

(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 novels selected to show the range of narrative techniques, methods of characterization and plot construction, and styles representative of the genre. This course is part of the Literature Concentration and may also be taken as an elective.

(GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

FLLL-444 Film as Literature  
Registration #0504-444  
This course examines the nature of narrative in both film and literature, the various aspects of adaption of literature into film, and the relationship between social reality and storytelling in documentary film. This course is a non-technical, non-chronological study of film with a balance of roughly 50% literature and 50% film. This course is part of the Literature Concentration and may also be taken as an elective.

(GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-445 Great Authors  
Registration #0504-445  
This course provides extended study of the works of a specific great author (to be listed in the sub-title) as selected by the instructor for each section of the course. Students can take any single section of this course as part of the Literature Concentration or as an elective. Additional sections can be taken for elective credit.

(GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-480 Women in Literature  
Registration #0504-480  
This course concentrates on literature by women about women primarily from the early nineteenth century to the present. The course considers the aspiration, frustrations, and achievements of women as documented by themselves, as well as the perceptions and representations of women in literature by male writers. Works are examined for their literary value as well as their documentation of broader feminist issues. This course is part of the Women's Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GLLL-483 Hinduism and Buddhism  
Registration #0504-483  
This course presents the religious experience from the viewpoints of two major Eastern Religions: Hinduism and Buddhism. Drawing upon these traditions, the course examines the psychological and philosophical dimensions of the religious experience. This course is part of the Perspectives on Religion Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GLLL-484 Literature and Religion  
Registration #0504-484  
A literature course which explores the complexity and variety of man's personal religious quest and its conflicts as these are portrayed by writers from biblical times to our own day. The literature will be supplemented by readings from such disciplines as psychology, philosophy, history and theology. This course is part of the Perspectives on Religion Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GLLL-485 Modern Latin American Literature  
Registration #0504-485  
Reading short stories, novels, and poetry of modern Mexico, Central and South America reveals a literature and culture wherein the mythic functions as an integral part of the modern worldview and the poet functions as a potent political power. The impressive vitality of modern Latin American literature can be attributed to its indigenous roots and to its branches that stemming from a common language and a shared continent, overarch national boundaries and political regimes to form an international literary community. This course is part of the foreign language/culture study concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GLLL-501 Speculative Fiction  
Registration #0504-501  
Speculative fiction is a survey course in contemporary literature presenting conjectural views of man, his world, his society and his belief. Attention is given to the historical development of the genre as well as those works which have become classics of science fiction and fantasy.

Class 3, Credit 4 (offered occasionally)

GLLL-503 Great World Drama  
Registration #0504-503  
A chronological survey of the major periods of theatrical evolution, with emphasis on the physical theatre and production techniques which influenced the playwrights' works within respective periods.

Class 3, Credit 4 (offered annually)

GLLL-505 The American Spirit In Literature  
Registration #0504-505  
This is a survey of the development of American philosophy through the study of the selected works from the colonial period through the mid-19th century. Particular attention is given to the ideas of the writers under consideration and their effect on modern American thought.

Class 3, Credit 4 (offered annually)
skeptical response of American writers to the technological Utopia. The works selected reflect mostly the attention to the beginnings of realism, naturalism and symbolism. Works by contemporary American writers will be examined, with special emphasis being placed on these writers’ relation to contemporary American culture.

Class 3, Credit 4 (offered annually)

GLLL-508 20th Century World Fiction
Registration #0504-508
Reading 20th century short stories and novels from the East, West and Third World reveals, in addition to stylistic innovation and excellence, a variety of perspectives, values, and problems that contribute to the delineation of contemporary global civilization.

Class 3, Credit 4 (offered annually)

GLLL-515 Contemporary American
Registration #0504-515 Novel
The course will cover American fiction written after World War II. Works by contemporary American writers will be examined, with special emphasis being placed on these writers’ relation to contemporary American culture.

Class 3, Credit 4 (offered annually)

GLLL-516 Literature and Society
Registration #0504-516
Selected works by writers such as Sophocles, Dante, Dickens, Camus and Vonnegut as important works of art that reflect the human condition and implicitly prophesy against particular evils in attitudes or institutions of their times.

Class 3, Credit 4 (offered annually)

GLLL-517 Literature of the Bible
Registration #0504-517
A close and rapid reading of selected Old and New Testament books to show the range and variety of literary genres and styles in the Bible.

Class 3, Credit 4 (offered annually)

GLLL-524 Contemporary Film
Registration #0504-524
A study of contemporary world films, to be drawn from those presently showing in the Rochester area (theaters, television, film festivals). Emphasis will be on both technical and aesthetic aspects of the films.

Class 3, Credit 4 (offered annually)

GLLL-528 Great World Novels
Registration #0504-528
A careful reading and analysis of novels selected from the best examples of the genre. The novels are selected to exhibit a wide range of techniques of narration, methods of characterization, and approaches to plot construction.

Class 3, Credit 4 (offered occasionally)

GLLL-531 American Literature of the
Registration #0504-531 1920s and 1930s
A study of American writers of the 20th century with particular attention to the beginnings of realism, naturalism and symbolism.

Class 3, Credit 4 (offered annually)

GLLL-535 Technology in American
Registration #0504-535 Literature
A study of the 19th and 20th century American literature (short stories, an essay, poems, and novels) commenting upon the impact of technology upon society. The works selected reflect mostly the skeptical response of American writers to the technological Utopia.

Class 3, Credit 4 (offered annually)

GLLL-538 The Nightmare of
Registration #0504-538 Technology: Studies in 19th Century British Writing
A study of 19th century British prose and poetry. Attention will be devoted to the effects of industrialism on a changing English society. The course will study in general the various social problems confronting 19th century England, and how various writers responded to these problems through their writing.

Class 3, Credit 4 (offered occasionally)

GLLL-539 The Romantic Vision
Registration #0504-539
A study of 19th century European prose and poetry (primarily British) with particular attention paid to the collapse of the Romantic vision, and its gradual absorption into the aesthetic and decadent literary traditions of the late nineteenth century European literature.

Class 3, Credit 4 (offered occasionally)

GLLL-543 Literature of War and Peace
Registration #0504-543
This course focuses on significant world literature whose subject is war and peace. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

GLLL-545 The Deaf in Fiction
Registration #0504-545
A study of the literature of deafness, with special emphasis on literary works which identify and illuminate "the deaf experience."

Class 3, Credit 4 (offered annually)

GLLL-548 Modern Poetry
Registration #0504-548
A close examination of poems of important English and American poets of the 19th and 20th centuries, including several living poets.

Class 3, Credit 4 (offered annually)

GLLL-551 World Literature in English
Registration #0504-551
The course will cover short stories and novels written in English by Australian, African, Asian, and West Indian authors. The selection will be discussed against the background of the social, political, and cultural milieu in which the authors worked.

Class 3, Credit 4 (offered occasionally)

GLLL-556 Athens and Rome: The First Moderns
Registration #0504-556
A trip to the beginnings of our culture and an exploration of the first artistic expressions of "modern" sensibility, primarily through reading of the chief authors of Classical Greece and Rome.

Class 3, Credit 4 (offered occasionally)

GLLL-560 Art of the Cinema
Registration #0504-560
A critical examination of certain films as an integral part of modern culture.

Class 3, Credit 4 (offered annually)

GLLL-561 Rites of Passage
Registration #0504-561
A survey of literary works providing a variety of insights into growing up, especially from adolescence into young adulthood, which take the reader from the humorously reminiscent to the devastatingly brutal and which provide the reader with a better understanding of and appreciation for this phase of life.

Class 3, Credit 4 (offered occasionally)

GLLL-562 Literature of Suspense
Registration #0504-562
An introduction to stories of mystery and suspense whose literary mode has aesthetic merit; whose plots, characters and/or settings are uniquely entertaining and whose authors have evolved rare styles of story telling.

Class 3, Credit 4 (offered occasionally)
GSHF-441  American Architecture
Registration #0505-441
A survey of American Architecture from the seventeenth century of the present. Stress will be placed on a visual as well as a historical and social analysis. This course is part of the American Artistic Experience Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-442  Music in the United States
Registration #0505-442
A survey of music in the United States from the time of European colonization to the present. Particular emphasis will be placed upon the question of what makes music distinctively “American”. This course is part of the American Artistic Experience Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-443  images of American Life
Registration #0505-443
This course examines images of American life in the 19th and 20th century in the visual arts, particularly photography, to analyze and evaluate the influences of American political, social and cultural events on imagery and perception. This course is part of the American Artistic Experience Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-444  American Painting
Registration #0505-444
A survey of the style and meaning in American paintings from the colonial limners to contemporary artists. It will center on what distinguishes painting of the colonies and of the United States from its European counterpart. This course is part of the American Artistic Experience Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-445  Issues in American Art
Registration #0505-445
The purpose of this course is to offer the student a comprehensive overview of American attitudes and philosophies as they have shaped and been embodied in our artistic heritage. Emphasis will be placed on American art from 1850 to the present. This course is part of the American Artistic Experience Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-446  American Film
Registration #0505-446
This course will develop an understanding of theories, styles and in American trends, film through a historical and sociological study of the medium. This course is part of the American Artistic Experience Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-480  Women and the Visual Arts
Registration #0505-480
This course examines the image of women in the visual arts and the role of women as image makers. Major topics to be covered include: the variety of images of women, the evolution and change of these images over time, media images (as differentiated from fine art images) of women, images of women by women and by men, women's images and the issues of their relationship to the images made by men, the nude and pornography, history of women artists, selected women artists and their work, relation of their work to the art of the period, current issues and status of women artists. This course is part of the Women's Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)
A course examining the psychological, political and philosophical contexts that gave shape and force to Beethoven's compositions and the creation of the sublime in music. This course is part of the foreign language/culture study concentration and may also be taken as an elective.

Class 3, Credit 4 (offered occasionally)

This course introduces the music of Beethoven in the psychological, political and philosophical traditions that gave 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 may also be taken as an elective.

Class 3, Credit 4 (offered occasionally)

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 may also be taken as an elective.

Class 3, Credit 4 (offered occasionally)

A survey outlining the development of art in India, China, Japan and Korea. Art forms of earlier eras and other cultures will also be discussed. Emphasis will be placed on the development of music in the classical tradition, experimental music and jazz.

Class 3, Credit 4 (offered annually)

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)

A survey of major 20th century composers and their works. Emphasis will be placed on the development of music in the classical tradition, experimental music and jazz.

Class 3, Credit 4 (offered annually)

This course investigates the nature and value of the arts and their relation to other areas of human activity such as religion, economics, science and technology and personal freedom.

Class 3, Credit 4 (offered annually)

After an investigation of the works of "primitive" man and the function of art in a tribal environment, this course will focus on pre-literate societies of sub-Saharan Africa.

Class 3, Credit 4 (offered occasionally)

This course examines the stylistic development of painting in Europe from 1420 to 1650. The Renaissance style will be analyzed and studied through the works of painters, with emphasis placed on stylistic evolution through the 15th century and the classical synthesis created in the high Renaissance. Mannerist and Early Baroque paintings will be discussed from the point of view of the Renaissance style to investigate concepts of stylistic continuity, evolution, and change. Paintings will also be discussed within their cultural and political contexts.

Class 3, Credit 4 (offered occasionally)

This course will survey the development of opera and the American musical theatre, highlighting representative works, composers, librettists, and performers.

Class 3, Credit 4 (offered occasionally)

This course examines the political, social, cultural, and economic development of the American people in the modern period. Studies the United States in its foreign relations.

Class 3, Credit 4 (offered quarterly)
GSHH-302 History: Modern European Registration #0507-302
An examination of social, economic, political and intellectual movements of Europe from the Modern Period to the Twentieth Century, which played major roles in shaping our contemporary world.
Class 3, Credit 4 (offered annually)

GSHH-440 United States: Its People and Registration #0507-440 Its Institution
This course will examine the American people, their society and their culture, in relation to the nation's institutions: government, courts, business, labor and political and private associations. The interplay between the American people and the institutions which structure their lives sheds light on the dynamic forces which shape American history and help to explain the present. Instead of detaining day-to-day chronology, this study will highlight the sweep of major trends and movements over longer periods of the American experience. This course is part of the History Concentration and may also be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered quarterly)

GSHH-441 20th Century American Registration #0507-441 Diplomatic History
An examination of the major events and forces which shaped American diplomacy from the opening years of the 20th century to the immediate post World War II era. This course is part of the History Concentration and may also be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-442 The Contemporary Registration #0507-442 Middle East
This course analyzes the making of the contemporary Middle East from the rise of Islam to the present with special emphasis on the patterns of political development in the twentieth century. This course is part of the History Concentration and also the International Relations Concentration and may also be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-443 European Social Intellectual Registration #0507-443 History Since 1600
An analysis of social events and intellectual movements in Europe since 1600. This course is part of the History Concentration and may also be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSHH-444 European Diplomatic History, Registration #0507-444 1871-1945
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 may also 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 may also be taken as an elective. This course is part of the history concentration and also the foreign language/culture study concentration and may also 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 may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHH-483 Christianity in the West Registration #0507-483
This course traces the development of Christian thought in the broad historical context of Western Civilization. It concentrates on major movements and outstanding personalities. 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 may also 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 may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHH-485 Foundations of Asian Civilization 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 may also be taken as an elective.
Class 3, Credit 4 (offered frequently)

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 may also 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 will also examine the causes for the rise of Communism in modern China, the context and process of its development, as well as contributions and problems Communism brought forth to the Chinese people. In addition, China and the world will be examined. This course is part of the foreign language/culture study concentration and may also be taken as an elective.
Class 3, Credit 4 (offered occasionally)

GSHH-488 Modern Germany Registration #0507-488
A study of Germany in the 19th and 20th centuries. This course will begin with the unification of Germany in 1871 and trace the political evolution of the nation to the present. Special emphasis will be placed on the rise of Nazism. Pertinent social and cultural factors will be considered as well. This course is part of the foreign language/culture study concentration and may also 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 may also 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.
Class 3, Credit 4 (offered alternate years)

GSHH-501 United States Community Registration #0507-501 History
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 annually)

GSHH-502 Europe Since 1918 Registration #0507-502
A study of the European states and peoples in the inter-war period, the diplomatic and military history of World War 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 annually)

GSHH-520 Crime, Violence, and Urban Registration #0507-520 Crisis
The course will analyze the causes of the outbreak and rapid increase of violent and criminal trends in the world as the most serious realities of the 20th century. The course will be a comparative study on America's and the world’s problems of violence, crime, and urban crisis.
Class 3, Credit 4 (offered annually)

GSHH-524 The Italian American Experience Registration #0507-524
An examination of the history and culture of the Italian Americans from the colonial period to the present. Stresses their role in the arts, business, politics, the Church, and the labor movement. Italian history is studied as it relates to the Italians in America.
Class 3, Credit 4 (offered annually)

GSHH-526 The United States and The Registration #0507-526 Third World Revolutions in the 20th Century
One of the dominant features of the 20th century has been the revolution of rising expectations in the countries of the Third World. This course will study the underlying causes of these revolutions and the reaction of the United States government to this revolutionary ferment in Latin America, Asia and Africa.
Class 3, Credit 4 (offered annually)

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 annually)

GSHH-530 19th Century American Diplomatic History Registration #0507-530
An examination of American diplomacy from the early years of American independence to the emergence of the United States as a world power. The War of 1812, Monroe Doctrine, and Manifest Destiny are among the topics considered.
Class 3, Credit 4 (offered annually)

GSHH-531 Black Experience in America Registration #0507-531
Examines the history of Blacks in America, treating the subject primarily from a social and cultural perspective. Studies the impact of Whites on Black Americans and describes the contribution of Blacks to the development of the United States.
Class 3, Credit 4 (offered annually)

GSHH-532 Civil Liberties in American History Registration #0507-532
The course will teach the history of civil liberties in America. Emphasis will be placed on the current state of civil liberties. Students will make philosophical as well as historical analyses of cases.
Class 3, Credit 4 (offered annually)

GSHH-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-540 Selected Problems in Black History Registration #0507-540
A seminar approach to the thought of key black leaders (Washington, Garvey, King) and the study of civil rights and black power movements.
Class 3, Credit 4 (offered occasionally)

GSHH-545 Revolutionary Leaders in Latin America Registration #0507-545
In this course three movements will be studied: the rise of Juan Peron in Argentina in the 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)
opportunities provided by science and technology are guided by their
yet people, guided by individual and societal values, develop the
values. Science and technology are often assumed to be value free,
Class 3, Credit 4 (offered quarterly)

GSHN-550 The Ascent of Man
Registration #0507-550
The course is a multi-disciplinary study in societal, historical, in-
tellectual, technological and scientific perspectives of man's develop-
ment from prehistoric times to the present. The course is partially
based on the television series The Ascent of Man created and nar-
rated by J. Bronowski.
Class 3, Credit 4 (offered annually)

GSHN-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 leader-
ship 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 annually)

GSHH-553 The United States Since
Registration #0507-553
World War II: Patterns in
Recent American History
1945 to the Present
An analysis of the major themes characterizing post World War II
United States history. The course aims to investigate the specific
characteristics of America as a modern state. Selected themes will
have an intellectual, cultural and political history focus.
Class 3, Credit 4 (offered annually)

GSHH-555 The History of the Soviet
Registration #0507-555
Union
A study in depth of the Bolshevik revolution, the rise of Stalin, in-
dustrialization and collectivization, the terror and purges, the process
of de-Stalinization under Krushchev and his successors, and current
developments in the Soviet Union.
Class 3, Credit 4 (offered 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 in-
sstitutions 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
Registration #0507-557
Democracy in Their
Theoretical Foundations
A political and historical appraisal of these philosophies. Emphasis is
placed upon the claims they make with regard to the individual and
the state, and the changes they demand for the future.
Class 3, Credit 4 (offered occasionally)

GSHN-211 Science, Technology and
Registration #0508-211
Values
This course explores the concepts and effects of science and tech-
nology in society, analyzes the relationship between science and
technology, examines how each has come to play a major role today,
and looks at science and technology have been affected by our
values. Science and technology are often assumed to be value free,
yet people, guided by individual and societal values, develop the
science and technology. In turn, the choices people make among the
opportunities provided by science and technology are guided by their
individual values.
Class 3, Credit 4 (offered quarterly)

GSHH-540 History of Science
Registration #0508-440
This course presents a study of the origins, nature, and development
of Western science, and its social, economic, and cultural context.
This course is part of the Social Impacts of Science and Technology
Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-441 Science and Technology
Registration #0508-441
Policy
This course will examine how local, state, Federal, and international
policies are developed to influence innovation, the transfer of tech-
nology, and industrial productivity in the United States and other
selected nations. This course is part of the Social Impacts of Science
and Technology Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-442 History of American
Registration #0508-442
Technology
This course presents an examination of the cultural context of Amer-
ican technology and its influence on American social, economic,
political, and cultural institutions. This course is part of the Social
Impacts of Science and Technology Concentration and may also be
taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-443 Face of the Land
Registration #0508-443
This course is a case study in the relationship of technology and
society, focusing on the interaction of land, people and technology.
By considering the natural landforms of the United States and other
countries as appropriate, students will see how the nature of land
determines its value. As technological innovations are made and
introduced, old relationships with the land are altered, sometimes
irreversibly. Through this study students have a concrete example of
the positive and negative effects of technology on the social struc-
ture. This course is part of the Social Impacts of Science and Tech-
ology Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-444 Social Consequences of
Registration #0508-444
Technology
Modern society is increasingly based on technology. With each ad-
vance due to technology, unanticipated problems are also intro-
duced. Society must define and solve these problems or the ad-
vances may be dilated or lost. In this course we will study several
interactions between technology and the world in which we live. We
will investigate how various technologies developed and compare
the expected effects of the new technologies with the actual results.
This course is part of the Social Impacts of Science and Technology
Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHH-445 Biomedical Issues in Science
Registration #0508-445
and Society
A study of the impact of science and technology on life, our view of
life, and of the value issues that arise from this impact. This course is
part of the Social Impacts of Science and Technology Concentration
and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-481 Introduction to Environmental
Registration #0508-481
Studies
This course seeks to make students aware of the environmental
consequences of modern technology by investigating to what de-
gree various technological systems conflict with the basic ecological
principles. This course is part of the Environmental Studies Con-
centration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)
GSHN-482  Energy and the Environment
Registration #0508-482
In this course we will look at the current situation, its environmental implications, and try to determine how we got here, why we got here, and where we may be able to go in the next 20 to 50 years. We will look at the nature, uses, and relative importance of our sources of energy system; high technology and low or appropriate technology, hard energy paths and soft energy paths. We will look especially at the role of government policy in the energy area. This course is part of the Environmental Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-483  Environmental Values
Registration #0508-483
We seek to identify, interpret, and trace the values associated with concern for the environment, and the factors that induced change in these values. Concern with the environment is not a new concept; its history reaches to ancient times, but the values related to this concern have drastically changed. Understanding environmental values helps one become a better prepared participant in the environmental decision making. This course is part of the Environmental Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-484  Environmental Legislation, Regulation and Enforcement
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 will also focus on the value, economic, and social implications of environmental regulation, enforcement, and will identify current developments in the area. This is a concentration course in the Environmental Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHN-503  Technology and the Individual
Registration #0508-503
A study of the effects on the life of the individual due to the acceleration of the technological change.
Class 3, Credit 4 (offered occasionally)

GSHN-506  Space, Time and Reality
Registration #0508-506
In this course we learn the conceptual development of the 20th century theories of time and space with major emphasis on their applications in the present decade. These views, which grew out of the rigorous, mathematical logic of relativity theory and quantum theory, represent one of the most profound revisions of intellectual thought in human history. We learn how any vestige of an absolute frame of reference in space and time, and how cause and effect and strict determinism were demolished and how probability was introduced by means of these theories.
Class 3, Credit 4 (offered occasionally)

GSHN-507  Community Energy Planning
Registration #0508-507
This course is designed to allow the student to understand the concepts underlying community energy self-reliance, how to analyze a community’s energy supply and consumption, and how to evaluate possible energy futures for a community based as much as possible on conservation and alternative energy strategies.
Class 3, Credit 4 (offered occasionally)

GSHN-508  Special Topics In Environmental Studies
Registration #0508-508
This course will be offered periodically as an elective. The topic and specific content and methods will vary from year to year or term to term. The course will allow an in depth examination of a problem or area that is relevant to the other environmental studies courses.
Class 3, Credit 4 (offered occasionally)

GSHN-509  Special Topics in the Social Impacts of Science and Technology
Registration #0508-509
This course will be offered periodically as an elective in the area of the social impact of science and technology. The topic and specific content and methods will vary from year to year or term to term. The course will allow examination of a special problem or area that is relevant to the other courses in this area of study.
Class 3, Credit 4 (offered occasionally)

GSHN-511  Modern Warfare Technology and Arms Control Problems
Registration #0508-511
A telecourse designed to present the way of the humanist and reveal it as commanding more of the hidden potential of the individual, and to present science as an expression of the human spirit that commands more of the hidden potential of nature. Science is presented as one life style--a human one based on the need for understanding, and not for the sake of progress, survival, or upgrading one’s position in the world.
Class varies, Credit 4 (offered on demand)

GSHN-512  Science as a Humanity
Registration #0508-512
This course is designed to help the student understand the life of modern science through the lives of modern scientists. Modern science is understood to be science from Scientific Revolution of the sixteenth and seventeenth centuries to the present. Much recent scholarship has been devoted to analyzing science in context, i.e., the way it actually develops in particular social and political environments as well as through the lives of individuals.
Class 3, Credit 4 (offered annually)

GSHN-513  Makers of Modern Science
Registration #0508-513
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-210  Philosophy: Selected Issues
Registration #0509-210
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-211  Philosophy: Ethics
Registration #0509-211
An introduction to moral philosophy through an analysis, comparison and evaluation of some main theories that have been offered as systematic ways of making moral decisions, and through discussions of contemporary moral problems.
Class 3, Credit 4 (offered quarterly)

GSHP-213  Philosophy: Critical Thinking
Registration #0509-213
An introduction to philosophical analysis, especially as it may be applied in contexts other than professional philosophy.
Class 3, Credit 4 (offered quarterly)

GSHP-440  Philosophy of Religion
Registration #0509-440
A critical examination of a number of important issues connected with religion. These include the nature of religion itself, the existence of God, the problem of evil, and questions about the language we use when we talk and write about religion. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)
GSHP-441 Logic
Registration #0509-441
An introduction to the basic principles of logic. The main emphasis will be on symbolic, or formal logic, but some attention may be paid to informal logic as well. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-442 Aesthetics
Registration #0509-442
This course will introduce students to thinking philosophically about the nature of art and its relation to other human experiences. Among the topics considered will be: the aesthetic experience, the relation between morality and art, ugliness in art, and truth in art. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-443 Philosophy of Science
Registration #0509-443
An examination of the nature of the scientific 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 may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-444 The Great Thinkers
Registration #0509-444
This course will introduce the student to the thought of some of those philosophers who have been most influential in the history of ideas. An attempt will be made to cover in some depth the works of one or more of those "great thinkers." It is hoped that the student will begin to recognize the enduring nature of some of our most pressing problems, as well as the intellectual foundation of proposed solutions. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-445 Social and Political Philosophy
Registration #0509-445
An examination of some of the main problems of social and political philosophy through an analysis, comparison and critical examination of various views concerning the natures of individuality and society, the relations between them and the dependence of one on the other. This course is part of the Philosophy Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-483 The Biblical Tradition
Registration #0509-483
An examination of Judaism and Christianity as they are presented in the Old and New Testaments. This course is part of the Perspectives on Religion Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSHP-515 Philosophy of Law
Registration #0509-515
An introduction to philosophical analysis centering on the nature, extend and justification of law, the nature of legal thought, and the problems and theories of justice.
Class 3, Credit 4 (offered annually)

GSHP-516 Philosophy and Peace
Registration #0509-516
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.
Class 3, Credit 4 (offered annually)

GSHP-517 Contemporary Moral Problems
Registration #0509-517
This is a one-term elective course which 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 (e.g., Donegan, Frankena, Gadamer, Habermas, Jonas, Singer, and Wellmer), as well as key classical texts (e.g., Plato, Locke, Hume, Reid, Kant, and Dewey).
Class 3, Credit 4 (offered annually)

GSSA-210 Cultural Anthropology
Registration #0510-210
This course is a study of the nature, method, and scope of human culture - the patterns of thought and behavior with which mankind makes decisions, criticisms, choices, and judgments in order to satisfy the needs of life and experience.
Class 3, Credit 4 (offered quarterly)

GSSA-440 Culture In Crisis
Registration #0510-440
The Chinese proverb "may you be cursed to live in interesting times" sets the tone for this course. Change in all subsystems of human culture is the hallmark of the 20th century. The stress and strain that accompany change challenge every traditional way of life in the world today. From peasant revolutions and millenarian movements to the feminist activism of the past generation, causes and consequences are explored in historical and cross-cultural perspective. This course is part of the Social Change in a Technological Society Concentration and may also be taken as an elective. (GSSA-210 or GSSS-210)
Class 3, Credit 4 (offered annually)

GSSA-483 The Anthropology of Religion
Registration #0510-483
This course is designed to provide students with a basic understanding of how religion operates as an integral part of any society. In order to demonstrate this, the institution of religion will be studied from a cross-cultural, anthropological perspective. Emphasis will be on primitive and peasant societies. This course is part of the Perspectives of Religion Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSA-501 Anthropological Research Methods: Explorations In Subcultural Diversity
Registration #0510-501
This course is designed to expose students from a variety of backgrounds to an alternative means of understanding human behavior through the methods of the cultural anthropologist and to demonstrate that variations in cultural patterning exist in our presumably homogeneous society. The primary emphasis in the course will be on involvement of students in the actual observation of human behavior and collection of data in a subculture of their own selection in the Rochester area.
Class 3, Credit 4 (offered occasionally)

GSSA-502 American Culture: The Archaeology of Us
Registration #0510-502
American history and contemporary American society are examined through the only unexagurated record of our behavior, the material remains. This course illustrates how the techniques of archaeology can throw new light on the lives of our Pilgrim forbears, the founding fathers, on slaves and free blacks, on the American industrial revolution, and even on the contemporary middle-class of a city like Tucson, Arizona.
Class 3, Credit 4 (offered annually)
GSSE-210 Introduction to Economics
Registration #0511-210
This course is designed to introduce the student to basic economic concepts and methods of analysis. Application of these concepts and methods of analysis to the contemporary economic issues of the U. S. and other countries will be emphasized. Topics of primary interest will include: economic methodology, the economizing problem, economic foundations of American capitalism, the marginal principle and efficient choice, supply and demand, national income and accounting, models of income determination, the role of government in the economy, money and the banking system, unemployment, and inflation.
Class 3, Credit 4 (offered annually)

GSSE-440 Urban Economics and Public Policy
Registration #0511-440
Urban economics is the application of economic analysis to spatial relationships in densely populated (urban) areas. The first part of the course develops economic models which explain the location behavior of consumers and businesses in cities. The second part of the course is issue-oriented, applying the insights gained in the first part to a number of urban problems. This course is part of the Economics Concentration and may also be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)
Class 3, Credit 4 (offered quarterly)

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: human capital, education, economics of employment discrimination, primary and secondary education, higher education, distribution of income and wealth, poverty and income maintenance, manpower planning, and microeconomic analysis of the work/leisure decision. This course is part of the Economics Concentration and may also be taken as an elective. (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 may also 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 focuses consideration of current macroeconomic theory and policy application in the context of the U. S. economic problems, e.g., tax-based incomes policies, wage-price controls. This course is part of the Economics Concentration and may also be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-444 Public Finance
Registration #0511-444
This course is a study of the economics of the public sector. Topics include but are not limited to: taxation and public expenditures and their effect on the allocation of resources, distribution of income, and employment; market failure; public goods; the economics of public choice; and the application of public finance principles and normative questions to public economic issues. This course is part of the Economics Concentration and may also 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, Keynesian, Neoclassical, Monetarist, etc.) are studied. This course is part of the Economics Concentration and may also be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-480 The Economic Role of Women
Registration #0511-480
This course is intended to analyze the economic role of women in today's society. This analysis includes the economic role of women in labor force, as owners of other factors of production, and in business decision making process. The impact of changing role of women on GNP, labor market, and other economic variables is elaborated. Through the analysis of some economic models and their application to real world situations, it is shown that the social, political, and individual equality of women depends, to a great extent, on their economic role in family and society. This course is part of the Women's Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSE-481 Environmental Economics
Registration #0511-481
The course will examine the relationship and apparent conflict between economic growth and environmental quality, the economics of environmental issues and policy, the environment as a resource and a public good, and the ability and lack of ability of free markets and the government to deal adequately with pollution and other environmental problems. This course is part of the Environmental Studies Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSE-482 Comparative Economic Systems
Registration #0511-482
The subject matter of this course is 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 disadvantage of each, and propose general policy recommendations to improve each system's relative efficiency. This course is part of the Global Studies Concentration and may also be taken as an elective. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)
Class 3, Credit 4 (offered annually)

GSSE-483 Economics of Less Developed Countries
Registration #0511-483
This course introduces the students to the economic problems of the 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 may also be used as an elective. (GSSE-210 or GSSE-301)
Class 3, Credit 4 (offered annually)
GSSE-520  Intermediate Price Theory
Registration #0511-520
Intermediate Price Theory develops the tools of analysis utilized in contemporary economics to study the process of price formation in a capitalist society. Topics covered in the course include the theories of consumer behavior, cost and production, alternative market structures, and the pricing of factors of production. (GSSE-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSE-521  Intermediate Macroeconomic Theory
Registration #0511-521
The central question of macroeconomics is the determination of output, employment and prices. This course develops models which incorporate behavioral assumptions concerning consumption, investment, and the role of money and their relationship to macroeconomic variables. (GSSE-301 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSE-522  International Trade and Finance
Registration #0511-522
This course examines the students to the theory and the practical issues of the export/import markets, the international flow of capital, and international investment decisions. In addition, the students study the foreign-exchange and the Eurodollar markets and the investment opportunities in them. The role of multinational corporations in international trade and finance is also discussed. (GSSE-210 or GSSE-301 and GSSE-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSE-523  Monetary Analysis and Policy
Registration #0511-523
This course is the study of monetary behavior and the role of monetary institutions in the modern economy. The course includes consideration of monetary theory, the development and current characteristics of monetary institutions in the American economy, and the use of the tools of monetary analysis to evaluate alternative monetary policies. The course will conclude with an evaluation of the neo-Keynesian and Monetarist positions. (GSSE-210 or GSSE-301 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSE-524  Industrial Organization
Registration #0511-524
This course is the study of the structure, conduct, and performance of contemporary American industry. The course involves the application of the tools of microeconomic analysis and empirical evidence to aid in understanding the behavior of modern industry. In addition the course considers the historical determinants of contemporary market structure and the public policy measures designed to preserve a competitive market structure. (GSSE-302 or equivalent)
Class 3, Credit 4 (offered occasionally)

GSSE-526  Research Methods for Economics
Registration #0511-526
This course develops the skills used by the applied economist in computer-based research. Exercises and research projects for the course will be chosen to illustrate the kind of problems actually dealt with by the contemporary applied economist. (GSSE-302, ICSA-210)
Class 3, Credit 4 (offered occasionally)

GSSM-211  American Politics
Registration #0513-211
This course is a study of the American national political system, its theoretical foundations and institutions, and the contemporary issues which confront it.
Class 3, Credit 4 (offered quarterly)

GSSM-215  Ideology and the Political Process
Registration #0513-215
This course examines major ideological concepts and how these are operationalized through the political processes of various governmental structures.
Class 3, Credit 4 (offered quarterly)

GSSM-440  International Relations
Registration #0513-440
This course critically analyzes the structure and principles of the international system with emphasis on the tensions between the imperatives of power politics and the requirements of law and justice. This course is part of the International Relations Concentration and may also be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-441  Politics in China
Registration #0513-441
This course is designed to provide the students with the political dynamics of the People’s Republic of China. Major emphasis will be given to the historical background, major aspects of the political systems, and the foreign relations of China. This course is part of the International Relations Concentration and may also be taken as an elective. This course is part of the international relations concentration and also the foreign language/culture study concentration and may also be taken as an elective. (GSSM-211 or GSSM-215)
Class 3, Credit 4 (offered annually)

GSSM-442  Government and Politics of Europe
Registration #0513-442
This course examines various aspects of the Soviet political system with particular emphasis on the communist party apparatus, governmental institutions, political leadership and contemporary issues in the USSR. This course is part of the International Relations Concentration and may also be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-443  Foreign Policy of the Soviet Union
Registration #0513-443
This course critically examines fundamental elements of Soviet foreign policy since its inception. Special emphasis will be given to geopolitical and ideological aspects of Soviet national interests as well as analyses of the mechanics of foreign policy formulation and its implementation with respect to the United States, Western and Eastern Europe, China, the Third World and the Middle East. This course is part of the International Relations Concentration and may also 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 may also be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)

GSSM-450  State and Local Politics
Registration #0513-450
This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. It will illustrate differences in state governments by comparing other states to New York, and will use the Rochester area for comparisons with local governments found elsewhere. This course is part of the American Politics Concentration and may also be taken as an elective. (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 will also be directed to state legislatures. Topics to be studied include elections, party organization, committees, interest group activities, and executive-legislative relations. This course is part of the American Politics Concentration and may also be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)
Class 3, Credit 4 (offered annually)
This course is a study of the role of the presidency in the American Political System. Among the topics to be considered are: the nomination and election process, evolution, expansion and limitation of presidential powers, factors in decision making, and the various leadership functions performed by the American Presidency. This course is part of the American Politics Concentration and may also be taken as an elective. (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 may also 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 may also 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 may also be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

GSSM-480  Comparative Politics
Registration #0513-480

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 Global Studies Concentration and may also be taken as an elective.

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 underdeveloped 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 annually)

GSSM-504  Twentieth Century America
Registration #0513-504

An examination of the major political, social and economic developments affecting the United States in the 20th century. Emphasis will be placed upon the reactions of the various presidential administrations to conditions in both the domestic and foreign fields.

Class 3, Credit 4 (offered annually)

GSSM-514  Theories of Political Systems
Registration #0513-514

An examination of the basic questions in political theory, a survey of the major political philosophers, and an inquiry into the major political ideologies.

Class 3, Credit 4 (offered annually)

GSSM-524  The Judicial Process
Registration #0513-524

This course examines the structure and function of the state and federal courts in the American political system.

Class 3, Credit 4 (offered annually)

GSSP-210  Introduction to Psychology
Registration #0514-210

This course is designed to introduce the student to the scope and methodology of psychology. Topics will include: aims and methods, sensation and perception, learning and memory, emotion and motivation, normal and abnormal personality, and social psychology.

Class 3, Credit 4 (offered quarterly)

GSSP-440  Human Growth and Development
Registration #0514-440

This course explores human development from conception through adolescence. The developmental approach provides the opportunity to integrate many areas of psychological research such as cognition, personality, perception, social interaction and moral development as they apply to human development. This course is part of the Human Growth and Development Concentration and may also be taken as an elective. (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 Human Growth and Development Concentration and may also 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 Human Growth and Development Concentration and may also be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)
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 pervasive throughout their lives. It examines the complexity of memory process, which is an essential element of learning and learning theories and their applications in real-life situations. This course is part of the Human Growth and Development Concentration and may also be taken as an elective. (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 human growth and development concentration and may also 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 human growth and development concentration and may also be taken 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 may also be taken as an elective. (GSSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-483 Social Psychology of Religion
Registration #0514-483
This course examines religions as cultures which, like other “ways of life,” face the task of attracting or creating new members, maintaining their loyalty, providing them with a coherent world view and satisfying their basic needs. It will examine the way religions use education, ritual, rewards, punishment, symbols and other mechanisms of social control and cohesion formation to build and nurture their flocks. In addition it will examine the ways in which religious organizations and their individual members reconcile conflicts between religious and secular norms, world views, loyalties and problem solving strategies. Finally it will suggest how psychological processes such as identity information, attribution, self actualization, brainwashing, conflict, denial, projection, and repression may be applied and misapplied in efforts to understand religious belief and behavior. This course is part of the Perspectives on Religion Concentration and may also be taken as an elective.
Class 3, Credit 4 (offered annually)

GSSP-501 Industrial Psychology
Registration #0514-501
Consideration of principles, application and current research in industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership and communication. (GSSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-503 Abnormal Personality
Registration #0514-503
This course examines the major categories of mental disorder not only from the descriptive point of view, but, also in terms of the major theoretical explanations of the causes of disorder. The major treatment modalities are also covered. (GSSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-504 Attitude Formation and Persuasion Techniques
Registration #0514-504
The course will focus on current theories of attitude formation, and seek to apply them to contemporary events to achieve an understanding of how those who wish to shape or change attitudes do so. (GSSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-512 Psychology of Personality
Registration #0514-512
This course examines the strengths and weaknesses of the major psychological theories of personality. Methods of assessing personality, research, and applications of theory to real-life situations are included in the evaluation of each theory. (GSSP- 210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-514 Behavior Modification
Registration #0514-514
This course will teach you the skills of changing your behavior by controlling your environment and the consequences of your behavior. (GSSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-517 Death and Dying
Registration #0514-517
This course will view death from a social-psychological perspective. After dealing with topics such as the leading causes of death, attitudes toward death, suicide, and American funeral practices, it will focus on such questions as how people can better cope with their own mortality and that of loved ones, and how people can help others face death, and help themselves and others during periods of bereavement. (GSSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-518 Psychology of Aging
Registration #0514-518
The Psychology of Aging course will present a psychological overview of human aging with some study of the dynamic problems of the elderly in contemporary society. Psychological aspects of adulthood and aging will be emphasized within the perspectives of an interdisciplinary approach (GSSP-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSP-519 Psychology of Altered States of Consciousness
Registration #0514-519
This course will cover such topic areas as the specialized consciousness in the two halves of the brain, dreaming, 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)

GSSS-210 Foundations of Sociology
Registration #0515-210
This course introduces students to the way sociologists interpret social reality, the major elements of the field and the most important research findings. Included are such topics as cultural differences and ethnocentrism, socialization, social statuses and roles, group dynamics, social institutions, stratification, collective behavior.
Class 3, Credit 4 (offered quarterly)

GSSS-441 The Changing American Family
Registration #0515-441
This sociology course examines contemporary patterns in the courtship, marital and family systems of the United States with special reference to gender role definitions, participation in the workplace and variations in social class. This course is part of the Social Change In a Technological Society Concentration and may also be taken as an elective. (GSSS-210 or GSSA-210)
Class 3, Credit 4 (offered quarterly)

GSSS-443 Work and Society
Registration #0515-443
This sociology course analyzes the essential properties of work, its structure, the group processes involved in it, and its social meaning. The course treats work as emerging, like other social realities, out of social relationships between individuals and groups. It looks at ways in which people can develop a positive self-regard or a sense of alienation in their occupations and professions and various types of work organizations. It also considers leisure as a complement to work. This course is part of the Social Change in a Technological Society Concentration and may also be taken as an elective. (GSSS-210 or GSSA-210 or instructor's permission)
Class 3, Credit 4 (offered annually)

GSSS-444 Dynamics of Social Change
Registration #0515-444
Few people need to be more prepared to deal with social change than professionals in technical fields. In this culture, technology is often at the center of change and technical people are expected not only to cope with change but to help guide it. The purpose of this course is to help RIT students 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 may also be taken as an elective. (GSSS-210 or GSSA-210 or equivalent)
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 development, structure, organization, function and effects of mass media in society. Issues to be discussed will include: ethnicity, race, age and sex-role stereotyping; the consequences of broadcasting violence; children and the media; the business of television; economic control; the entertainment industry; the production of culture; the global reach of television and its consequences. This course is part of the Social Change in a Technological Society Concentration and may also be taken as an elective. (GSSS-210 or GSSA-210 or equivalent)
Class 3, Credit 4 (offered annually)

GSSS-446 Health and Society
Registration #0515-446
This course is a survey of the sociological aspects of health and illness. Some areas of study will be the definition, causes (etiolog)- and cure of disease in various societies and social groups. Also included will be a discussion of the epidemiology of disease, access to, and delivery of health care in contemporary U. S. society, problems of patient care and the study of mental illness and death and/or dying. This course is part of the Social Change In a Technological Society Concentration and may also be taken as an elective. (GSSS-210 or GSSA-210 or equivalent)
Class 3, Credit 4 (offered Annualy)

GSSS-480 Women in Contemporary U. S. Society Concentration and may also be taken as an elective. (GSSS-210 or GSSA-210)
Class 3, Credit 4 (offered annually)

GSSS-506 Social Inequality
Registration #0515-506
The study of social inequality is a survey course which will examine different dimensions of stratification in the U. S. and elsewhere. Explanations for the existence of inequality will be addressed at individual, group and institutional levels.
Class 3, Credit 4 (offered annually)

GSSS-507 Complex Organizations
Registration #0515-507
This course analyzes the structure and dynamics of a wide variety of social organizations (government bureaucracies, corporations, and voluntary groups). Topics discussed will include theories of organization, organizational processes, technological impact, and organizational change and development. An examination of the internal operation of large organizations will include sources of power and authority, modes of communication, division of labor as well as tension, stress and strain.
Class 3, Credit 4 (offered annually)

GSSS-508 Aging and Society
Registration #0515-508
This course considers concepts, issues, and research techniques in the behavioral and biological aspects of aging. It examines the interaction of group processes in the family and community which influence society’s attitudes toward the aging process. It further examines the cultural, environmental and institutional changes as they relate to an increasing population of older people.
Class 3, Credit 4 (offered annually)

GSSS-509 Social Policy
Registration #0515-509
An examination of social policy formulation in a variety of contexts from local government to national government. Special attention will be given to the strategies, choices and priorities in the formulation of social policy. The course will deal with historical development of social policies including the issues of health, aging, poverty, family and children. The course will also examine the question of how social values and economy influence policy development.
Class 3, Credit 4 (offered annually)
GSSS-510 Juvenile Justice
Registration #0515-510
The philosophical, historical and operational aspects of the juvenile justice system; evaluation of the social and personal factors related to juvenile delinquency; the role of police, the courts, corrections and community programs in delinquency prevention, control and treatment.
Class 3, Credit 4 (offered annually)

GSSS-511 Population and Society
Registration #0515-511
Study of demographic variables of mortality, fertility, and migration as they affect the rise and quality of population.
Class 3, Credit 4 (offered annually)

GSSS-513 Criminology
Registration #0515-513
A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, theories of criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime.
Class 3, Credit 4 (offered annually)

GSSS-514 The Urban Experience
Registration #0515-514
This sociology course analyzes social and spatial characteristics of cities and considers reasons for urban development, ecological factors, types and networks of settlements, and urbanism as a way of life. It also examines the issues of neighborhoods, subareas, ghetto enclaves, metropolitan regions, urban social and political structures, problems, services, and planning.
Class 3, Credit 4 (offered annually)

GSSS-515 Social Policy and the Aging
Registration #0515-515
This course will be organized around culture and values as context for policy formulation. Special attention will be given to the process of policy analysis and implementation. Several specific policy areas will be examined: social security and income maintenance; health and long-term care; work and retirement; social services and the aging network; housing and living arrangements for the elderly; and the role of the family and the elderly.
Class 3, Credit 4 (offered annually)

GSSS-524 Applied Sociology
Registration #0515-524
This course is an effort to provide the student with useful sociological knowledge applicable to solutions of practical problems. The inventory of problems is not fixed beforehand, and the specific course content reflects the problems either already encountered by students or very likely to represent a significant portion of their anticipated professional concern upon graduation. (Permission of instructor)
Class 3, Credit 4 (offered annually)

GSSS-526 Hispanic American Culture
Registration #0515-526
This course is an effort to study the social experiences and conditions of Hispanic Americans and the degree to which they have been assimilated into the mainstream dominant culture. Various Hispanic groups will be studied with the goal of defining and outlining their differences and similarities. The Puerto Ricans in the Northeast and the Mexican-Americans in the Southwest will be specifically selected for analysis. The course will help students to better understand the problems faced by Hispanic Americans by looking at specific socio-economic indicators such as: their access to health care, to job opportunities, to educational institutions, and to the degree that Hispanics have "progressed" in the United States.
Class 3, Credit 4 (offered annually)

GSSS-527 Black Culture
Registration #0515-527
This course is designed to analyze past, present and future social policies, programs and practices from their actual effects and predictable effects on black people. These analyses and solutions will include particular emphasis on how the Black community has been forced to develop mechanisms for coping with the debilitating effects of poverty, environmental deprivation, and institutional racism. The course is designed to present a systematic means of facilitating change in people's attitudes and behaviors.
Class 3, Credit 4 (offered annually)

GSSS-569 Human Sexuality
Registration #0515-569
This course is designed to be sex positive in its approach to the study of human sexual behavior. It will focus upon basic physiology, sexual awareness, sexual development throughout the life cycle, sex roles, sexual myths, legal and social issues, pre-marital and marital sexual behavior, and alternative sexual choices. Frequently these issues raise questions of sexual attitude and value and these will be examined and clarified.
Class 3 + 2hr. weekly seminar, Credit 4 (offered biannually)

GLAA-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, investigating 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)

GSSS-401, 402 Aerospace Studies: National Security Forces In Contemporary American Society
The course is a study of U.S. national security policy which examines the formulation, organization and implementation of national security; the context of national security; the evolution of strategy; the management of conflict and civil-military interaction. It also includes blocks of instruction on the military profession, officership, and the military justice system. The course is designed to provide future Air Force Officers with a background in U.S. national security policy so they can effectively function in today's Air Force.
Class 4-5, Credit 9 (for two quarters)
GLAI-201 Seminar: Academic Fields of Registration #0520-201 Study (Tech. and Ub. Studies)
This seminar is designed to introduce students to the full array of degree programs offered by RIT. Although it is part of a student's exploration of career possibilities, the focus will be on fields of study necessary for particular careers rather than on the ultimate career activity itself. The presupposition is that interest in a field of study is necessary to career success, but also that any one field of study can lead to a variety of career choices.
Class 1, Credit 1 (offered annually)

GLLC-301, 302, 303 College Writing I, II, 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 Registration #0502-403 Communication
This course provides knowledge and practice of written and oral communication skills generally required in technical professions. Focus is on individual and group writing and speaking tasks. All written work must be prepared on word processor.
Class 3, Credit 4 (offered annually)

GLLC-404 Communication with the Registration #0502-404 Handicapped
An examination of the communication difficulties with the handicapped: specifically the deaf, blind and others with physical handicaps. To include interpersonal, family, social and rehabilitation modes of communication. (GSSP-210)
Class 3, Credit 4 (offered occasionally)

GSSE-301 Principles of Economics I Registration #0511-301
This is the first course in a two quarter sequence designed to introduce the student to the basic principles of economics. This course will focus on basic economic concepts and macroeconomics. Topics of primary interest include economic methodology, the economizing problem, capitalist ideology, supply and demand, national income accounting, income determination, inflation, money, and the role of government in the economy. Other topics in basic economics will be selected by the instructor.
Class 3, Credit 4 (offered quarterly)

GSSE-302 Principles of Economics II Registration #0511-302
This is the second course in a two quarter sequence designed to introduce the student to the basic principles of economics. This course will focus on microeconomics. Topics of primary interest include market structure, supply and demand analysis involving elasticity, the theory of cost in the short and long run, perfect competition, monopoly, monopolistic competition oligopoly, marginalist distribution theory, the labor market, and general equilibrium analysis. Other topics in microeconomics will be selected by the individual instructor.
Class 3, Credit 4 (offered quarterly)

GSSE-303 Principles of Economics III Registration #0511-303
A further elaboration of the elementary principles of economic analysis introduced in Principles of Economics I and II. Particular emphasis will be placed on the application of these principles to the decision making process of the firm. (GSSE-302)
Class 3, Credit 4 (offered annually)

GSSE-527 Seminar in Applied Registration #0511-527 Economics
A senior-level course emphasizing applications of economic analysis and quantitative methods to economic decision-making. Cases will be drawn from both the private and public sectors of the economy. (Limited to BS in economics degree seniors)
Class 3, Credit 4 (offered occasionally)

GSSE-528 Applied Econometrics Registration #0511-528
This course is designed to provide students in the Economics program with an opportunity to develop their skills in applied regression analysis. The course will cover the various regression models, estimation techniques, data preparation and transformation, and the interpretation of regression results. Particular emphasis will be placed on the dangers of misuse of regression techniques.
Class 3, Credit 4 (offered occasionally)

GLZ-200 Basic Communications Registration #0518-200
Students will gain an understanding of deafness, plus basic skills which will permit communication with a segment of the deaf population.
Class 3, Credit 4 (offered on sufficient demand)

GLLL-702 Film and Society Registration #0504-702
An inquiry concerning the relationship between motion pictures and society that will use historical, humanistic, and social science research to achieve an understanding of movies as a social force, industry, and art form.
Class 3, Credit 4 (offered occasionally)

GSHF-702 Film History and Criticism Registration #0505-702
A critical examination of key aspects of film criticism and of the development of film as an art. The emphasis of the course will be historical, with the development of cinema being traced through major films by important directors. There will be an opportunity to pursue individual interests.
Class 3, Credit 4 (offered occasionally)

GSHF-703 American Architecture Registration #0505-703
An examination of American architecture from the 17th century to the present designed for the graduate level of study. Emphasis will be placed on American building art in the late 19th and 20th centuries.
Class 3, Credit 4 (offered occasionally)

GSHF-705 Theories of Aesthetics and Registration #0505-705 Art Criticism
A course of the art-oriented graduate student centering on the student's search for a supportable and reliable basis for making value judgments about works of art as well as introducing the student to major concepts in aesthetics.
Class 3, Credit 4 (offered occasionally)

GSHF-707 Cubism to the Present Registration #0505-707
Cubism as a way of seeing and as an expression of 20th century thinking. Differences and similarities with art forms of earlier eras and other cultures will be discussed.
Class 3, Credit 4 (offered on sufficient demand)
GSHF-708 Oriental Art
Registration #0505-708
A seminar exploring the philosophical and cultural perspectives underlying traditional Far Eastern art as a prelude to examining selected topics in Indian, Chinese, and Japanese art. Emphasis will be placed on the application of research techniques and critical methods of an individually selected area of interest which may serve as a foundation for continuing study.
Class 3, Credit 4 (offered occasionally)

GSHF-711 20th Century American Art
Registration #0505-711
An investigation of American art from the Civil War to the present. Emphasis will be placed on the visual arts but many references will be made to music and architecture.
Class 3, Credit 4 (offered occasionally)

GSHF-712 Arts and Crafts in Tribal Societies
Registration #0505-712
A study of the function of primitive art and the techniques of its production, including the use of clay, stone, fibers, bark, wood, bronze, gold, etc. Hair styling, body painting and scarification will also be discussed.
Class 3, Credit 4 (offered occasionally)

GSHF-713 Contemporary issues in Art
Registration #0505-713
This course offers the graduate art student the opportunity to investigate those aspects of 20th century art that question the very nature of art and the role of the artist in today's and tomorrow's society.
Class 3, Credit 4 (offered occasionally)

GSHF-714 Art Vision and Concept
Registration #0505-714
Though the course will develop chronologically from the Renaissance to the present. Emphasis will be placed on a close analysis of (1) selected works of art, including paintings, sculpture and architecture, and (2) the development of the unique oeuvre of selected artists. Topics chosen for study will be limited in number but treated in depth. Topical choices will be based on richness and import of the formal and/or conceptual content embodied therein. Some background in the history of art is helpful but not necessary.
Class 3, Credit 4 (offered occasionally)

GSHF-715 Picasso
Registration #0505-715
The impact of Picasso and his circle on 20th century art. Their affinities with modern scientific and philosophical attitudes will also be discussed.
Class 3, Credit 4 (offered occasionally)

GSHF-716 Rembrandt
Registration #0505-716
A detailed analysis of the art and times of the Baroque master. Emphasis will be placed on the development of his style and technique, on his and other artist's relationship to their society and to the character of the Baroque outlook.
Class 3, Credit 4 (offered occasionally)

GSHF-717 Topics in Music History
Registration #0505-717
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.
Class 3, Credit 4 (offered occasionally)
College of Science
Biology

SBIB-201 General Biology
Registration #1001-201
Characteristics and origin of life; basic principles of modern cellular biology including cell organelle structure; chemical basis and functions of life including enzyme systems, respiration and photosynthesis; nutrient procurement in plants and animals.
Class 3, Credit 3 (F)

SBIB-202 General Biology
Registration #1001-202
A study of the physiological processes of gas exchange, internal transport, osmoregulation, excretion, and hormonal control in plants and animals; nervous system and behavior in animals.
Class 3, Credit 3 (W)

SBIB-203 General Biology
Registration #1001-203
A study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology.
Class 3, Credit 3 (S)

SBIB-205, 206, 207 General Biology Laboratory
Registration #1001-205, 206, 207
Laboratory work to complement the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve ability to make, record and interpret observations. (Corequisite SBIB-201, 202, 203)
Lab 3, Credit 1 (F-205, W-206, S-207)

SBIB-230-01 Introduction to Co-op Seminar
Exploration of co-operative education opportunities in the biological sciences. Practice in writing letters of application; resume writing; and interviewing procedures.
Class 1, Credit 1 (W)

SBIB-240 (first-year students) Biology Symposium
Registration #1001-240
An introduction to biological theory and critical thinking in the biological sciences.
Class 1, Credit 1 (F)

SBIB-250 Introduction to Biotechnology
Registration #1001-250
An introduction to the nature and scope of the science of biotechnology, the employment environment and opportunities, and the literature of the field (One quarter of general biology).
Class 1, Credit 1 (W)

SBIB-301 Invertebrate Zoology
Registration #1001-301
Biology in invertebrate animals with reference to classification, structure, function, and ecology. (One year of general biology or permission of instructor)
Class 2, Lab 6, Credit 4 (offered upon sufficient request)

SBIB-302 Vertebrate Zoology
Registration #1001-302
Morphology, physiology, behavior, classification, and ecology of chordates. (One year of general biology)
Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SBIB-303 Comparative Vertebrate Anatomy
Registration #1001-303
A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)
Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SBIB-304 Botany
Registration #1001-304
Distribution of the major groups of plants and their adaptations to their particular environment. (One year of general biology or permission of 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 physiological experiments with human subjects. (One year of general biology, SCHG-217 or permission of instructor)
Class 3, Lab 3, Credit 4 (4)

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 3, Lab 3, Credit 4 (S)

SBIB-310 Plant Physiology
Registration #1001-310
Physiological phenomena in the growth and development of higher plants. Water relationships, photosynthesis, translocation, mineral nutrition, growth, hormonal control and reproduction. (One year of general biology and one year of organic chemistry)
Class 3, Lab 3, Credit 4 (S, SR)

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 (S)

SBIB-340 General Ecology
Registration #1001-340
Introduction to ecosystem ecology stressing the dynamic 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)

SBIS-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 (S)
SBIB-360 Horticuture
Registration #1001-360
A basic introduction to horticulture with a study of the interconnections of plants, gardens and their environment and discussion relating to applications of principles to indoor and outdoor gardening. (co-requisite 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, (co-requisite SBIB-360)
Lab 3, Credit 1 (offered upon sufficient request)

SBIB-370 (third year students) 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)

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, transplants, tumors, autoimmune diseases, immunosuppression and tolerance. (One year of general biology, one quarter of organic chemistry)
Class 3, Credit 3 (F, W)

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. (SCHO-334, SBIB-350)
Class 3, Lab 3, Credit 4 (W, S)

SBIB-404 Introductory Microbiology
Registration #1001-404
Principles of anatomy, biochemistry, genetics, taxonomy, ecology of viruses, bacteria, molds, algae and protozoa. Useful and harmful activities. Basic laboratory techniques, microscopy, staining, counting, identifying. (One year of general biology, one year of organic chemistry)
Class 3, Lab 4, Credit 5 (F, W)

SBIB-406 Virology
Registration #1001-406
Molecular biology, chemistry, epidemiology and clinical aspects of viruses; morphology, genetics, immunology, environmental effects; methods of isolation, cultivation, identification; assays. Human virus diseases. (One year of general biology)
Class 4, Credit 4 (F)

SBIB-407 Microbial and Viral Genetics
Registration #1001-407
The study of the molecular genetics of bacteria, bacteriophages, fungi, and eucaryotic viruses. (SBIB-350, SBIB-421, SCHO-334)
Class 3, Lab 3, Credit 4 (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-404, SCHO-334)
Class 3, Lab 3, Credit 4 (F)

SBIB-420 Plant Ecology
Registration #1001-420
A consideration of the nature and variation of plant communities with a discussion of factors which limit, maintain, and modify communities both locally and regionally. Field studies of various plant communities will be conducted. (SBIB-340)
Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SBIB-421 Genetics
Registration #1001-421
Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (SBIB-404)
Class 3, Lab 3, Credit 4 (W, S)

SBIB-430 Radiation Biology
Registration #1001-430
Effects of radiation upon living tissue, both harmful and beneficial. Morphological changes, genetic effects, and pathological changes in both plant and animal tissues. Use of radioisotopes in plant and animal research. (Minimum of 20 credits in biological science)
Class 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. (SBIB-445, one quarter of organic chemistry, corequisite SBIB-402)
Lab 3, Credit 2 (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 3 (F)

SBIB-446 Plant Tissue and Cell Culture
Registration #1001-446
Study of the techniques and applications of plant organ, tissues, and cell culture in vitro, with emphasis on plant regeneration. (One year of general biology)
Class 2, Lab 3, Credit 3 (W)

SBIB-450 Genetic Engineering
Registration #1001-450
Introduction to the theoretical basis, laboratory techniques, and applications of gene manipulation. (SBIB-350, SBIB-421, SBIB-407)
Class 2, Lab 6, Credit 4 (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-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 3 (offered upon sufficient request)

SBIB-491  Scanning Electron Microscopy  
Registration #1001-491  
A lecture/laboratory course covering operation, maintenance and calibration of scanning electron microscopes; preparation of biological, chemical and physical specimens for the scanning electron microscope; black-and-white photographic darkroom techniques. (Third-, fourth- or fifth-year status)  
Class 1, Lab 6, Credit 3 (offered upon sufficient request)

SBIB-540, 541, 542, 543  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. (Third-year status with a GPA of 2.5 in science and mathematics courses, and consent of faculty)  
Class variable, Credit variable (F, W, S, SR)

SBIB-550  Biology Seminar  
Registration #1001-550  
Written and oral reports and their discussion by class members covering topics of current interest in the biological sciences. (40 quarter hours in biology and successful completion of the departmental writing requirement)  
Class 2, Credit 2 (W, S)

SBIB-559  Special Topics - Biology  
Registration #1001-559  
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary 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-599  Independent Study-Biology  
Registration #1001-599  
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (One year of general biology)  
Class variable, Credit variable (offered every quarter)

SBIB-710  Antibiotics & Chemotherapy  
Registration #1001-710  
Class 3, Lab 2, Credit 4 (offered upon sufficient request)

SBIB-720  Introduction to Pharmacology  
Registration #1001-720  
A survey of the pharmocodynamic properties and physiological effects of drugs used clinically to treat disease. Emphasis will be placed on anti-cancer drugs, antibiotics, and drugs which will affect the central and peripheral nervous system. (SBIB-305, 306 or equivalent, SCHO-233)  
Class 3, Credit 3 (S)

SBIB-721  Laboratory  
Registration #1011-721  
Laboratory work to accompany the lectures in Introduction to Pharmacology. (Corequisite SBIB-720)  
Lab 3, Credit 1 (S)

SBIB-740  General Toxicology  
Registration #1001-740  
The study of the science of poisons (the harmful actions of chemicals on biologic tissue) through the examination of biological and chemical mechanisms, their implications for biological systems, and detection. (Physiology, Anatomy, Organic Chemistry or permission of the instructor. Genetics recommended. Laboratory a corequisite for biology majors)  
Class 3, Credit 3 (offered upon sufficient request)

SBIB-741  General Toxicology  
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 or bio technology majors.

SBIB-710  Antibiotics & Chemotherapy  
Registration #1001-710  
Class 3, Lab 2, Credit 4 (offered upon sufficient request)

SBIB-720  Introduction to Pharmacology  
Registration #1001-720  
A survey of the pharmocodynamic properties and physiological effects of drugs used clinically to treat disease. Emphasis will be placed on anti-cancer drugs, antibiotics, and drugs which will affect the central and peripheral nervous system. (SBIB-305, 306 or equivalent, SCHO-233)  
Class 3, Credit 3 (S)

SBIB-740  General Toxicology  
Registration #1001-740  
The study of the science of poisons (the harmful actions of chemicals on biologic tissue) through the examination of biological and chemical mechanisms, their implications for biological systems, and detection. (Physiology, Anatomy, Organic Chemistry or permission of the instructor. Genetics recommended. Laboratory a corequisite for biology majors)  
Class 3, Credit 3 (offered upon sufficient request)

SBIB-741  General Toxicology  
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 or bio technology majors.

SBIB-710  Antibiotics & Chemotherapy  
Registration #1001-710  
Class 3, Lab 2, Credit 4 (offered upon sufficient request)

SBIB-720  Introduction to Pharmacology  
Registration #1001-720  
A survey of the pharmocodynamic properties and physiological effects of drugs used clinically to treat disease. Emphasis will be placed on anti-cancer drugs, antibiotics, and drugs which will affect the central and peripheral nervous system. (SBIB-305, 306 or equivalent, SCHO-233)  
Class 3, Credit 3 (S)

SBIB-740  General Toxicology  
Registration #1001-740  
The study of the science of poisons (the harmful actions of chemicals on biologic tissue) through the examination of biological and chemical mechanisms, their implications for biological systems, and detection. (Physiology, Anatomy, Organic Chemistry or permission of the instructor. Genetics recommended. Laboratory a corequisite for biology majors)  
Class 3, Credit 3 (offered upon sufficient request)

SBIB-741  General Toxicology  
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 or bio technology majors.
SBIG-212  Human Biology II
Registration #1004-212
A general study of human anatomy and physiology with emphasis on mechanisms by which the nervous and endocrine systems coordinate and integrate body functions. This second course includes discussions of nutrition, metabolism and respiratory, circulatory, lymphatic, urinary and reproductive systems. Recitation for the social work students emphasizes common disease states and their treatments. (Corequisite SBIG-232)
Class 3, Credit 3, or Class 3, Rec. 1, Credit 4 (S)

SBIG-220  Microbiology in Health & Disease Laboratory
Registration #1004-220
Laboratory culturing, handling and identification of microorganisms with special emphasis on the relationship of bacteria to food handling and preservation, the production of food products by bacteria, and the prevention of food-borne diseases. (Corequisite SBIG-210)
Lab 3, Credit 1 (F)

SBIG-231  Human Biology Laboratory
Registration #1004-231
Laboratory for dietetic and medical illustration students complements the lecture materials of SBIG-211. Experiments are designed to illustrate the dynamic characteristics of cells, tissues and organ systems.
Lab 3, Credit 1 (W)

SBIG-232  Human Biology Laboratory
Registration #1004-232
Laboratory for dietetic and medical illustration students complements the lecture material of SBIG-212. Experiments are designed to illustrate the dynamic anatomy and physiology of major organ systems.
Lab 3, Credit 1 (S)

SBIG-289  Contemporary Science-Biology
Registration #1004-289
A study in various biological topics relevant to contemporary problems of society. Topics may include population biology, pollution, disease control, human heredity, contagious diseases, marine biology, bioethics.
Class 4, Credit 4 (F, W, S)

SBIG-315  Medical Genetics
Registration #1004-315
A survey of selected human variations and disease of medical importance, with emphasis on the underlying genetic principles. (SBIB-203 or equivalent)
Class 2, Credit 2 (W)

Chemistry

SCHA-261  Introduction to Chemical Analysis I
Registration #1008-261
An introduction to quantitative analysis; solubility of ionic compounds and the equilibria involved; activity concepts; statistical treatment of data. Laboratory experiments include gravimetric and precipitation methods. (Corequisite SCHA-251)
Class 2, Lab 5, Credit 3 (offered every year) (F)

SCHA-262  Introduction to Chemical Analysis II
Registration #1008-262
Systematic treatment of acid-base equilibria, titrations, analytical oxidation-reduction processes; complexometric methods. (Corequisite SCHA-252) (SCHA-261)
Class 2, Lab 5, Credit 3 (offered every year) (W)

SCHA-263  Introduction to Chemical Analysis III
Registration #1008-263
Introduction to electrochemical and spectroscopic methods, potentiometric and spectrometric titrations. Electrodeposition and pH measurements included in lab. (Corequisite SCHA-253) (SCHA-262)
Class 2, Lab 5, Credit 3 (offered every year) (S)

SCHA-311  Analytical Chemistry-Instrumental Analysis
Registration #1008-311
Elementary treatment of instrumental theory and techniques; properties of light, ultraviolet, visible, and infrared spectrophotometry; atomic and molecular fluorescence, emission spectroscopy; flame photometry. (Corequisite SCHA-318) (SCHC-253)
Class 3, Credit 3 (offered every year) (F, W)

SCHA-312  Analytical Chemistry-Separations
Registration #1008-312
Inorganic and organic separations; Raoult’s and Henry Laws; phase rules; distillation; extraction; absorption and surface effects; chromatography including gas, liquid, column, paper, thin layer, and ion exchange. (Corequisite SCHA-319) (SCHC-253)
Class 3, Credit 3 (offered every year) (S, SR)

SCHA-318  Instrumental Analysis Lab
Registration #1008-318
Lab accompanying SCHA-311. Quantitative and qualitative experiments in ultraviolet, visible, and infrared spectrophotometry, molecular fluorescence and flame atomic absorption spectrophotometry. Laboratory report writing is emphasized. (Corequisite SCHA-311) (SCHC-253)
Lab 4, Credit 1 (offered every year) (F, W)

SCHA-319  Separations Lab
Registration #1008-319
Lab accompanying SCHA-312. Experiments with chemical separation techniques including distillations, extractions and a variety of chromatographic methods (HPLC, thin layer, paper, ion exchange, gas, gel filtration). Laboratory report writing is emphasized. (Corequisite SCHA-312) (SCHC-253)
Lab 4, Credit 1 (offered every year) (S, SR)

SCHB-334  Biochemistry
Registration #1009-334
Introduction to biological chemistry. An in-depth survey of the molecular organization, physiological functions and bio-energetics principles of the molecular components of cells; amino acids, proteins, enzymes, carbohydrates, lipids, and nucleic acids. Emphasis is on the structure-function relationships, solution behavior, and metabolism of biomolecules. (SCHO-233)
Class 4, Credit 4 (offered every year) (F)

SCHC-200  Chemical Safety
Registration #1010-200
A basic course in safe chemical laboratory practices. Topics include protective equipment, toxicity, safe reaction procedures, storage and disposal methods, and handling all chemicals including flammable materials, compressed gases, cryogens, radioactive materials and other special chemicals.
Class 1, Credit 1 (offered every year) (F)

SCHC-230  Introduction to Co-op Seminar
Registration #1010-230
Exploration of co-operative 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 SCHA-262) (SCHC-251)  
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  
A laboratory course for photoscience 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.  
Lab 3, Credit 1 (offered every year) (F)

SCHG-206  Chemical Principles II  
Registration #1011-206  
A laboratory course for photoscience and science majors and others who are taking SCHG-212. Laboratory experiments are designed to complement lecture topics and may include the following: titrations, thermochromy, kinetics, spectrophotometry (visible), and redox reactions. (SCHG-205)  
Lab 3, Credit 1 (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 regarding the use of chemical literature. (SCHO-433, SCHP-442 may be taken concurrently).  
Class 2, Credit 2 (offered every year) (F, W)

SCHC-402  Introduction to Research  
Registration #1010-402  
Introduction to laboratory research projects of interest to chemistry faculty members. Students desiring to pursue active undergraduate research will investigate research opportunities with faculty members. Preparation and presentation of a research proposal in this course is a prerequisite to participation in research. (SCHO-431, SCHP-441)  
Class 1, Credit 0 (offered every year) (F, W)

SCHC-403, 404, 405  Introduction to Research  
Registration #1011-403, 404, 405  
Introduction to laboratory research projects of interest to chemistry faculty members. Students desiring to pursue active undergraduate research will investigate research opportunities with faculty members. Preparation and presentation of a research proposal in this course is a prerequisite to participation in research. (SCHO-431, SCHP-441)  
Class 1, Credit 0 (offered every year) (F, W)

SCHC-521  Independent Study-Chemistry  
Registration #1010-521  
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.  
Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHG-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. (SCHG-206)  
Lab 3, Credit 1 (offered every year) (S)

SCHG-208  College Chemistry I  
Registration #1011-208  
Primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stoichiometry, first law of thermodynamics, thermochemistry, electronic theory of composition and structure, chemical bonding.  
Class 4, Credit 4 (offered every year) (F, W)

SCHG-209  College Chemistry II  
Registration #1011-209  
A continuation of SCHG-208. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry and the chemistry of metals. (SCHG-208)  
Class 4, Credit 4 (offered every year) (S)

SCHG-210  Chemical Topics for Computer Engineering  
Registration #1011-210  
Electrochemistry, as well as other chemical properties of metals, is covered after a review of thermodynamics including entropy, free energy and the Second Law of Thermodynamics. The chemical properties of metals to be covered include structures of metal complexes, magnetism and color.  
Class 1, Credit 1 (W)

SCHG-211  Chemical Principles I  
Registration #1011-211  
For science and photoscience majors and others who desire an in-depth study of general chemistry. Atomic structure and chemical bonding, chemical equations and chemical analysis; gases; acids and bases.  
Class 3, Credit 3 (offered every year) (F)
SCHG-212  Chemical Principles II  
Registration #1011-212  
Problem solving applications of chemical principles. Topics include thermodynamics and equilibrium, oxidation-reduction, and chemical kinetics. (SCHG-211)  
Class 3, Credit 3 (offered every year) (W)

SCHG-213  Introduction to Organic Chemistry I  
Registration #1011-213  
Introduction to the structure and reactivities of organic molecules for physical science majors. An overview of the structure, nomenclature, bonding, and reactivities of major functional groups. Special topics will include spectroscopy, organometallics, polymers, and biomolecules. (Corequisite SCHG-207) (SCHG-212)  
Class 3, Credit 3 (offered every year) (S)

SCHG-215  General & Analytical Chemistry I  
Registration #1011-215  
General chemistry for students in biology, medical technology and the life sciences. Introduction to chemical symbols, formulas, equations, stoichiometry, atomic structure, chemical periodicity and bonding. Emphasis is on an early introduction to solutions, concentrations, acid-base and precipitation reactions; analytical chemistry problem-solving applications are stressed. (Corequisite SCHG-225)  
Class 3, Credit 3 (offered every year) (F)

SCHG-216  General & Analytical Chemistry II  
Registration #1011-216  
Introduction to quantitative gravimetric analysis, oxidation-reduction, nomenclature, chemical equilibrium and equilibria in aqueous solutions. Particular emphasis on solution equilibria including weak acids, bases, buffers, hydrolysis, pH titrations and heterogenous equilibria. (Corequisite SCHG-226) (SCHG-215)  
Class 3, Credit 3 (offered every year) (W)

SCHG-217  General & Analytical Chemistry III  
Registration #1011-217  
The concepts of polyprotic equilibria, spectrophotometry instrumentation and analyses, electrochemistry, nuclear chemistry and chemical kinetics are presented with an emphasis on the analytical applications of these principles to the life sciences. (Corequisite SCHG-227) (SCHG-216)  
Class 3, Credit 3 (offered every year) (S)

SCHG-221  Survey of General Chemistry Laboratory  
Registration #1011-221  
Laboratory course to accompany SCHG-201. Emphasis on introduction to methods of chemical analysis, qualitative and quantitative techniques.  
Lab 3, Credit 1 (offered every year) (F)

SCHG-222  Survey of Organic Chemistry Laboratory  
Registration #1011-222  
Laboratory course to accompany SCHG-202. Emphasis is on representative examples of typical organic techniques and synthesis. (SCHG-221 or equivalent)  
Lab 3, Credit 1 (offered every year) (W)

SCHG-225  General & Analytical Chemistry Laboratory  
Registration #1011-225  
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.  
Class 3, Credit 3 (offered every year) (W)

SCHG-226  General & Analytical Chemistry Laboratory  
Registration #1011-226  
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. (SCHG-225)  
Lab 3, Credit 1 (offered every year) (W)

SCHG-227  General & Analytical Chemistry Laboratory  
Registration #1011-227  
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. (SCHG-226)  
Lab 6, Credit 2 (offered every year) (S)

SCHG-240  Fundamentals of Chemistry  
Registration #1011-240  
Basic training in general chemistry assuming no prior experience, concentrating on those aspects important to the fields of engineering technology. Emphasis will be placed on atomic structure, periodicity, bonding, structure of compounds, physical and chemical properties, acids and bases, oxidation-reduction, and kinetics. (Basic Chemistry Laboratory SCHG-275 may be taken concurrently.)  
Class 4, Credit 4 (offered every year) (F)

SCHG-271  Basic Chemistry Laboratory  
Registration #1011-271  
Basic training in general chemistry assuming no prior experience, concentrating on those aspects important to the field of water conservation. (SCHG-275 should be taken concurrently.)  
Class 3, Credit 3 (offered every year) (W)

SCHG-272  Chemistry of Water and Wastewater  
Registration #1011-272  
Chemistry of water analyses, including solids, pH, alkalinity, acidity, chloride, phosphate, BOD, COD, nitrogen, metals, radioactivity, residual chlorine and chlorine demand. Polymers and synthetic adhesives will also be covered. (SCHG-271 or equivalent)  
Class 3, Credit 3 (offered every year) (F)

SCHG-275  Basic Chemistry Laboratory  
Registration #1011-275  
Laboratory to be taken concurrently with SCHG-240 or SCHG-271. General chemistry and volumetric techniques will be covered.  
Lab 3, Credit 1 (offered every year) (W)

SCHG-276  Chemistry of Water and Waste Water Laboratory  
Registration #1011-276  
Laboratory to be taken concurrently with SCHG-272. Techniques used in water and waste water analysis will be covered. (SCHG-271 or equivalent)  
Lab 3, Credit 1 (offered every year) (F)

SCHG-281  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.  
Class 3, Credit 3 (F)

SCHG-282  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) (F)
SCHG-283  Chemical Foundations III
Registration #1011-283
Aspects of organic chemistry of widest application to graphic arts technology; reaction rates and kinetics, organic chemistry and functional groups, nuclear chemistry. (SCHG-282)
Class 3, Credit 3 (offered every year) (S)

SCHG-285  Chemical Foundations Lab I
Registration #1011-285
Laboratory to accompany SCHG-281. Laboratory experiments in general chemistry; quantitative techniques.
Lab 2, Credit 1 (F)

SCHG-286  Chemical Foundations Lab II
Registration #1011-286
Laboratory to accompany SCHG-282. Laboratory experiments in general chemistry; quantitative techniques.
Lab 2, Credit 1 (W)

SCHG-289  Contemporary Science -
Registration #1011-289*  Chemistry
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)
* Not acceptable for science credit for College of Science majors.

SCHO-231, 232  Organic Chemistry
Registration #1013-231, 232
Survey of the structure names, reactions, and synthesis of the major functional groups. Mechanisms of main classes of reactions are discussed. (SCHG-216, or SCHG-212, or SCHG-209)
Class 3, Credit 3 (offered every year) (231-F, 232-W)

SCHO-233  Organic Chemistry
Registration #1013-233
Structure, nomenclature, reactions, and properties of the important classes of bio-organic molecules (carbohydrates, lipids, amino acids, proteins, and nucleic acids) are covered in depth. Emphasis is on structure and reactivity in relation to biochemical processes.
(SCHO-232)
Class 3, Credit 3 (offered every year) (S)

SCHO-235, 236, 237  Organic Chemistry Lab
Registration #1013-235, 236, 237
Laboratory work emphasizes techniques, preparations, and analyses. SCHO-237 emphasizes reactions and properties of bi-omonomers and polymers. (Should be taken concurrently with SCHO-231, 232, 233.)
Lab 3, Credit 1 (offered every year) (235-F, 236-W, 237-S)

SCHO-431  Organic Chemistry I
Registration #1013-431
A rigorous survey of the reactions of major organic functional groups, emphasizing alkanes, alkenes, alkyl halides, and alkenes. Stereochemistry is also included. (Corequisite SCHO-435) (SCHC-253)
Class 3, Credit 3 (offered every year) (S, SR)

SCHO-432  Organic Chemistry II
Registration #1013-432
A continued survey of reactions of major organic functional groups, including aromatic compounds, alcohols, ethers, aldehydes, and ketones. Organometallics and spectral analysis (IR, UV, NMR) are also included. (Corequisite SCHO-436) (SCHO-431)
Class 3, Credit 3 (offered every year) (F, W)

SCHO-433  Organic Chemistry III
Registration #1013-433
A continued survey of reactions of major organic functional groups, including carboxylic acids, carboxylic acid derivatives, amines, and enolate anions. Structure, nomenclature, reactions, and properties of important classes of bio-organic molecules are also included. (Corequisite SCHO-437) (SCHO-432)
Class 3, Credit 3 (offered every year) (S, SR)

SCHO-435, 436  Preparative Organic Chemistry
Registration #1013-435,436
Synthesis of organic compounds utilizing a variety of laboratory techniques. Purification techniques and spectral characterization will be routinely used. (SCHC-253) (SCHO-431 should be taken concurrently with SCHO-435 and SCHO-432 with SCHO-436.)
Lab 6, Credit 2 (offered every year) (435-S, SR, 436-F, W)

SCHO-437  Systematic Identification of 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) (437-S, SR)

SCHP-340  Introduction to Physical Chemistry
Registration #1014-340
Review of the thermodynamic laws; criteria for equilibrium and spontaneity; chemical equilibrium; phase rule; equilibrium in ideal and non-ideal solutions; electrochemistry. (Should be taken concurrently with SCHP-445.) (SCHP-340)
Class 3, Credit 3 (offered every year) (F, W)

SCHP-441  Physical Chemistry I
Registration #1014-441
Introduction to quantum mechanics and spectroscopy, radioactivity; Planck’s law; photoelectric effect; the Bohr atom; DeBroglie, Schrodinger, and Heisenberg theories; eigenvalue/eigenfunction equations; variation and perturbation theory; quantum statistics; Heitler-London theory of covalent bonds; selection rules and spectroscopy. (Should be taken concurrently with SCHP-446.) (SMAM-306 and SCHP-441)
Class 3, Credit 3 (offered every year) (S, SR)

SCHP-442  Physical Chemistry II
Registration #1014-442
Introduction to physical chemistry laboratory; chemical thermodynamics and equilibrium. (Should be taken concurrently with SCHP-441.)
Class 3, Credit 3 (offered every year) (S, SR)

SCHP-443  Physical Chemistry III
Registration #1014-443
Kinetic molecular theory; transport properties of gases; chemical kinetics; surface chemistry; photochemical kinetics; irreversible processes in solution. (Should be taken concurrently with SCHP-447.) (SCHP-441)
Class 3, Credit 3 (offered every year) (F, W)

SCHP-445  Physical Chemistry Laboratory I
Registration #1014-445
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)
Graduate Courses

SCHA-711 Instrumental Analysis Registration #1008-711
Theory, applications and limitations of selected instrumental methods in quantitative, qualitative, 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. SCHA-711 is a corequisite.
Lab 6, Credit 2 (offered every year) (F, W)

SCHB-702 Biochemistry-Biomolecular Regulation #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 Registration #1009-704 and Molecular Genetics
The biochemistry of inheritance, expression of genetic information, protein biosynthesis, differentiation, viral and bacterial infection and the "origin of life." (SCHB-702)
Class 3, Credit 3 (offered every year) (S, 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 Registration #1010-870
Credit 1-16 (offered every year)

SCHC-879 Research and Thesis Registration #1011-879
Guidance
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 Registration #1012-762
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 Registration #1012-763
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 pseudometal concepts in synthesis design. (SCHI-762, SCHP-442)
Class 3, Credit 3 (offered every year) (F, W)

SCHI-764 Inorganic Chemistry III: Chemical Periodicity Registration #1012-764
An integrated survey of descriptive inorganic chemistry (including industrial applications and geochemical origins) based on the periodic table and the structure and reactivity concepts developed in SCHI-762 and SCHI-763. (SCHI-762, 763)
Class 3, Credit 3 (offered every year) (S, SR)

SCHI-765 Preparative Inorganic Chemistry Registration #1012-765
Laboratory oriented course designed to illustrate the characterization techniques presented in SCHI-762 and the various synthetic applications of thermodynamics and kinetics presented in SCHI-763. (SCHI-762, SCHI-763 may be taken concurrently)
Class 1, Lab 6, Credit 3 (offered every year) (F, W)

SCHO-730 Chemical Toxicology Registration #1013-730
Xenobiotic mechanism, chemical carcinogenesis, drum-induced toxicology, environmental and genetic toxicology, teratology and biossay/biometrics. (SCHO-433)
Class 3, Credit 3 (offered upon sufficient request)
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: polynuclear compounds, modern synthetic methods, stereochemistry, conformational analysis, free radical reactions, natural products, and new synthetic reagents. (SCHO-433)
Class 4, Credit 4 (offered every year)

SCHO-833  Heterocyclic Chemistry
This course will contain a comprehensive treatment of heterocyclic chemistry. Based on the concept of \( n \)-excessive and \( n \)-deficient ring systems, the student will be introduced to categorical similarities and differences among various heterocyclic systems. In addition, the course will explain the logical consistency of the numerous syntheses and relative reactivities of heterocyclic compounds as demonstrated by their chemical reactions and spectroscopic properties. These results of reactivities and synthetic studies are then applied to a number of commercially important heterocyclic compounds. (SCHO-433)
Class 4, Credit 4 (offered upon sufficient request)

SCHO-601  Organic Chemistry of Polymers
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 (offered every year) (F, W)

SCHO-835  Organic Chemistry of Polymers
Introduction to the chemistry of synthetic, high molecular weight polymers and a survey of their diverse structures and properties. Mechanisms of condensation, free radical and ionic polymerization. (SCHO-433)
Class 3, Credit 3 (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 and SMSM-306)
Class 4, Credit 4 (offered every year)

SCHP-742  Survey of Physical Chemistry
A study of the fundamental principles of physical chemistry from 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
Matrices 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-602  Physical Chemistry of Polymers
Study of the theoretical and experimental aspects of polymer characterization. In addition, theoretical considerations of the configuration of polymer chains and statistical thermodynamics of polymer solutions will be related to experimental results. (SCHP-443)
Class 3, Credit 3 (S, SR)

SCHP-747  Principles of Magnetic Resonance
This course will consist of a series of lectures designed to introduce the principles of both nuclear magnetic resonance (NMR) and electron spin resonance (ESR) spectroscopies, two 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, magnetic angle spinning, and spectrometer design. (SCHP-443)
Class 4, Credit 4 (offered upon sufficient request)

Mathematics

SMAM-201, 202, 203  Algebra, Trigonometry and Analytic Geometry
A sequence of courses covering essential skills and concepts in such topics as solutions of equations, graphing, exponents and radicals, logarithms, trigonometric functions and applications, vectors, determinants, inequalities and conic sections. (High school algebra and geometry)
Class 3, Credit 3 (offered every year) (201-F, 202-W, 203-S)

SMAM-204  College Algebra and Trigonometry
Topics include a review of the fundamentals of algebra; solution of linear, fractional and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic and trigonometric functions; systems of linear equations. (2 years of high school algebra)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-205, 206, 207  Introduction to Mathematics for Computing I, II, III
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 (F, S-205, F, W-206, S-207)

SMAM-210, 211  Freshman Seminar
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.
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 and Business Registration #1016-216, 217
A non-rigorous introduction to selected topics in matrix algebra, finite mathematics, and calculus used extensively in business and finance applications.
216: Demand, revenue and cost functions, break-even 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
Introduction to functions including linear, quadratic, polynomial and rational functions with applications to supply and demand, cost, revenue, and profit functions. Additional topics include matrices, linear programming, and mathematics of finance. (3 years of high school mathematics)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-226  Calculus for Management Registration #1016-226
A course stressing applications of calculus concepts to solving problems in business and economics. Topics include the limit concept, differentiation, partial differentiation, and integration. (SMAM-216)
Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-230  Co-op Seminar Registration #1016-230
Exploration of co-operative education opportunities; practice in writing letters of application; resume writing; and interviewing procedures.
Class 1, Credit 0

SMAM-251, 252, 253  Calculus I, II, III Registration #1016-251,252,253
A standard first course in calculus intended for students majoring in mathematics, science or engineering with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter is divided as follows: 251: Two-dimensional analytic geometry, functions, limits, continuity, the derivative and its formulas, and applications of the derivative. (3 years of high school mathematics)
252: Anti-derivatives by various methods, the definite integral with applications to calculation of area, arc length, volumes of revolution, etc.; transcendental functions, numerical integration. (SMAM-251)
253: Improper integrals, formal limits of sequences, infinite series, Taylor series, polar coordinates, conic sections. (SMAM-252)
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-265  Foundations of Discrete Mathematics Registration #1016-265
A study of several discrete mathematics topics with careful attention given to the underlying concepts and development. Topics include: logic, proofs, switching circuits, sets, mathematical induction theorem, relations, equivalence classes, functions, one-to-one, onto, discrete functions, counting principles, graphs (trees, networks). (3 years of high school mathematics)
Class 4, Credit 4 (offered every year) (W, S)

SMAM-289*  Contemporary Mathematics Registration #1016-289
A basic survey of mathematical structures as well as an introduction to problem solving. Topics will be chosen from foundations of mathematics, algebra, topology, number theory, graph theory and probability theory. These structures will be examined as they occur naturally in modern settings.
Class 4, Credit 4 (offered every year) (F, W, S)
* Not acceptable for science credit for College of Science majors.

SMAM-300  Transfer Math Registration #1016-300
Course content includes material from both SMAM-253 and SMAM-305. (SMAM-252)
Class 8, Credit 8 (offered upon sufficient demand) (SR)

SMAM-305  Calculus IV Registration #1016-305
A continuation of SMAM-253 treating 3-dimensional analytic geometry and vector algebra, partial derivatives, multiple integrals and applications. (SMAM-253)
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-306  Differential Equations I Registration #1016-306
This course provides an introduction to the study of ordinary differential equations and their application. Common first order equations and linear second order equations are solved. Method of undetermined coefficients, variation of parameters, linear independence and the Wronskian, numerical solution techniques - Runge Kutta, vibrating systems, LaPlace Transforms. (SMAM-305)
Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-307  Differential Equations II Registration #1016-307
Second quarter course in ordinary differential equations which includes power series solutions to ordinary differential equations about ordinary and regular singular points; Legendre's equation; Bessel's equations; hypergeometric equation; Ricard's theorem; solution of systems of linear differential equations; phase plane analysis and stability.
Class 4, Credit 4 (offered every year) (S)

SMAM-309  Elementary Statistics Registration #1016-309
An introduction to elementary techniques of statistical description and inference. Topics include descriptive statistics, probability, estimation of parameters, hypothesis testing, and simple linear regression. The statistical software package MINITAB will be used to introduce students to the use of computers in statistical analysis. NOTE: This course may not be taken for credit if credit is to be earned in SMAM-319. (SMAM-203 or SMAM-204)
Class 4, Credit 4 (offered every year) (W, S, SR)

SMAM-318  Boundary Value Problems Registration #1016-318
The course includes: power series solutions of ordinary differential equations about ordinary and regular singular points; Fourier series; separation of variables solution of the wave equation, the heat equations and LaPlace's equation in rectangular and polar coordinates. (SMAM-306)
Class 4, Credit 4 (offered every year) (S)
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<th>Credit</th>
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<th>Prerequisites</th>
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<tr>
<td>SMAM-319</td>
<td>Data Analysis</td>
<td>#1016-319</td>
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<td>(offered every year)</td>
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<td>SMAM-328</td>
<td>Engineering Mathematics</td>
<td>#1016-328</td>
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<td>SMAM-354</td>
<td>Introduction to Regression</td>
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<td>SMAM-355</td>
<td>Design of Experiments</td>
<td>#1016-355</td>
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<td>SMAM-361</td>
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<td>#1016-361</td>
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<td>SMAM-365</td>
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<td>#1016-365</td>
<td>4</td>
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<tr>
<td>SMAM-411, 412</td>
<td>Real Variables</td>
<td>#1016-411, 412</td>
<td>4</td>
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<tr>
<td>SMAM-420</td>
<td>Complex Variables</td>
<td>#1016-420</td>
<td>4</td>
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<td>Matrix Algebra</td>
<td>#1016-431</td>
<td>4</td>
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<td>SMAM-432</td>
<td>Linear Algebra</td>
<td>#1016-432</td>
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<tr>
<td>SMAM-451, 452</td>
<td>Mathematical Statistics I, II</td>
<td>#1016-451, 452</td>
<td>4</td>
<td>(offered every year)</td>
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</table>

**SMAM-319 Data Analysis**
This course will study the statistical principles of presenting and interpreting data. Topics covered will include: descriptive statistics and displays, random sampling, the normal distribution, confidence intervals, and hypothesis testing. The statistical software package MINITAB will be used to introduce students to the use of computers in statistical analysis. NOTE: This course may not be taken for credit if credit is to be earned in SMAM-309. (SMAM-204)

Class 4, Credit 4 (offered every year) (F, W)

**SMAM-328 Engineering Mathematics**
This course provides introduction to matrix algebra and vector calculus. Topics include: matrix operations with applications to the solution of linear systems of algebraic equations; gradient, divergence and curl; line and surface integrals; independence of path and the divergence theorem and Stoke's theorem with discussion of engineering applications. NOTE: This course may not be taken for credit if credit is to be earned in SMAM-431. (SMAM-306)

Class 4, Credit 4 (offered every year) (S, SR)

**SMAM-351 Probability**
Discrete and continuous probability models; random variables; probability density and distribution functions; mathematical expectations; measures of central tendency and dispersion; central limit theorem. (Corequisite SMAM-305) (SMAM-253)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

**SMAM-352 Applied Statistics I**
Basic statistical concepts, sampling theory, hypothesis testing, confidence intervals and non-parametric methods. (SMAM-351)

Class 4, Credit 4 (offered every year) (W, S, SR)

**SMAM-353 Applied Statistics II**
Topics in simple linear regression, an introduction to analysis of variance and the use of statistical software packages. (SMAM-352)

Class 4, Credit 4 (offered every year) (S, SR)

**SMAM-354 Introduction to Regression**
A study of regression techniques with applications to the type of problems encountered in real-world situations. Includes extensive use of statistical software. Topics include review of simple linear regression; residual analysis; multiple regression; matrix approach to regression; model selection procedures; various other models as time permits. (SMAM-353 and SMAM-431 or SMAM-328).

Class 4, Credit 4 (offered every year) (F, W)

**SMAM-355 Design of Experiments**
A study of the design and analysis of experiments. Includes extensive use of statistical software. Topics include: single-factor analysis of variance; multiple comparisons and model validation; multifactor factorial designs; fixed, random, and mixed models; expected mean square calculations; confounding; randomized block designs; Latin square designs; other designs and topics as time permits. (SMAM-353)

Class 4, Credit 4 (offered every year) (S, SR)

**SMAM-361 Mathematical Modeling**
The course will emphasize problem solving, formulation of the mathematical model from physical considerations, solution of the mathematical problem, testing the model and interpretation of results. Problems will be selected from the physical sciences, engineering and economics. (SMAM-352, SMAM-306, SMAM-431)

Class 4, Credit 4 (offered every year) (S, SR)

**SMAM-365 Combinatorial Mathematics**
An introduction to the mathematical theory of combination, arrangement and enumeration of discrete structures. Topics include: enumeration; recursion; inclusion-exclusion; block design; general functions. (SMAM-265 or permission of instructor)

Class 4, Credit 4 (offered every year) (F, W)

**SMAM-370 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.

Class 4, Credit 4 (S)

**SMAM-411, 412 Real Variables**
SMAM-411: An investigation and extension of the theoretical aspects of elementary calculus. Topics include: mathematical induction, real numbers, functions, limits, continuity, differentiation, Hospital's Rule, Taylor's Theorem. (SMAM-305 and either SMAM-265 or permission of the instructor)

SMAM-412: A continuation of SMAM-411 which concentrates on integrations; definition of integral-its existence and its properties, improper integrals, infinite series and sequences and power series. (SMAM-411)

Class 4, Credit 4 (offered every year) (SMAM-411-F, W, 412-S, SR)

**SMAM-420 Complex Variables**

Class 4, Credit 4 (offered every year) (F, W)

**SMAM-431 Matrix Algebra**
An introduction to the basic concepts of linear algebra, with an emphasis on matrix manipulation. Topics will include Gaussian elimination, matrix arithmetic, determinants, Cramer's rule, vector spaces, linear independence, basis, null and column space of a matrix, eigenvalues, and numerical linear algebra. Various applications will be interspersed throughout the course. (SMAM-306)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

**SMAM-432 Linear Algebra**
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-451, 452 Mathematical Statistics I, II**
SMAM-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)

SMAM-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, SMAM-355)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-457 Research Sampling Techniques
Registration #1016-457
This course provides an in depth study of inferential procedures that are valid under a wide range of shapes for the population distribution. Topics include: tests based on the binomial distribution, contingency tables, statistical inferences based on ranks, runs tests, and randomization methods. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-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 to be solved. A review of pertinent matrix theory including convex sets and systems of linear inequalities; the simplex method of solution; artificial bases; duality; parametric programming; and applications. (SMAM-432)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-466 Advanced Mathematical Programming
Registration #1016-466
The optimization of functions of integers; theory and practice of branch and bound; implicit enumeration; cutting plane duality and related solution techniques; heuristics, and applications. (SMAM-465)

Class 4 Credit 4 (offered every year) (S)

SMAM-467 Theory of Graphs and Networks
Registration #1016-467
The basic theory of graphs and networks, including the concepts of circuits, trees, edge and vertex separability, planarity and vertex coloring and partitioning. There is a strong emphasis on applications to physical problems and on graph algorithms such as those for spanning trees, shortest paths, non-separable blocks and network flows.

Class 4, Credit 4 (offered every year) (F, W)

SMAM-469 Mathematical Simulation
Registration #1016-469
An introduction to computer simulation, simulation languages, model building and computer implementation, and mathematical analyses of simulation models and their results using techniques from probability and statistics. (SMAM-353, 361, ICSP-241, 242)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-501, 502 Advanced Differential Equations
Registration #1016-501,502
A study of first order, linear higher order and systems of differential equations including such topics as existence, uniqueness, properties of solutions, Green’s functions, Sturm-Liouville systems and boundary value problems. (SMAM-307)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-511, 512 Numerical Analysis
Registration #1016-511, 512

512: Continuation of 511 which treats systems of equations, eigenvalue problems, boundary value problems, splines, additional topics at the discretion of the instructor. (SMAM-511)

Class 4, Credit 4 (offered every year) (511-F, W, 512-S, SR)

SMAM-521, 522 Probability Theory
Registration #1016-521, 522
Selected topics in applied probability and statistics to meet the needs and interest of the students (SMAM-305, SMAM-352 or permission of instructor).

Class 4, Credit 4 (offered upon sufficient demand)

SMAM-524 An Introduction to Time Series
Registration #1016-524
A study of time series, auto-covariance functions and spectrum, integral representation of time series, linear filtering, estimation of spectrum, and multivariate time series prediction. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-531, 532 Abstract Algebra
Registration #1016-531, 532
531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265, SMAM-432)

532: The basic theory of rings, integral domains, ideals and fields GF (pn), applications to coding theory or abstract vector spaces, function spaces, direct sums, applications to differential equations, to scientific problems. (SMAM-531)

Class 4, Credit 4 (offered every year) (531-F, W; 532-S, SR)

SMAM-551 Topics in Algebra
Registration #1016-551
Topics in abstract algebra to be chosen by the instructor either to give the student an introduction to topics not taught in SMAM-531, 532 or to explore further the theory of groups, rings or fields. (Permission of instructor).

Class 4, Credit 4 (offered upon sufficient request)

SMAM-552 Topics in Analysis
Registration #1016-552
Topics in analysis to be chosen by the instructor, either to introduce the student to topics not covered in SMAM-411, 412 or to explore further the topics covered there. (SMAM-265, SMAM-412)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-555, 556 Statistics Seminar I, II
Registration #1016-555, 556
This course introduces the student to statistical situations not encountered in their previous course of study. Topics include open-ended analysis of data, motivating use of statistical tools beyond the scope of previous courses, introduction to the statistical literature, development of statistical communication skills, and the pros and cons of statistical software packages. (SMAM-353, 354, 355)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-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-553, SMAM-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-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)

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. (SMAM-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 3 (offered upon sufficient request) (W, S)

* Not acceptable for science credit for College of Science majors.

SPSP-211 College Physics I
Registration #1017-211
An elementary course in college physics. Mechanics: Newton's laws of motion, momentum, rotational motion, energy. (SMAM-203 or SMAM-223) (See SPSP-271 for 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 laboratory)

Class 3, Credit 3 (offered every year) (F, S)

SPSP-271 College Physics Lab I
Registration #1017-271
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lecture. (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 III
Registration #1017-273
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in SPSP-213)

Lab 2, Credit 1 (offered every year) (F, S)
Class 4, Credit 4 (offered upon sufficient request) (S)
sitions; operating principles of solid state devices; theory and ap-
cation. (SPS-315 and permission of instructor)
Class 4, Credit 4 (offered every year) (W, S)
Registration #1017-315 Semiconductor Physics
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 SPS-371 for three-hour lab,
SPS-375 for two-hour lab)
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-312 University Physics II
Fluids and elastic properties, heat and thermodynamics, wave mo-
tion, sound, geometrical and physical optics. (Credit or coregistra-
tion in SMAM-253) (SPS-311) (See SPS-372 for three-hour lab,
SPS-376 for two-hour lab)
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-313 University Physics III
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. (Coreg-
istration or credit in SMAM-253) (SPS-311) (See SPS-373 for three-hour lab,
SPS-377 for two-hour lab)
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-314 Introduction to Modern Physics
An introductory survey of modern physics at the sophomore level.
Fundamentals of relativity, photons, interaction of radiation with mat-
ter, deBroglie waves, Bohr model, introduction to quantum mechan-
ics, nuclear systematics, radioactivity, alpha, beta, and gamma de-
cays, Q-values, nuclear fission, nuclear fusion. (SMAM-305,
SPS-312, 313)
Class 4, Credit 4 (offered every year) (F, W, S)

SPSP-315 Introduction to 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 met-
als, insulators, and semi-conductors; operation principles of diodes,
bipolar junction transistors, and MOS-FET's. (SMAM-306,
SPS-314)
Class 4, Credit 4 (offered every year) (W, S)

SPSP-319 Electrical Processes in Solids
Introduction to statistical mechanics; Planck's formula: transport equa-
tion; electronic properties of conductors and semiconductors;
characteristics of metal-metal, metal-semiconductor, and on junc-
tions; operating principles of solid state devices; theory and ap-
lication. (SPS-315 and permission of instructor)
Class 4, Credit 4 (offered upon sufficient request) (S)

SPSP-321 Introduction to Laboratory Techniques
An introduction to equipment and procedures common to the phys-
ics research laboratory. The oscilloscope and ac circuit analysis,
statistics, vacuum systems including vacuum pumps and gauges, the
laboratory notebook, and writing for publication. (SPS-313,
SPS-373)
Class 3, Lab 3, Credit 4 (offered every year) (W)

SPSP-331 Introduction to Electricity and Electronics
Fundamentals of electricity; construction and measurements of elec-
trical and electronic circuits encountered in a scientific laboratory.
(Two quarters of introductory physics)
Class 3, Lab 3, Credit 4 (offered every year) (F, W, S)

SPSP-341 Foundations of Scientific Thinking
Definition of science; historical perspective; ingredients of the sci-
entific quest; the scientific method; scientific explanation, laws, the-
ories, and hypotheses; the role of mathematics; probability and in-
duction; science and other disciplines. (At least a year of basic sci-
ences at the college level.)
Class 2, Credit 2 (offered upon sufficient request) (F, W)

SPSP-351 Radiation Physics I
Introductory modern physics emphasizing radiation phenomena.
Atomic physics, nuclear physics, radioactivity, production of ra-
dionuclides, interaction of charged particles and neutrons with mat-
ter. (SPS-213, SMAM-223 required; SMAM-309 recommended)
Class 4, Lab 3, Credit 5 (offered every year) (F)

SPSP-352 Radiation Physics II
Interaction of x-rays and gamma-rays with matter. Radiation de-
tectors; scintillation detectors, solid state detectors. Radionuclide
imaging instrumentation. (SPS-351)
Class 4, Lab 3, Credit 5 (offered every year) (W)

SPSP-353 Radiation Physics III
Principles of radiation protection. Radiation protection instrumentation.
Internal and external dose calculations. Practical radiation
health physics. Introduction to electronics, including laboratory.
(SPS-352)
Class 4, Lab 3, Credit 5 (offered every year) (S)

SPSP-355 Radiation Protection
Principles and practical aspects of radiation protection; calculation of
external and internal radiation dose measurements. (Permission of
instructor and one year of college-level physics)
Class 3, Credit 3 (offered every year) (S)

SPSP-361 Ultrasonic Physics
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 phys-
ics 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
This laboratory course includes experiments related to the principles
and theories discussed in the corresponding lectures. (Credit or
coregistration in SPS-315) (See SPS-373 for a 2-hr lab for Univer-
sity Physics)
Lab 3, Credit 1 (offered every year) (F, W, S)
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (See SPSP-376 for a 2-hr lab for University Physics)

Lab 3, Credit 1 (offered every year) (F, W, S)

SPSP-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-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-376 University Physics Lab II
Registration #1017-376
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-377 University Physics Lab III
Registration #1017-377
This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-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-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 #J017-411, 412
Electric and magnetic fields using vector methods, Gauss's law, theory of dielectrics, Ampere and Faraday laws, vector potential, displacement current, Maxwell's equations. (SMAM-307, SPSP-312, 313)

Class 4, Credit 4 (offered every year) (411-F, 412-S)

SPSP-415 Thermal Physics
Registration #1017-415
Introduction to the principles of classical thermodynamics and kinetic theory. Equations of state, the First and Second Laws of Thermodynamics, entropy, thermodynamic potentials, applications of thermodynamics, and kinetic theory of gases. (SMAM-307, SPSP-313)

Class 4, Credit 4 (offered alternate years) (F)

SPSP-421, 422 Experimental Physics
Registration #1017-421, 422
Advanced laboratory work in physics, with experiments selected from one or more of the following branches of physics; mechanics, acoustics, heat, electromagnetism, and physical optics. (SPSP-314, 321 plus 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, 432 Electronic Measurements
Registration #1017-431, 432
Laboratory course in electronic measurements and instrumentation, with theory and applications of discrete and integrated circuits in analog and digital electronics. (SPSP-313, SPSP-321)

Class 3, Lab 3, Credit 4 (offered every year) (431-S, 432-F)

SPSP-455 Optical Physics
Registration #1017-455
Physical optics including interference, diffraction, and polarization. Brief introduction to modern optics. (SMAM-305, SPSP-312, 313)

Class 4, Credit 4 (offered alternate years) (F)

SPSP-480 Theoretical Physics I
Registration #1017-480
An introduction to mathematical topics necessary for a quantitative study of physical phenomena. Topics include: vector analysis including vector differentiation and integration, curvilinear coordinate systems and transformations from one orthogonal coordinate system to another, Fourier series and an introduction to Fourier integrals. Applications of these concepts to physics are presented. (SMAM-307, SPSP-313)

Class 4, Credit 4 (offered every year) (S)

SPSP-501 Theoretical Physics II
Registration #1017-501
Application of advanced mathematical methods to physics. (SMAM-307, SPSP-480, plus coregistration or credit in SPSP-401 and SPSP-411)

Class 4, Credit 4 (offered every year) (F)

SPSP-521 Advanced Experimental Physics
Registration #1017-521
Advanced laboratory experiments and projects in atomic physics, nuclear physics, or solid state physics. Special emphasis on experimental research techniques. (SMAM-307, SPSP-421)

Lab 6, Credit 2 (offered every year) (F)

SPSP-522 Introduction to Quantum Mechanics
Registration #1017-522
A study of the concepts and mathematical structure of non-relativistic quantum mechanics. Exact and approximate techniques for solving the Schroedinger equation are presented for various systems. (SPSP-314, SPSP-480) (SPSP-315 and SPSP-501 are recommended)

Class 4, Credit 4 (offered every year) (S)

SPSP-531 Solid State Physics
Registration #1017-531
The structure of solids and their thermal, mechanical, electrical and magnetic properties. (SPSP-315, SPSP-480, and SPSP-522) (SPSP-501 is recommended)

Class 4, Credit 4 (offered every year) (F)
Clinical Sciences

SCLG-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 (offered every quarter)

SCLG-599 Independent Study - Clinical Sciences Registration #1026-599
Faculty directed study of appropriate topics on a tutorial basis. This course will be used to enable an individual to pursue studies of existing knowledge available in the literature.
Class variable, Credit variable (offered every quarter)
SCLN-401 Introduction to Clinical Nuclear Medicine Registration #1025-401
A combination lecture/laboratory course introducing clinical aspects of Nuclear Medicine. Hospital organization is presented as well as the relationship of nuclear medicine services to other hospital services. Laboratories in affiliated hospitals are correlated with lectures on nuclear medicine technology, patient care and emergency procedures. (Fourth-year standing in NMT program)
Credit 4 (F)

SCLN-402 Nuclear Medicine Procedures-Central Nervous System Registration #1025-402
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the central nervous system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 1 (F)

SCLN-502 Nuclear Medicine Procedures-Skeletal System Registration #1025-502
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the skeletal system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 1 (F)

SCLN-503 Nuclear Medicine Procedures-Respiratory System Registration #1025-503
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the respiratory system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 1 (F)

SCLN-510 Nuclear Medicine Procedures-Urinary System Registration #1025-510
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the urinary system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)
Credit 1 (F)

SCLN-511 Nuclear Medicine Procedures-Endocrine System Registration #1025-511
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 Registration #1025-512
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 Registration #1025-513
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 Registration #1025-514
A combination lecture/practicum course. Lectures are given on specific imaging procedures involving special studies. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in the NMT program)
Credit 1 (S)

SCLN-515 Nuclear Medicine Procedures-Hematological and In Vitro Studies Registration #1025-515
This course covers the basic procedures utilized in nuclear medicine for the evaluation of patients with hematologic disorders. Medical indications, fundamentals principles, technique, data calculations and test interpretation are covered for each procedure discussed. (Fourth-year standing in the NMT program)
Credit 1 (S)

SCLN-516 Instrumentation and Computers In Nuclear Medicine Registration #1025-516
A combination lecture/laboratory 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-517 Radiochemistry and Radiopharmacology Registration #1025-517
A combination lecture/lab course covering the production and use of radioisotopes in medicine. Radiopharmaceutical compounding, quality control procedures, dose calibration, and licensing regulations regarding the handling and use of radiopharmaceuticals are covered. (Fourth-year standing in NMT program)
Credit 2 (W)

SCLN-518 Radionuclide Therapy Registration #1025-518
A study of the application of radionuclides in the treatment of disease and the study of the biologic changes which occur following irradiation. (Fourth-year standing in NMT program)
Credit 1 (W)

SCLN-519 Radiation Health Safety Registration #1025-519
A course designed to familiarize the student with the daily routine for safe handling of radioactive materials. Radiation protection, licensing regulations, decontamination procedures, waste disposal and area surveys are covered. (Fourth-year standing in NMT program)
Credit 2 (S)

SCLN-520 Radioassay Registration #1025-520
A combination lecture/practicum course in RIA. Topics include theory and basic principles, instrumentation, types of assays performed, and quality control. Commonly encountered pitfalls, current RIA developments and the diagnostic meaning of several tests are covered. (Fourth-year standing in NMT program)
Credit 4 (S)
A combined lecture/laboratory course introducing clinical concepts and didactic applications of ultrasound. (Fourth-year standing in the ultrasound program.)

Credit 2 (S)

Clinical Nuclear Medicine I

Registration #1025-522

A clinical practicum which gives the student the opportunity to learn and master nuclear medicine procedures through technical and practical experience. Each student is assigned a particular combination of three hospitals and trains approximately four months in each. Students work with patients under the supervision of physicians and technologists on the hospital staff. Student progress and performance is monitored by the RIT nuclear medicine technology clinical coordinator who makes periodic visits to the hospital department. (Fourth-year standing in NMT program)

Credit 7 (F)

Clinical Nuclear Medicine II

Registration #1025-523

Continuation of Clinical Nuclear Medicine I. (Fourth-year standing in NMT program)

Credit 7 (W)

Clinical Nuclear Medicine III

Registration #1025-524

Continuation of Clinical Nuclear Medicine II. (Fourth-year standing in NMT program)

Credit 7 (S)

Introduction to Diagnostic Ultrasound

Registration #1030-411

A course which surveys the historical development of medical ultrasound technology, the professional and occupational development of sonography and the current major diagnostic use of ultrasound. Registry certification will also be discussed.

Class 2, Credit 2 (F)

Ultrasonic Cross-Section Anatomy

Registration #1030-412

Basic cross-sectional anatomy of the head, neck, abdomen, and pelvis. Emphasis is placed on sonographic correlation of anatomical structures. Course is self-paced within each assigned section. Students draw and label cross-sections using the cadaver slices as guides. (Permission of instructor)

Class 3, Rec. 1, Credit 4 (W)

Ultrasound Instrumentation

Registration #1030-413

Principles and fundamentals of diagnostic ultrasound instrumentation. Application of ultrasonic physics to ultrasound scanning techniques will also be discussed. Laboratory will stress the development of scanning techniques and use of instrument controls.

Class 3, Lab 1, Credit 4 (S)

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)

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. Completion of a clinical practicum is required. (SCLS-551 and fourth-year standing in the ultrasound program)

Credit 5 (F, W, S)

Introduction to Gynecologic Ultrasound

Registration #1030-553

This course will equip the student with the practical skills and clinical knowledge necessary to perform basic gynecologic ultrasound scans. Image production, recognition, and acceptability are stressed. Examination protocols will be outlined. This course provides classroom, simulation laboratory, and clinical instruction in advanced gynecological ultrasound. Instruction includes review of teaching files. Completion of a clinical practicum is required. (SCLS-551 and fourth-year standing in the ultrasound program)

Credit 5 (F, W, S)

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. 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 scanning practicum is required. (SCLS-552 and fourth-year standing in the ultrasound program)

Credit 5 (F, W, S)

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 gynecological ultrasound. Instruction includes the review of teaching files. This is an internship course. Completion of a clinical practicum is required. (SCLS-553 and fourth-year standing in the ultrasound program)

Credit 5 (F, W, S)

Introduction to Abdominal Ultrasound I

Registration #1030-556

This course will equip the student with the practical skills and clinical knowledge necessary to perform basic abdominal ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in basic abdominal ultrasound procedures. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical practicum is required. (SCLS-551 and fourth-year standing in the ultrasound program)

Credit 6 (F, W, S)

Introduction to Abdominal Ultrasound II

Registration #1030-557

This course will equip the student with the practical skills and clinical knowledge necessary to perform basic abdominal ultrasound scans. Image production, recognition, and acceptability are stressed. 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-556 and fourth-year standing in the ultrasound program)

Credit 7 (F, W, S)
SCLS-558 Advanced Abdominal Ultrasound
Registration #1030-558
This course will equip the student with the practical skills and clinical knowledge necessary to perform basic abdominal and small parts ultrasound scans. Image production, recognition, and acceptability are stressed. This course provides classroom, simulation laboratory, and clinical instruction in basic abdominal ultrasound procedures. Examination protocols will be outlined. Review of teaching files and discussion of scanning techniques will be addressed. This is an internship course. Completion of a clinical Practicum is required. (SCLS-557 and fourth-year standing in the ultrasound program)
Credit 7 (F, W, S)

SCLS-560 Seminar in Ultrasound I
Registration #1030-560
Case study presentations by ultrasound interns. Students prepare and orally present two ten minute case studies. Presentations to include: physical findings, laboratory data, clinical impression, ultrasound findings, follow-up, 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, physical findings, laboratory data, clinical impression, ultrasound findings, follow-up, pathology, and scanning techniques. Paper is due in March, April or May of the internship year as assigned. Paper should be a minimum of five pages in length not including the bibliography or references. (Permission of Instructor)
Class 2, Credit 2 (S)

Graduate Courses, Master of Science in Clinical Chemistry

SCLC-820 Advanced Clinical Chemistry I
Registration #1023-820
Toxicology, therapeutic drug monitoring, electrolytes acid-base, vitamins, oncology, hepatitis, coagulation, and various standard methods. (Permission of instructor)
2 hr. Lec., 2 hr. Sem., Credit 4 (S)
On a rotating basis Ad Clin. Chem. I, II, III will be offered two courses per year: one in the fall, another in the spring, and the third the following fall. They are independent courses that may be taken in any sequence.

SCLC-810 Advanced Clinical Chemistry Laboratory I
Registration #1023-810
Comparison of current methods for analysis of toxicology samples-gas-liquid chromatography, radioimmunoassay, enzyme multiplied immunoassay. (Permission of instructor, class size limited to 12) (Offered concurrently with SHPC-820)
Lab 4

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)
2 hr. Lec., 2 hr. Sem., Credit 4 (F)

SCLC-811 Advanced Clinical Chemistry Laboratory II
Registration #1023-811
Comparison of current methods for separation and determination of isoenzymes. (Permission of instructor, class size limited to 12) (Offered concurrently with SHPC-821)
Lab 4

SCLC-822 Advanced Clinical Chemistry III
Registration #1023-822
Radioimmunoassay, hormones, fetal-placement unit, integration of laboratory data. (Permission of instructor)
2 hr. Lec., 2 hr. Sem., Credit 4 (F, S)

SCLC-812 Advanced Clinical Chemistry Laboratory III
Methods for the development, improvement, and trouble shooting of radioimmunoassay analyses. (Permission of instructor, class size limited to 12) (Offered concurrently with SHPC-822)
Lab 4

SCLC-877 External Clinical Chemistry Research
Credit variable

SCLC-879 Clinical Chemistry Research
Credit 1-16

SCLC-899 Independent Study
Registration #1023-899
Credit variable

SCLC-712 Statistics and Quality Control
Registration #1023-712
Principles of statistics as they apply to biomedical sciences and to clinical laboratory analyses. Illustrative examples will involve clinical laboratory data. Probability, normal distributions, analysis of variance sampling, normal values, quality control, applications in patient care, hypothesis testing.
Class 3, Credit 3 (S)

SCLC-870 Clinical Chemistry Seminar
Registration #1023-870
Credit 1

SCLC-872 Special Topics in Clinical Science
Registration #1023-872
In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of regular courses will be presented. These courses will be structured as ordinary courses with specified prerequisites, contact hours and examination.
Class variable, Credit variable

SCLC-722 Clinical Laboratory Computer Applications
Registration #1023-722
Data processing overview and terminology, hospital computer utilization, evaluation of the need for computers in the laboratory, design of laboratory and hospital systems, evaluation-selection-installation of computer systems, legal aspects of biomedical data processing, instrument interfacing.
Class 3, Credit 3 (W)

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 systematic disease and healing.
Credit 3 (W)

Materials Science and Engineering

SESM-701 Introduction to Materials Science
Registration #1028-701
Crystal structure and defects, strength of materials, metals, alloy principles, ferrous alloys.
Credit 4 (offered every year)
This course is designed to meet the needs of students of materials science in the area of theoretical and experimental physical chemistry. Credit 4

SESM-722
Polymer Processing
Registration #1028-722
A study of the basic principles and methods involved in the technology of polymeric materials, including treatment of heat transfer, mass flow, mixing, shaping and moulding of polymeric materials.
Credit 4

SESM-730
Optical Properties of Materials
Registration #1028-730
Fundamentals of geometrical and physical optics; interaction of radiation with atoms, molecules, and matter; dielectrics; phenomenological considerations of electro-optics, acousto-optics, and lasers.
Credit 4

SESM-733
Electrical and Magnetic Properties of Materials
Registration #1028-733
Band structures of pure and doped solids and solid compounds, transport phenomena, semiconductor, optical properties, galvanomagnetic and magnetooptic effects.
Credit 4

SESM-740
Nuclear Science and Engineering
Registration #1028-740
Systematics of the atom nuclei; radioactivity; neutron induced reactions; fission; nuclear reactor principles, designs and materials.
Credit 4

SESM-760
Plasma Science
Registration #1028-760
An introduction to plasma science; a study of the basic phenomena and application of plasma to etching, deposition, polymerization, plasma production of materials, emission spectroscopy and atomospheric science.
Credit 4

SESM-770
Physics and Chemistry of I. C. Processing
Registration #1028-770
Topics include diffusion, oxide growth, chemical vapor deposition, epitaxy, ion implantation, plasma processing, photolithography, and mask making as they apply to fabrication of integrated circuits.
Credit 4

SESM-800
Special Topics
Registration #1028-800
In addition to in-depth study of any of the courses listed under Elective Courses, special topics may be selected from such areas as elastomers, organometallics, radiation damage, processing of materials, superconductivity, etc.
Credit 4

SESM-879
Research and Thesis Guidance
Registration #1028-879
A project involving research on a topic in materials science and engineering carried out either on campus or off campus under the industrial internship option. An oral examination and written thesis are required.
Credit variable
SESMM-890 Seminar
Registration #1028-890
This course is required for completion of the program and will involve
a one-hour presentation on some topic in materials science and
engineering.
Credit 1

SESMM-899 Independent Study
Registration #1028-899
This course number should be used by students wishing to study a
topic on an independent study basis. (Permission of instructor)
Credit variable
National Technical Institute for the Deaf

Department of Support Service Education

Interpreting

NITP-203 Principles of American Sign Language for Interpreters
Registration #0850-203
Students will be able to generate and accurately produce ASL classifiers and ASL idioms, recognize and accurately produce non-manual grammatical markers, use appropriate body/facial expressions, apply grammatical features of ASL, and manipulate sign utilization to vary meaning. (CHGD-0234-211, 212)
Class 2, Lab 2, Credit 3 (any quarter)

NITP-204 American Sign Language Interpreting I
Registration #0850-204
Students apply the skills and principles learned in Principles of American Sign Language. The student will practice interpreting from English to American Sign Language (ASL). Practice will include interpreting both live talent and audiotapes. The speed of the spoken message will be between 80-111 words per minute. (NITP-203)
Class 3, Lab 2, Credit 3 (F, W, S, SR)

NITP-205 American Sign Language Interpreting II
Registration #0850-205
The course is built around a series of advanced vocabularies necessary for interpreting in the community and in educational environments. Materials are structured so that students progressively increase transmission skills from 80 to 120 words per minute. Students' skills in American Sign Language (ASL) will be enhanced with ongoing critiques. (NITP-204)
Class 3, Credit 3 (W, S)

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 III
Registration #0850-213
This course continues development of the voicing task. More complex videotaped samples of signed/spoken messages of hearing-impaired persons are delivered at a faster rate than those in Voice I and II. This is a self-paced lab course. (NITP-212, 332)
Class 3, Credit 3 (F, W)

NITP-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 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-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, readings, 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, 261, 332, 372, 395)
Class 15, Credit 5 (available any quarter)

NITP-251, 252 Aspects and Issues of Interpreting 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-262 Theory and Practice of Interpreting I
Registration #0850-262
This course addresses the current theory and practice of the profession of interpreting. Topic areas include: (1) general communication principles of their application to the interpreting task; (2) the history of the profession of interpreting; (3) different types of interpreting and related terminology; (4) general skills required in interpreting and current applications by professional interpreters; (5) overview of the professional code of ethics and its rationale; (6) populations served by interpreters, e.g., hearing-impaired speech-readers, deaf/blind individuals, multiply handicapped individuals, etc; (7) resources available to students related to interpreting and mainstreaming; (8) current issues facing the profession, i.e., multiple roles, mainstreaming specialists.
Class 3, Credit 3 (offered annually)

NITP-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 281, 382)
Class 1, Credit 1 (available any quarter)
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)