
R · I · T

**Undergraduate
Courses 1991–92**

**Rochester Institute of Technology
Rochester, New York**

Rochester Institute of Technology

1991-92 Institute Calendar

• FALL QUARTER

September 1	Move-in Day for New Residents
September 1-4	Fall Orientation
September 4	Open Registration (New and Returning Students)
September 4-7	All Classes Begin
September 12	End of Drop/Add Period
October 25	Last Day to Withdraw with a Grade of "W"
November 13	Last Day Class
November 16	Last Saturday Class
November 15, 16, 18, 19	FINAL EXAMS
November 19	Last Evening Class
November 20- December 1	Fall/Winter Break

• WINTER QUARTER

December 2	Open Registration
December 2	Evening Classes Begin
December 3	Day Classes Begin
December 7	Saturday Classes Begin
December 10	End of Drop/Add Period
December 21	Last Day of Classes Before Break
January 6, 1992	Classes Resume
February 7	Last Day to Withdraw with a Grade of "W"
February 24	Last Day Class
February 26-29	FINAL EXAMS
February 28	Last Evening Class
February 29	Last Saturday Class
March 1-5	Winter/Spring Break

• SPRING QUARTER

March 6	Open Registration
March 7	Saturday Classes Begin
March 9	Evening Classes Begin
March 9	Day Classes Begin
March 16	End of Drop/Add Period
May 1	Last Day to Withdraw with a Grade of "W"
May 15	Last Day Class
May 16	Last Saturday Class
May 19-22	FINAL EXAMS
May 22	Last Evening Class
May 23	COMMENCEMENT
May 24-31	Spring/Summer Break

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RIT will admit and hire men and women, veterans, and persons with disabilities, individuals of any race, creed, religion, color, national or ethnic origin, sexual orientation, age, or marital status, in compliance with all appropriate legislation.

Course Numbering

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

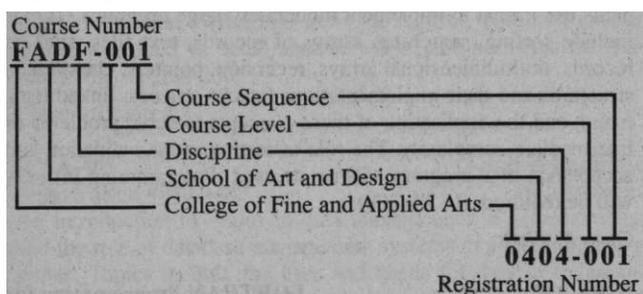
First letter: College offering the course

Second and third letters: School or department of that college

Fourth letter: Discipline

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

Second and third numbers: Course differentiation and sequencing



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

Course prerequisites and/or corequisites are shown in parentheses after course descriptions.

Course of Study 1991-1992

Produced by RIT Communications

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

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

Rochester Institute of Technology

Office of Admissions

Bausch & Lomb Center

P.O. Box 9887

Rochester, NY 14623-0887

(716) 475-6631

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Or for information about programs offered through

NTID, contact:

Rochester Institute of Technology

National Technical Institute for the Deaf

Department of Career Outreach and Admissions

Lyndon Baines Johnson Building

P.O. Box 9887

Rochester, NY 14623-0887

(716) 475-6770 (Voice)

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College of Applied Science and Technology

School of Computer Science and Information Technology

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

Information Technology

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

ICSA-200 **Registration #0602-200** **Survey of Computer Science**

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

Class 4, Credit 4

ICSA-205 **Registration #0602-205** **Computer Techniques—FORTRAN Language**

Students will be introduced to computer systems, learn problem solving techniques, and learn to program in the FORTRAN language. Topics available for study include straight line programming, decision and repetition capabilities, input/output, data structuring, and the use of subprograms. Programming projects will be required. (Pre-calculus)

Class 3, Credit 3

ICSA-206 **Registration #0602-206** **Computer Techniques—BASIC Language**

Students will be introduced to computer systems, learn problem solving techniques, and learn to program in the BASIC language. Topics available for study include straight line programming, decision and repetition capabilities, formatted input/output, data structuring, and the use of subprograms. Programming projects will be required. (Pre-calculus)

Class 3, Credit 3-4

ICSA-207 **Registration #0602-207** **Computer Techniques—C Language**

Students will be introduced to computer systems, learn problem solving techniques, and learn to program in the C programming language. Topics available for study include straight line programming, decision and repetition capabilities, input/output, data structuring, and the use of subprograms. Programming projects will be required. (Pre-calculus)

Class 3, Credit 3-4

ICSA-208 **Registration #0602-208** **Introduction to Programming**

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

Class 4, Credit 4

ICSA-210 **Registration #0602-210** **Program Design and Validation**

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

Class 4, Credit 4

ICSA-220 **Registration #0602-220** **FORTRAN Programming for Engineers**

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

Class 4, Credit 4

ICSA-300 **Registration #0602-300** **Business Applications Using COBOL**

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

Class 4, Credit 4

ICSA-303 **Registration #0602-303** **Advanced Business 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 Software Systems**
Registration #0602-410

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

Class 4, Credit 4

ICSA-411 **Data Communications and Computer Networks**
Registration #0602-411

An introduction to data communications hardware and software, and use of these components in computer networks. Topics include communication system components, communications software, packet switching, network control, common carrier issues, long-haul vs. local area networks, and performance considerations. (ICSA-200)

Class 4, Credit 4

ICSA-483 **Applied Database Management**
Registration #0602-483

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

Class 4, Credit 4

ICSA-590 **Seminar in Applied Computer Studies**
Registration #0602-590

Current topics and advances in applications of computer technology for undergraduate students. (Permission of instructor)
 Credit variable 2-4

ICSA-599 **Independent Study**
Registration #0602-599

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

Credit variable 2-4

Computer Science Courses

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

ICSP-203 **AP Pascal**
Registration # 0601-203

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

Class 0, Credit variable

ICSP-241 **Programming I Algorithmic Structures**
Registration #0601-241

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

Class 3, Lab 2, 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, and trees. Programming projects are an integral part of the course. (ICSP-241)

Class 3, Lab 2, Credit 4

ICSP-243 **Programming III Design and Implementation**
Registration #0601-243

A first course on the design and implementation of moderately large software systems. Modern principles of design and testing will be presented in class and reinforced by programming assignments. The importance of both internal and external program documentation will be stressed. Topics include top-down design, stepwise refinement, test data selection, modularity measures (cohesion and coupling), common programming paradigms, and advanced file I/O. Programming projects are required; one of these will be a team project. (ICSP-305)

Class 4, Credit 4

ICSP-305 **Assembly Language Programming**
Registration #0601-305

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

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. (ICSS-325)

Class 4, Credit 4

ICSP-307 **Business Applications Programming**
Registration #0601-307

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

Class 4, Credit 4

ICSP-309 **C Programming**
Registration #0601-309

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

Class 1, Credit 1

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

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

Class 4, Credit 4

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

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

Class 4, Credit 4

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

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

Class 4, Credit 4

ICSS-101 **Freshman Seminar**
Registration #0603-101

This course provides first-year students an opportunity to build upon skills necessary for success in the Computer Science Program. Through interactions in a small group environment, students will make friends with other computer science students, create a stronger bond with RIT and their college through increased relationships and extended orientation information, and focus on communication and small group skills valuable for future project work. The students will become more knowledgeable about the computer science curriculum, career options, and ethical issues.

Credit 1

ICSS-312 **Introduction to Software Engineering**
Registration #0603-312

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

Class 4, Credit 4

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

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

Class 3, Lab 2, Credit 4

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

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

Class 4, Credit 4

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

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

Class 4, Credit 4

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

One quarter of appropriate work experience in industry.

Credit 0

ICSS-510 Software Specification and Design

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

Class 4, Credit 4

ICSS-511 Software Testing and Quality Assurance

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

Class 4, Credit 4

ICSS-515 Analysis of Algorithms

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

Class 4, Credit 4

ICSS-520 Computer Architecture

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

Class 4, Credit 4

ICSS-521 Introduction to Microprocessor Systems

An examination of microcomputers and microcomputer applications, including the study of microprocessors and their use in the construction of microcomputers. Additional topics covered include microcomputer buses, 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

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

Class 4, Credit 4

ICSS-531 Introduction to Parallel Computing

A study of the hardware and software issues in parallel computing. Topics include an introduction to the basic concepts, parallel architectures, parallel algorithms, parallel languages, network topology, coarse- versus fine-grained parallelism, applications, parallel programming design and debugging. Programming projects will be required. (ICSP-450, ICSS-440)

ICSS-532 Parallel Algorithms and Program Design

A study of the principal trends in parallel algorithm design through the analysis of algorithms used in various areas of application. Specific techniques that have gained widespread acceptance will be highlighted. The course will investigate the interplay between architecture and algorithmic structure and will discuss the effect that these issues have on the complexity and efficiency of parallel algorithms. Each student will be required to research an area of parallel program design and then implement a parallel computing project for an application within that area. Programming projects will be required. (ICSS-531)

ICSS-540 Operating Systems Laboratory

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

Class 4, Credit 4

ICSS-541 Introduction to Computer Networks

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

Class 4, Credit 4

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

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

Class 4, Credit 4

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

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

Class 3, Lab 2, Credit 4

ICSS-555 **Software Engineering Project**
Registration #0603-555 **Laboratory**

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

Class 4, Credit 4

ICSS-560 **Compiler Construction**
Registration #0603-560 **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**
Registration #0603-565

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

Class 4, Credit 4

ICSS-570 **Introduction to**
Registration #0603-570 **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 fundamentals, graphics packages, and graphics systems. Students will use and develop a graphics software system based on an accepted graphics standard. Programming projects will be required. (Third-year standing in Computer Science)

Class 4, Credit 4

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

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

Class 4, Credit 4

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

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

Class 4, Credit 4

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

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

Class 2-4, Credit 2-4

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

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

Class 2-4, Credit 2-4

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

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

Class 4, Credit 4

Packaging Science

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

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

Class 3, Credit 3

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

A basic course in engineering drawing. Topics include, but are not limited to, lettering, line quality, use of instruments, free-hand sketching, orthographic projections, pictorials, sections, auxiliary views, and dimensioning.

Class 1, Lab 3, Credit 3

IPKG-302 CAD Drawing**Registration #0607-302**

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

Class 1, Lab 3, Credit 3

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

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

Class 3, Credit 3

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

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

Class 3, Credit 3

IPKG-313 Methods of Evaluation**Registration #0607-313**

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

Class 1, Lab 4, Credit 3

IPKG-321 Rigid Containers**Registration #0607-321**

A detailed study of primary packages. History, manufacturing processes, characteristics, and applications for containers in direct contact with the product. Structural design, chemical 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-341 Computer Applications**Registration #0607-341**

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

Class 2, Lab 4, Credit 4

IPKG-401 Career Seminar**Registration #0607-401**

Career opportunities in Packaging Science; methods and procedures used in obtaining co-op and entry-level positions. Career advancement within the corporate organization; job changes.

Class 1, Credit 1

IPKG-420 Technical Communication**Registration #0607-420**

Introduction to the principles of effective written technical communication for the packaging professional. Topics include: memos, business letters, summary activity reports, technical proposals, and research papers. This course is open only to packaging majors, and is required as part of the writing skills certification process under the RIT policy. (IPKG-321, 322)

Class 3, Credit 3

IPKG-431 Packaging Production**Registration #0607-431**

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

Class 2, Lab 4, Credit 4

IPKG-462 Packaging Regulations**Registration #0607-462**

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

Class 3, Credit 3

**IPKG-485 Principles of Shock and Vibration
Registration #0607-485**

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

Credit variable 3-4

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

One quarter of appropriate work experience in industry. Two quarters of co-op experience are required. (IPKG-321, IPKG-322)

Credit 0

**IPKG-510 Introduction to Electrostatics
Registration #0607-510**

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

Class 4, Credit 4

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

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

Class 3, Recitation 1, Credit 4

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

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

Class 4, Credit 4

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

Consideration of packaging in a social context. Factors which enhance secondary use, recycling, recovery of resources, and proper disposal will be discussed. Package design in relation to solid waste disposal and materials and energy shortages will be considered. Other topics of current social interest will be discussed. Primarily a discussion class for senior students. Open to non-majors. (Professional elective)

Class 2, Recitation 1, Lab 2, Credit 4

**IPKG-531 Packaging Process Control
Registration #0607-531**

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

Class 3, Recitation 1, Credit 4

**IPKG-536 Medical Products Packaging
Registration #0607-536**

Study of unique requirements for packaging materials and containers for sterilized medical devices. Current sterilization techniques, impacts on materials properties, and distribution requirements are considered for this specialized product group. (IPKG-433; professional elective)

Class 2, Recitation 1, Lab 2, Credit 4

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

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

Class 3, Lab 2, Credit 4

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

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

Class 3, Lab 2, Credit 4

**IPKG-570 Point of Purchase Displays
Registration #0607-570**

An interdisciplinary course considering the unique requirements for display packaging at the retail point of purchase. The retail store environment, display techniques, customer motivation, product tie-ins, construction techniques, production and distribution requirements, product promotion and point of purchase support materials and activities, design, and printing of point of purchase displays. (Course is intended to be an interdisciplinary, senior elective for students in packaging, packaging design, marketing, retailing and printing.) (Professional elective)

Class 2, Lab 4, Credit 4

**IPKG-577 Packaging Internship
Registration #0607-577**

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

Credit variable 1-8

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

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

Arranged, Credit 4

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

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

Arranged, Credit variable 1-4

School of Engineering Technology

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

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

Class 1, Credit 0

Civil Engineering Technology

ITEC-099 **Introduction to Civil** **Registration #0608-099** **Engineering Technology**

Introduces freshman and transfer students to the CET program in order to ease the transition from their previous schools. Information is provided on cooperative education, technical electives, liberal arts core and concentration courses, and preregistration procedures. Discussion of topics including P.E. registration and N.I.C.E.T. certification.

Class 1, Credit 0

ITEC-101,102 **Architectural & Structural** **Registration #0608-101,102** **Blueprint Reading**

(Residential, Commercial) Reading and interpretation of architectural and structural drawings; use of scales, symbols for materials, drafting conventions, schedules and specifications; freehand sketching, elementary mathematics, and some quantity take-off.

Credit 3

ITEC-201 **Architectural Drawing I** **Registration #0608-201**

Introduction to architecture, the role of architectural drawings in the construction process, and basic drafting techniques used in architectural drawing including pencil techniques, freehand sketching and lettering. Introduction to drawings required in the traditional construction drawing set.

Credit 2

ITEC-202 **Architectural Drawing II** **Registration #0608-202**

Introduction to the techniques of the architectural design process including preliminary presentation drawings, isometrics, and perspectives. Preparation of drawings required in the design and construction process of different building types. (ITEC-201)

Credit 2

ITEC-203 **Architectural Drawing III** **Registration #0608-203**

Advanced study in the complete architectural process required in developing more complex building types. Preparation of design and schematic drawings of different building types with concentration on detail and construction drawings. (ITEC-202)

Credit 2

ITEC-204,205,206 **Architectural Drawing IV, V, VI** **Registration #0608-204, 205,206**

Design development, presentation and working drawing preparation including: plans, elevation, sections, and details of different building types. Site planning, perspective presentation and related design skills. (ITEC-203)

Credit 2

ITEC-207,208,209 **Architectural Drawing VII, VIII, IX** **Registration #0608-207, 208, 209**

Advanced design development, presentation and working drawing preparation including: plans, elevation, sections, and details of different building types. Site planning, perspective presentation and related design skills. (ITEC-206)

Credit 2

ITEC-210 **Engineering Graphics** **Registration #0608-210**

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

Class 2, Lab 4, Credit 4

ITEC-220 **Civil Engineering Graphics** **Registration #0608-220**

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

Class 2, Lab 4, Credit 4

ITEC-230 **Computer Applications** **Registration #0608-230**

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

Class 4, Credit 4

ITEC-231 **Surveying** **Registration #0608-231**

Introduction to surveying including measurement of horizontal distances, leveling, theory of error, bearings and azimuths, measurement of angles, tachymetry, traverse surveys and computations. Several field trips provide familiarization with instrument use. (High school algebra and trigonometry or equivalent)

Credit 4

ITEC-241 **Building Construction** **Registration #0608-241** **(Materials)**

Study of basic construction materials including concrete, masonry, metal, wood, bitumens, plastics, coatings, glass and glazing. Basic physical properties of materials are defined and emphasis is placed on practical applications. Design of concrete mixtures and basic stress-strain relationships are covered.

Credit 3

ITEC-242,243 **Building Construction I, II**
Registration #0608-242,243 **(Methods and Procedures)**
 Elements and details of building construction. Study of fundamental design concepts, building codes, foundations, wood, steel and concrete construction, specifications and construction management. (ITEC-241 or equivalent)

Credit 3

ITEC-251 **Construction Contracting**
Registration #0608-251
 Construction activities from the contractors' viewpoint. Bidding procedure from bid advertisement to bid opening; bonds, insurance, contracts, subcontracts and bidding documents; construction safety, project planning, scheduling and control. Governmental controls including zoning and building codes.

Credit 3

ITEC-252,253 **Building Estimating I, II**
Registration #0608-252,253 **(Residential, Commercial)**
 Basic cost estimating of residential and commercial construction projects including types of estimates, quantity taken off, unit price, material and labor costs, overhead, profit and contingencies. Job cost data sources and cost indices are reviewed. (ITEC-101 or ITEC-203 or equivalent)

Credit 3

ITEC-301 **Structural Theory**
Registration #0608-301
 Analysis of loads, determination of reactions, horizontal and vertical shear, shear diagrams, bending moments, axial and combined stress, truss analysis, deflections and introduction to computer analysis. (ITEM-302 and ITEM-303 or equivalents)

Credit 4

ITEC-302 **Structural Design**
Registration #0608-302
 Fundamentals of structural design including the basic design concepts of structural steel, reinforced concrete, and timber: design of beams, columns, and trusses including connections. (ITEC-301 or equivalent)

Credit 4

ITEC-311,312,313 **Architectural Projects**
Registration #0608-311,312,313
 Advanced work in architectural drafting to develop specialized skills in design development, contract documents, frame construction, shop drawings, site planning or other related areas. Program to be planned individually to match the individual requirements of each student. (ITEC-206 or equivalent)

Credit 2

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 2, Credit 4

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

Class 3, Lab 3, Credit 4

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

Class 4, Credit 4

ITEC-404 **Applied Mechanics of Materials**
Registration #0608-404
 Basic strength of material and statics are reviewed. Advanced topics are covered to include stress and strain, Mohr's circle concept, transversely loaded members, statically indeterminate problems, Euler's equations, and column decision principles. (ITEM-302 and 303 or equivalent)

Class 4, Credit 4

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

Class 3, Credit 3

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

Lab 3, Credit 1

ITEC-422 **Elements of Building Construction**
Registration #0608-422

Elements and details of building construction; study of building codes from a design concept; foundations; wood, steel and concrete construction and wall systems; overview of highway bridges.

Class 4, Credit 4

ITEC-432 **Water and Wastewater**
Registration #0608-432 **Transport Systems**

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**
Registration #0608-438 **of Water and Sewage**

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

Class 3, Lab 2, Credit 4

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

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

Class 2, Credit 2

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

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

Class 4, Credit 4

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

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

Class 4, Credit 4

ITEC-480 **Groundwater Hydraulics**
Registration #0608-480

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

Class 4, Credit 4

ITEC-482 **Hydrology**
Registration #0608-482

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

Class 4, Credit 4

ITEC-485 **Hydraulic Structures**
Registration #0608-485

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

Class 4, Credit 4

ITEC-490 **Structural Analysis**
Registration #0608-490

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

Class 4, Credit 4

ITEC-495 **Structural Design**
Registration #0608-495

Structural design in reinforced concrete and structural steel. In the reinforced concrete portion of the course, the working stress method is briefly covered, but emphasis is on the strength method; members and frames are primarily of the indeterminate type. In the structural steel portion, the working stress method is emphasized; member and frames are primarily of the determinate type. In both portions the accent is on building construction. Provisions of the ACI code and AISC specification are followed. (ITEC-490)

Class 4, Credit 4

ITEC-499 **Cooperative Education**
Registration #0608-499

One quarter of appropriate work experience in industry. (ITES-099)

Credit 0

ITEC-500 **Labor Relations**
Registration #0608-500

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

Class 2, Credit 2

ITEC-505 **Construction Safety**
Registration #0608-505

General safe practices in construction operations. Safety standards, both voluntary and mandatory. Employer 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: settling, filtration, softening, disinfection, organics removal, and plant design construction elements. (ITEC-438)

Class 2, Credit 2

ITEC-513 **Computer Techniques in Civil Engineering Technology**
Registration #0608-513

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

Class 2, Credit 2

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

The environmental and social aspects of land planning are covered as well as the engineering and cost considerations. Topics included are zoning concepts, master plans, subdivision regulations and design criteria, flood plains, environmentally sensitive areas, wetlands, other planning and control tools, solar access planning, and urban revitalization. Students are involved in an independent project consisting of a concept design for a subdivision, or other land use 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

The course is organized to continue with the study of reinforced concrete that was begun in ITEC-495. Topics include retaining walls, footings, two-way slabs, rectangular tanks, columns, and an introduction to prestressed concrete. The strength method of the ACI code is used. (ITEC-495)

Class 4, Credit 4

ITEC-518 **Masonry Design**
Registration #0608-518

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

Class 2, Credit 2

ITEC-520 **Design of Wastewater Treatment Facilities**
Registration #0608-520

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

Class 3, Lab 2, Credit 4

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

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

Class 3, Lab 3, Credit 4

ITEC-525 **Hazardous Waste**
Registration #0608-525

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

Class 4, Credit 4

ITEC-526 **Industrial Wastewater**
Registration #0608-526

Industrial wastewater characterization and waste flow survey. Case studies of selected industrial wastewater. (ITEC-438)

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

ITEC-527 **Soil Mechanics and Foundations**
Registration #0608-527

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

Class 3, Credit 3

ITEC-528 **Soil Mechanics Laboratory**
Registration #0608-528

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

Lab 2, Credit 1

ITEC-530 **Transportation Engineering**
Registration #0608-530

The course exposes the student to the fields of highway, airport, and rail engineering. The areas of administration, planning, design, construction, maintenance, and operation are covered. After the introductory material is presented, stress is put on specific skills needed in these fields, including highway, rail, and airport standards, geometry and alignment, drainage, earthwork, safety standards, and structures. Ample field exposure to all elements is part of the formal structured program. (Route Surveying)

Class 4, Credit 4

ITEC-535 Pavement Design**Registration #0608-535**

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

Class 3, Lab 2, Credit 4

ITEC-544 Contracts and Specifications**Registration #0608-544**

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

Class 2, Credit 2

ITEC-546 Professional Principles and Practices**Registration #0608-546**

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

Class 1, Credit 1

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

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

Class 4, Credit 4

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

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

Class 4, Credit 4

ITEC-556, 557 Wastewater Treatment Plants Operation and Control I & II

A self-paced, audiovisual course. Emphasis is on the functional aspects of wastewater treatment plants' operation. Discussion of the significance of the results of laboratory analysis and interpretation and application to the control of treatment processes. (ITEC-438 and permission of instructor)

Credit variable 1-4

ITEC-560 Construction Project Management**Registration #0608-560**

An introduction to basic construction management and organization. Topics include company and project organization, bonds, insurance, bidding, cost and financial accounting, and project planning and scheduling. (ITEC-509 and ITEC-422 may be taken concurrently.)

Class 4, Credit 4

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

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

Class 4, Credit 4

ITEC-580 Senior Construction Seminar**Registration #0608-580**

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

Class 3, Credit 4

ITEC-599 Independent Study**Registration #0608-599**

A supervised investigation within a civil engineering technology area of student interest. Consent of the sponsor and departmental approval are required. Students are limited to a maximum of 4 quarter credit hours of independent study projects and 2 sections in any one quarter, plus a maximum of 8 quarter credit hours of independent study credits earned toward degree requirements

Credit variable 1-4

Electrical Engineering Technology**ITEE-201 DC Circuits****Registration #0609-201**

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

Class 3, Lab 2, Credit 4

ITEE-202 AC Circuits**Registration #0609-202**

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

Class 3, Lab 3, Credit 4

ITEE-203 Electronic Devices**Registration #0609-203**

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

Class 3, Lab 3, Credit 4

ITEE-207 EET First-Year Orientation**Registration #0609-207**

Introduction to electrical engineering technology. Topics include engineering technology versus engineering, registration system, learning styles, cooperative education, time organization and management, and electives in electrical engineering technology.

Class 1, Credit 1

ITEE-231 **Logic**
Registration #0609-231

Introduction to digital logic, number systems and codes, TTL gates, simplification of logic expressions, combination logic and sequential logic.

Class 3, Lab 2, Credit 4

ITEE-237 **Introduction to**
Registration #0609-237 **Computer Operations I**

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

Credit 3

ITEE-238 **Introduction to**
Registration #0609-238 **Computer Operations II**

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

Credit 3

ITEE-240 **Microcomputer Organization**
Registration #0609-240

Introduction to microcomputer organization along with in-depth study of computer peripherals. Special test equipment will be used in lab for the control and alignment of disk drives and other computer sub assemblies. (ITEP-301, ITEE-238)

Credit 4

ITEE-250 **Computer Systems Troubleshooting**
Registration #0609-250

Students will troubleshoot, repair, align, and maintain computer equipment to component and board level. Students will be responsible for demonstrating professional technique in both the lab and field environment. (ITEE-240)

Credit 4

ITEE-271 **Telecommunication Fundamentals**
Registration #0609-271

A survey of and introduction to the structure and regulation of the telecommunications industry is provided. The basics of data communications, telephony, switching systems, ISDN, multiplexing, and networks are introduced. Data communication components, codes, and techniques are identified. Methods for selecting, implementing, and managing a computer network or telephone system are reviewed.

Class 4, Credit 4

ITEE-337 **Electric Machines/Transformers**
Registration #0609-337

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

Class 3, Lab 2, Credit 4

ITEE-353 **Introduction to Microprocessors**
Registration #0609-353

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

Class 3, Lab 3, Credit 4

ITEE-361 **Applied Electronics I**
Registration #0609-361

The application of electronic devices in practical circuits. Power supply devices, properties of transistor amplifiers, and power circuits are investigated.

Class 3, Lab 2, Credit 4

ITEE-362 **Applied Electronics II**
Registration #0609-362

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

Class 3, Lab 2, Credit 4

ITEE-363 **Applied Electronics**
Registration #0609-363 **for Communication**

This course applies the concepts of circuits and electronics to basic communication circuits for amplitude and frequency modulation. (ITEE-202, 362)

Class 3, Lab 2, Credit 4

ITEE-399 **Independent Study**
Registration #0609-399 **(offered spring quarter only)**

Independent study of a design project by electrical technology students. Department approval must be obtained during the fall quarter for spring quarter registration.

Class, Lab as required, Credit 4

ITEE-401 **Transformed Circuits I**
Registration #0609-401

An introductory course in the use of LaPlace transforms to determine the complete response of circuits containing independent and dependent sources, resistance, inductance, and capacitance. Application of basic circuit theorems to the solution of transformed networks. (Corequisite SMAT-420 or equivalent)

Class 3, Recitation 2, Credit 4

ITEE-402 **Transformed Circuits II**
Registration #0609-402

Frequency response of network functions as solved by use of pole-zero diagrams and Bode diagrams. Mutual inductance. The Fourier series solution of circuits with non-sinusoidal inputs. (ITEE-401)

Class 3, Lab 2, Credit 4

ITEE-403 **Advanced Circuit Theory**
Registration #0609-403

An introduction to advanced circuit analysis techniques, including signal decomposition by Fourier Series and transient analysis using the LaPlace Transform. (SMAT-421)

Class 3, Lab 2, Credit 4

ITEE-404 **Control Systems I**
Registration #0609-404

Closed-loop control systems are analyzed with respect to their stability, steady state accuracy, and transient response. The design of lead-lag compensation to improve system performance is included. (ITEE-403, SMAT-422)

Class 3, Lab 2, Credit 4

ITEE-407 **EET Transfer Orientation**
Registration #0609-407

Introduction to electrical engineering technology. Topics include engineering technology versus engineering, registration system, the quarter system, resources available at RIT, the cooperative education placement process, and electives in electrical engineering technology.

Class 1, Credit 1

ITEE-408 **Transmission Lines**
Registration #0609-408

Development and application of the general transmission line equation starting from the distributed lumped LC model. Topics include the propagation of electromagnetic waves in a coaxial line; voltage, current, and impedance; graphical methods for analysis; transmission lines as circuit elements (SMAT-422, ITEE-202)

Lecture 3, Lab 2, Credit 4

ITEE-411 **Electrical Principles for Design I**
Registration #0609-411

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

Class 3, Lab 2, Credit 4

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

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

Class 3, Lab 2, Credit 4

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

Applications of microprocessors for manufacturing engineering technology students. Application of the INTEL 8085 microprocessor, with emphasis on the interface to SDK-85 microcomputers. Microcomputers as applied to robotics and numerically controlled machinery. (ITEE-412)

Class 3, Lab 2, Credit 4

ITEE-414 **Basic Electrical Principles**
Registration #0609-414

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

Class 3, Lab 2, Credit 4

ITEE-424 **Logic and Digital Devices**
Registration #0609-424

A course covering digital design with logic gates and with PALs. Combinational logic circuits are covered with a review of Boolean algebra and Karnaugh mapping techniques. Combinatorial PALs and PALASM software are introduced. Sequential logic is introduced with the coverage of flip-flops and counters through the coverage of state machines. The state machine is covered in some detail with the use of ASMs, state graphs, and state tables. Registered PALs are introduced to implement state machine designs. (ITEP-301)

Class 3, Lab 2, Credit 4

ITEE-437 **Computer Programming**
Registration #0609-437 **Techniques**

The objective of this course is to learn to write good, well documented programs using PASCAL as the programming language. The emphasis of the program will be to learn modern programming techniques and methods of solving problems using computers.

Class 4, Credit 4

ITEE-440 **Discrete Amplifier Design**
Registration #0609-440

Biasing of bipolar and field effect transistors is reviewed. Design and analysis of Class A amplifiers using small signal h-parameters are presented. Included are the topics of feedback and frequency response in multistage amplifiers. The design of Class A and B low-frequency power amplifiers is studied with special attention to transistor ratings and heat sinking requirements. (Corequisite ITEE-402)

Class 4, Lab 2, Credit 5

ITEE-441 **Integrated Circuit Amplifiers**
Registration #0609-441

A study of discrete differential amplifiers and integrated operational amplifiers, including applications in instrumentation, active filters, waveform generation and shaping, and precision rectifiers. Regulators, including switching regulators, are covered. (ITEE-440)

Class 4, Lab 2, Credit 5

ITEE-442 **Advanced Electronics**
Registration #0609-442

A review of basic operational amplifier circuits is supplemented by applications of special-purpose amplifiers. Use of op amps in signal generation, regulation, and active filtering is examined. Use of discrete transistors to augment power capabilities of integrated devices is included. (ITEE 403)

Class 3, Lab 2, Credit 4

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

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

Class 3, Lab 2, Credit 4

ITEE-473 **Transmission Systems**
Registration #0609-473

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

Class 3, Lab 2, Credit 4

ITEE-474 **Voice Communications:
Principles and Technology**
Registration #0609-474

Provides an understanding of basic telephony concepts and associated voice-based applications. Various telephone architectures are studied. Topic highlights include audiotext, ISDN (Integrated Service Digital Networks), and voice mail. Practical assignments emphasize "real-world" applications. (ITEE-271, ICSA-200)

Class 3, Lab 2, Credit 4

ITEE-475 **Switching Technologies**
Registration #0609-475

To familiarize the student with the various switching methods and equipment used in the telephone network. Voice and data switching methods such as matrix, circuit, message packet, burst, and LAN are studied and compared. The function of the switch in the network and network routing methods are examined. Voice and data traffic on a portable switch are simulated in the laboratory. (ITEE-474, SMAM-309)

Class 4, Credit 4

ITEE-476 **Digital Communication Systems**
Registration #0609-476

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

Class 3, Lab 2, Credit 4

ITEE-477 **Data Communication Technology**
Registration #0609-477

This course studies the various hardware and equipment used to implement and maintain data communication systems. Examples of data communication software systems presently in use by manufacturers are utilized to study this hardware. The laboratory uses telecommunication test equipment to test data communication. (ICS A-411 or ITEE-476)

Class 3, Lab 2, Credit 4

ITEE-480 **Telecommunications
Policy and Issues**
Registration #0609-480

This course provides an introductory overview of domestic and global information/telecommunications policy, standards, and regulation. Topic highlights include the European Unification, the automatic number identification (ANI)/call ID (CID) debate, privacy in the information age, transborder flow of information and security, and Personal Communications Network (PCN) standards. (ITEE-271)

Class 4, Credit 4

ITEE-499 **Cooperative Education**
Registration #0609-499

One quarter of appropriate work experience in industry. (ITES-099)

Credit 0

ITEE-520 **Electrostatic and
Magnetic Fields**
Registration #0609-520

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

Class 3, Recitation 2, Credit 4

ITEE-524 **Microwave Systems**
Registration #0609-524

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

Class 3, Lab 2, Credit 4

ITEE-534 **Analog Communication Systems**
Registration #0609-534

The Fourier Series is reviewed, and the Fourier Transfer is introduced. Circuit design and systems concepts for AM, DSB, SSB, VSB, and FM of each type of modulation is determined. The noise figure, noise temperature, and signal-to-noise ratio of a system is explained. (SMAT-423)

Class 3, Lab 2, Credit 4

ITEE-535 **Telecommunication Systems**
Registration #0609-535

Various types of digital and data communication systems and their components are studied. Digital communication modulation schemes and transmission techniques are introduced. Data communication concepts such as protocols, error control, transmission methods, coding, and circuit configurations are explained. Microwave radio and satellite communication systems concepts are studied with software in the laboratory. (ITEE-534 or knowledge of basic electronic communication concepts such as AM/FM transmission, tuned circuit and filter concepts, and basic digital theory.

Class 3, Lab 2, Credit 4

ITEE-538 **Digital Computer Design I**
Registration #0609-538

An advanced course in the design of digital systems. The top-down design method is used in the study of complex combinational and sequential logic circuits. Use of MSI circuits including multiplexers, demultiplexers, shift registers, counters, and comparators is discussed. Programmable Array Logic Devices—PALs—are also used in the design process. Course covers both synchronous and asynchronous design and timing problems that are inherent to them. The Logic Workbench software package will be used as part of the design process.

Class 3, Lab 2, Credit 4

ITEE-539 **Digital Computer Design II**
Registration #0609-539

Application of logic circuits to computer design. CPU structures and developments are introduced. Semiconductor memories, including RAM, ROM, and PROM, input/output circuits and their application to computers and microprocessors are considered. The basic operation of computer and microprocessor systems are examined. Programming requirements from microcode to modern languages are presented in light of the circuits and concepts presented in this course.

Class 3, Lab 2, Credit 4

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

An intermediate course in microprocessors emphasizing either the Motorola 68HC11 microcontroller or the Intel 8085 microprocessor. 8085 topics covered include the CPU, ROMs, RAMs, and programmable interfacing ICs. Assembly language programming is used on the 68HC11. (ITEE-424, ITEE-437)

Class 3, Lab 3, Credit 4

ITEE-543 **Peripherals and Interfacing**
Registration #0609-543

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

Class 3, Lab 3, Credit 4

ITEE-547 **Digital Processing of Signals**
Registration #0609-547

Basic concepts of linear systems are covered, followed by an introduction to digital signal processing. Emphasis is placed on digital filter design and digital spectral analysis. Significant programming projects are assigned. (SMAT-423)

Class 4, 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-337, 411, or 414)

Class 3, Recitation 2, Credit 4

ITEE-551 **Protective Relaying**
Registration #0609-551

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

Class 4, Credit 4

ITEE-552 **Power Systems II**
Registration #0609-552

The symmetrical component method of three-phase circuit analysis is used for fault analysis. Lightning and surge protection, load flow, economic operation, and system stability are covered. System protection is introduced. (ITEE-550, 411, 414, or permission of instructor)

Class 3, Recitation 2, Credit 4

ITEE-554 **Electronic Optic Devices**
Registration #0609-554

An introductory course in the basics of optoelectronics. Basic optics is reviewed. Topics covered include the introduction to optics, lenses and optical systems; light sources and transmitters; modulation; light detectors and receivers; fiber optics, and lasers. (ITEE-442)

Class 3, Lab 2, Credit 4

ITEE-560 **Microelectronics I**
Registration #0609-560

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

Class 3, Recitation 2, Credit 4

ITEE-561 **Microelectronics II**
Registration #0609-561

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

Class 3, Recitation 2, Credit 4

ITEE-565 **16-Bit Microprocessors**
Registration #0609-565

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

Class 3, Lab 3, Credit 4

ITEE-571 **Network Engineering**
Registration #0609-571

This course uses local area networks (LAN) to study design issues for communication networks. Design issues studied are topologies, transmission media, interfaces and standards. A LAN is implemented in the laboratory. (ITEE-472, ITEE-477)

Class 3, Lab 2, Credit 4

ITEE-572 **Network Management**
Registration #0609-572

The course studies the issues and regulatory policies confronting a manager of a modern communication network. Issues studied are cost/performance trade-offs, network flow, control, and security. The current state of federal and state regulatory policies is examined. (ITEE-474, ITEE-477)

Class 4, Credit 4

ITEE-574 **Network Planning and Design**
Registration #0609-574

This advanced course exposes the student to the practical aspects of network design. Network design, simulation, and diagnostics form the laboratory experience for participants. The emphasis is on providing the student with hardware and software design skills applicable across a multi-vendor environment. (ITEE-572, ITEE-477)

Class 3, Lab 2, Credit 4

ITEE-580 **Senior Project**
Registration #0609-580

Selected independent study of design project by electrical technology students with the approval of the department. Approval must be granted first week of fall or winter quarter for spring quarter registration.

Class/Lab as required. Credit 4

Mechanical Engineering Technology

ITEM-099 **Careers in Mechanical Engineering Technology** Registration #0610-099

An examination of the many career paths possible for MET students. Methods to develop career goals, how to select course options to move toward career goals.

Class 1, Credit 0

ITEM-200 **Mechanical Blueprint Reading** Registration #0610-200

This course involves the study of mechanical detail and assembly drawings. Topics include sketching, orthographic projections, and section views. The course will emphasize dimensioning practices, including geometric dimensioning and tolerancing used on detail and assembly drawings.

Lecture 1, Lab 2, Credit 2

ITEM-211 **Introduction to Materials Technology** Registration #0610-211

A course dealing with the characteristics of materials and the fabrication of materials into finished products. Topics will include mechanical, electrical, thermal, chemical, magnetic and optical properties of materials, the structure of the materials and the interrelationship of material characteristics and manufacturing processes. (ITEM-304 concurrently)

Class 3, Credit 3

ITEM-212 **Metrology** Registration #0610-212

A course dealing with precision measurements as applied to the manufacturing processes. Gaging of dimensions, surfaces, and contours by various techniques are among the topics covered. (ITEC-210)

Class 1, Lab 2, Credit 2

ITEM-220 **Mechanical Design Drawing** Registration #0610-220

A course dealing with the preparation of working drawings and their relation to actual production. Emphasis is placed on dimensioning and tolerancing, both conventional and geometric, along with sectional views and threads and fasteners. (ITEC-210)

Class 2, Lab 4, Credit 4

ITEM-302 **Introduction to Statics** Registration #0610-302

An introduction to statics covering forces, moments, vectors, equilibrium, friction, areas, volumes, and masses. (Algebra, trigonometry, physics)

Class 3, Recitation 2, Credit 4

ITEM-303 **Strength of Materials** Registration #0610-303

An introduction to the effect of external forces on the behavior of solid materials. Stresses, strains, Hooke's law; thermal effects are studied with consideration of axial, torsional, and bending loads, by themselves and in combination. (ITEM-302)

Class 3, Recitation 2, Credit 4

ITEM-304 **Materials Testing** Registration #0610-304

A laboratory course dealing with standard physical tests of various materials, instrumentation used in these tests, and the preparation of laboratory reports. (ITEM-211 concurrently)

Class 0, Lab 2, Credit 1

ITEM-305 **Pneumatic and Hydraulic Systems** Registration #0610-305

The study of the basics of fluid power. Areas of study are pressure, viscosity, turbulence, flow, thermal properties, and displacement. Hydraulic/pneumatic components such as pumps, actuators, valves, accumulators, lines, directional controls, sealing devices, servomechanisms, hydraulic fluids, and fluid containers will be studied.

Class 3, Lab 2, Credit 4

ITEM-306 **CAD Applications in Mechanical Design I** Registration #0610-306

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

Class 2, Lab 4, Credit 4

ITEM-307 **CAD Applications in Mechanical Design II** Registration #0610-307

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

Class 2, Lab 4, Credit 4

ITEM-308 **Kinematics** Registration #0610-308

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

Class 3, Recitation 2, Credit 4

ITEM-315 **Principles of Mechanical Design I** Registration #0610-315

A course in mechanics of materials as applied to mechanical design. Principles of deflection, stress, bending, and torsion in parts. Working stresses and failure in parts. Design of shafts, springs, screws. (ITEM-308)

Class 3, Recitation 2, Credit 4

ITEM-316 **Principles of Mechanical Design II** Registration #0610-316

Mechanical design of machine components—clutches, brakes, lubrication, ball and roller bearings, spur gears. (ITEM-315)

Class 3, Recitation 2, Credit 4

ITEM-318 **Materials Technology II** Registration #0610-318

A study of corrosion, plastics, and composite materials as related to mechanical design. Laboratory activities related to corrosion, plastic processing, testing and property evaluation. (ITEM-211, ITEM-304)

Class 3, Lab 2, Credit 4

ITEM-320 **Fluid Power Systems**
Registration #0610-320
 Introduction to pneumatic and hydraulic components; pneumatic and hydraulic power systems; compressors, pumps, efficiency, and applications; integrated electromechanical power systems. Lab sessions develop a qualitative feel for characteristics and applications of power systems, machines, and their control.
 Class 3, Lab 2, Credit 4

ITEM-351 **Electro-Mechanical Systems Design**
Registration #0610-351
 Concepts, principles, and analysis of components used in the design of control systems. This includes electrical, mechanical, thermo, and fluid system components. The analysis of control types and stability of various control systems are also presented.
 Class 3, Lab 2, Credit 4

ITEM-399 **Independent Study**
Registration #0610-399
 A supervised investigation within a mechanical technology area of student interest. Consent of the instructor and departmental approval are required.
 Credit 1-8

ITEM-404 **Applied Mechanics of Materials**
Registration #0610-404
 The basic concepts of mechanics of materials as applied to mechanical design are covered in depth. The course includes a review of statics, the concepts of stress and strain, the stress-strain relationship and strength of materials. Specific topics include simple normal and shear stresses, torsion of shafts, bending stress and deflection of beams, combined stresses and statically indeterminate problems. (ITEM-408 or equivalent)
 Class 3, Recitation 2, Credit 4

ITEM-405 **Applied Dynamics**
Registration #0610-405
 This is a course in the fundamentals of kinematics and kinetics of motion. Kinematics is the study of the geometry of motion. Kinetics relates the forces on objects to their resulting motion. This includes the study of Newton's Laws of Motion and energy methods. (ITEM-404, SMAT-421, or concurrent)
 Class 3, Recitation 2, Credit 4

ITEM-406 **Dynamics of Machinery**
Registration #0610-406
 A study of the kinematics of machine elements including gear trains, cams and linkages. Applications in robotics mechanisms are studied. Both graphical and computer methods are used. (ITEM-405 and 432)
 Class 3, Recitation 2, Credit 4

ITEM-407 **Mechanical Engineering Technology Laboratory I**
Registration #0610-407
 A course in mechanical laboratory techniques and the preparation of laboratory reports; experimental work in strength of materials, experimental stress analysis and dynamics. Instruction in the preparation of laboratory reports. (Must be taken concurrently with ITEM-404 and 405)
 Class 1, Lab 2, Credit 2

ITEM-408 **Introduction to Strength of Materials**
Registration #0610-408
 Elements of statics and strength of materials. Topics include plane equilibrium, friction, stress, strain, torsion, and the bending of beams.
 Class 3, Recitation 2, Credit 4

ITEM-409 **Mechanical Engineering Technology Laboratory II**
Registration #0610-409
 A course in laboratory techniques, the analysis of experimental results and the preparation of laboratory reports. Experimental work in materials science and plastics technology will be conducted with special emphasis on plastics technology. (SCHG-271 and ITEM-211; ITEM-416 concurrently)
 Class 1, Lab 2, Credit 2

ITEM-416 **Materials Technology**
Registration #0610-416
 Topical areas of study include corrosion reactions, corrosion prevention, properties and structure of plastics, an overview of plastics processing, the nature of adhesives and adhesive bonding, properties of composite systems, and ceramics properties and structure. (SCHG-273, lower division materials course)
 Class 4, Credit 4

ITEM-432 **Computers in Mechanical Technology**
Registration #0610-432
 The use of computers to solve problems encountered in mechanical engineering technology will be emphasized. This will include an introduction to the RIT academic computing system and introduction to the use of personal computers. Instruction will be provided in word processing, spread sheet programming, plotting and other applications programs. Assignments will be based on problems encountered in mechanics of materials dynamics, materials testing, energy analysis, etc. (a course in a programming language)
 Class 1, Lab 2, Credit 2

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

ITEM-442 **Heat Transfer**
Registration #0610-442
 The first course in heat transfer. The theory and application of the fundamentals of heat conduction, convection, and radiation. The design and applications of heat transfer-apparatus. (ITEM-440 and ITEM-460)
 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-422, ITEM-405)
 Class 4, Credit 4

ITEM-460 **Applied Fluid Mechanics**
Registration #0610-460
 A study of the fundamentals of fluid statics and dynamics. 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 Cooperative Education
Registration #0610-499**

One quarter of appropriate work experience in industry. (ITES-099)

Credit 0

**ITEM-506 Machine Design I
Registration #0610-506**

The study of static and fatigue failure of machine components and the design and analysis of fasteners, springs, and gears. Computer programs are used to study the static theories of failure and for fatigue analysis. (ITEM- 405,432)

Class 3, Recitation 2, Credit 4

**ITEM-508 Machine Design II
Registration #0610-508**

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

Class 3, Lab 2, Credit 4

**ITEM-509 Product Design
Registration #0610-509**

Integrates the product development and design process with materials, manufacturing methods, process planning, assembly, testing, reliability, and quality assurance. Special emphasis will be placed on parts design and the assembly operation. Students will learn how to reduce material costs, parts costs, assembly time, and the number of parts. (ITEM-506, 508)

Class 3, Lab 2, Credit 4

**ITEM-512 Computer Integrated
Registration #0610-512 Mechanical Design**

The use of computers in solving mechanical design problems will be emphasized. This includes data manipulation, plotting, graphics, applications programming, and an introduction to finite elements. (ITEM-432, 506)

Class 3, Recitation 2, Credit 4

**ITEM-515 Plastics Processing Technology
Registration #0610-515**

A course of dealing with the various methods used to manufacture plastics products. Topics include compression molding, rotational molding, extrusion, injection molding, blow molding, and thermoforming. (Third-year status)

Class 4, Credit 4

**ITEM-516 Plastics Product Design and
Registration #0610-516 Material Selection**

The study of design guidelines for plastics products based on the interrelationships between product design, the material selected, the manufacturing process selected, and the tooling to be used. (ITEM-515 or permission of the instructor)

Class 4, Credit 4

**ITEM-530 Instrumentation
Registration #0610-530**

The basic approach to the design and use of pressure, temperatures, flow, humidity and liquid level measurement instrument transducers. Techniques of test, calibration, and proper use will be demonstrated. Principles of experimentation and computerized data reduction are examined. (ITEE-411, ITEM- 460, SMAT-422)

Class 3, Lab 2, Credit 4

**ITEM-535 Analog Control Systems
Registration #0610-535**

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

Class 4, Credit 4

**ITEM-540 Applied Thermodynamics II
Registration #0610-540**

Application of thermodynamics to internal combustion engines, compressors, steam cycles, refrigeration, air conditioning, psychometrics and combustion processes. (ITEM-440)

Class 4, Credit 4

**ITEM-541 Alternative Energy Applications
Registration #0610-541**

The major emphasis of this course is in the area of solar energy—system design of solar hot water and space heating systems and solar-assisted heat pumps. Other alternative sources of energy are also discussed such as 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 air conditioning, psychrometrics, moisture calculations; also related heat transfer topics.

Class 4, Credit 4

**ITEM-543 Energy Management I
Registration #0610-543**

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

Class 4, Credit 4

**ITEM-544 Energy Management II
Registration #0610-544**

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

Class 4, Credit 4

ITEM-545 **Solar Thermal Applications**
Registration #0610-545

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

Class 4, Credit 4

ITEM-546 **Advanced HVAC Systems**
Registration #0610-546 **Engineering**

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

Class 4, Credit 4

ITEM-580 **Power Plant Design**
Registration #0610-580

Description of power plants and their components; boilers, turbines, pumps, condensers, heat exchangers, nuclear reactors. Relevant analytical tools; cycle calculations, heat balances, gas analysis, fuel analysis. Also, internal combustion power plants and cogeneration plants are covered. Field trips demonstrate state-of-the-art power technologies. (ITEM-440, ITEM-460)

Class 4, Credit 4

ITEM-599 **Independent Study**
Registration #0610-599

A supervised investigation within a mechanical technology area of student interest. (Permission of instructor and departmental approval are required.)

Credit variable (1-4)

Manufacturing Engineering Technology

ITEF-200 **Survey of Computer Aided Drafting (CAD)**
Registration #0617-200

This course includes an overview of the architecture and components of various CAD systems. A CAD system will be used to gain operator skills. (Drafting)

Credit 2

ITEF-220 **Manufacturing Processes I**
Registration #0617-220

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

Class 3, Lab 3, Credit 4

ITEF-260 **Introduction to CAD**
Registration #0617-260

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

Class 3, Lab 2, Credit 4

ITEF-261 **Introduction to**
Registration #0617-261 **Computer Aided Drafting-A**

The purpose of this course is to develop a set of working drawings with advanced system commands. Flowcharting and file management techniques will be required as supporting documentation for each project. This course will also include the digitizing board as an electronic input device for existing drawings and/or sketches. (ITEC-210 or equivalent)

Credit 4

ITEF-271 **Introduction to Numerical Control**
Registration #0617-271

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

ITEF-272 **Tool Design**
Registration #0617-272

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. (ITEF-220)

Credit 4

ITEF-330 **Introduction to**
Registration #0617-330 **Computer Integrated Manufacturing**

This course will discuss the multidisciplinary and interrelated nature of computer integrated manufacturing through the use of a common data base, information resource management, and interpersonal communication skills. Topics will include computer hardware and software applications for areas of factory automation, manufacturing processes, and system controls. Case studies and periodicals will be used to illustrate working models.

Credit 4

ITEF-331 **Programmable Controllers**
Registration #0617-331

Overview of programmable controllers, software and hardware, processor unit and memory, programming tools, input/output systems and languages.

Class 3, Lab 2, Credit 4

ITEF-372 **CAD Applications**
Registration #0617-372 **to Tool Design**

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

Class 3, Lab 2, Credit 4

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

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

Class 3, Lab 2, Credit 4

ITEF-391 **Production Control**
Registration #0617-391

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.

Credit 4

ITEF-403**Machine Elements****Registration #0617-403**

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

Class 2, Recitation 2, Credit 3

ITEF-405**Materials in Manufacturing****Registration #0617-405**

A course dealing with the materials used in modern manufacturing processes. Topics include metals, composites, plastics, and the selection of manufacturing materials from the point of view of design and manufacture.

Class 4, Credit 4

ITEF-410**Computers in Manufacturing****Registration #0617-410**

A course dealing with the use of UNIX operating system in the manufacturing environment and programming with C language. It also deals with the concepts of networking and distributed systems.

Class 2, Lab 2, Credit 3

ITEF-420**Manufacturing Processes II****Registration #0617-420**

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

Class 3, Lab 3, Credit 4

ITEF-424**Statistical Quality Control I****Registration #0617-424**

The basic concepts of statistics and probability are studied as they apply to quality control and reliability. Included are the study of control charts and sampling procedures and work measurement.

Class 4, Credit 4

ITEF-425**Statistical Quality Control II****Registration #0617-425**

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

Class 3, Credit 3

ITEF-434**Operations Management****Registration #0617-434**

A study of modern manufacturing organization and how it is managed. The course will cover manufacturing systems design, analysis, and control. Techniques of decision making process, design of manufacturing process, materials handling, design of Physical facilities, and control of manufacturing operations will be discussed.

Credit 4, Class 4

ITEF-436**Engineering Economics****Registration #0617-436**

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

Class 4, Credit 4

ITEF-437**Value Analysis****Registration #0617-437**

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

Class 2, Recitation 2, Credit 3

ITEF-450**Plastics Processing****Registration #0617-450**

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

Class 3, Lab 2, Credit 4

ITEF-460**Computer-Aided Design****Registration #0617-460**

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

Class 3, Lab 2, Credit 4

ITEF-470**Controls for Manufacturing****Registration #0617-470****Automation**

The course deals with the principles and application of programmable logic controllers. Topics include PLC hardware, programming, and application of PLCs in the manufacturing environment. (ITEE-411)

Class 2, Lab 2, Credit 3

ITEF-471**Computer Numerical Control****Registration #0617-471**

An advanced course in the application of numerical control. Emphasis is placed on computer-assisted part programming for contouring in two and three axes. The course will concentrate on N/C programming with APT. (ITEF-420 or Manufacturing Processes)

Class 2, Lab 2, Credit 3

ITEF-472**Tool Engineering****Registration #0617-472**

An advanced course dealing with manufacturing tools. Examines concepts in tool design, tool specification and tool selection. Emphasis is on the design of dies. (ITEF-220,420)

Class 2, Lab 2, Credit 3

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

A course dealing with the process aspects of Computer Integrated Manufacturing systems. Introduces the various elements of CIM and concentrates on the role of CAM in CIM. Deals with the concepts and application of Group Technology, Computer-Aided Process Planning, and Flexible Manufacturing Systems. Includes the relationships between CAD, CNC, Robotics, MRP and CAM. Emphasis is placed on building mini CAM systems in the laboratory. (ITEF-471, ITEF-470, ITEF-485, ITEE-413)

Class 3, Lab 2, Credit 4

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

Principles and application of basic methods for the improvement of operator-assignment time relationship. Methods of measuring and analyzing work, motion studies, and process analysis are covered.

Class 3, Credit 3

ITEF-485 **Robots in Manufacturing
Registration #0617-485**

A course dealing with the technology and application of robotics. Included are the study of hardware and software of robots and the integration of robots with other elements of Computer Integrated Manufacturing (CIM) systems. The hardware aspects will include the mechanical components, the power systems, the control units, and the sensors. The software aspects will cover the various methods of programming the robots and interfacing them with other components of CIM. The integration aspects include the potential areas of application of robots and their economics. (ITEF-470, ITEE-413)

Class 3, Lab 2, Credit 4

ITEF-491 **Production Control
Registration #0617-491**

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

Class 4, Credit 4

ITEF-499 **Manufacturing Technology Co-op
Registration #0617-499**

One quarter of appropriate work experience in industry. (ITES-099)

Credit 0

ITEF-502 **Non-Traditional
Registration #0617-502** **Manufacturing Processes**

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

Class 3, Credit 3

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

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

Class 1, Recitation 4, Credit variable 3-4

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

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

Class 3, Credit 3

ITEF-530 **Special Topics in Computer
Registration #0617-530** **Integrated Manufacturing**

An advanced course covering various problems faced by the industry in computer integrated manufacturing. Topics will include design for assembly, problems in design analysis, incompatible system components, hardware and software integration problems, universal standards, IGES, MAPS, hardware and software related problems in feedback devices and management and personnel problems. (ITEF-485 or permission of instructor)

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 1-8

Computer Engineering Technology

ITEP-201 **DC Circuits
Registration #0618-201**

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

Class 3, Lab 2, Credit 4

ITEP-202 **AC Circuits
Registration #0618-202**

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

Class 3, Lab 3, Credit 4

ITEP-220 **Electronic Fabrication
Registration #0618-220** **Techniques**

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

Class 1, Lab 2, Credit 4

- ITEP-225** **Schematic Capture**
Registration #0618-225
 An introductory course in the use of an automated drafting tool for both digital and analog circuits. The course will teach the proper drawing techniques needed to prepare a schematic using a computer-aided drafting (CAD) tool. The GED Graphic Editor, of Valid Logic System's Electronic Design Automation software package, will be used as the CAD tool.
 Class 1, Lab 2, Credit 2
- ITEP-301** **Digital Fundamentals**
Registration #0618-301
 A first course in digital fundamentals. Topics include binary arithmetic, Boolean algebra, logic gates, Karnaugh mapping, and an introduction to sequential logic. (ITEP-201)
 Class 3, Lab 2, Credit 4
- ITEP-303** **Microcomputers**
Registration #0618-303
 A first course involving the hardware and structure of a basic microprocessor-based microcomputer. Emphasis will center on the hardware characteristics that dictate performance limitations, design considerations, and interfacing principles. The course will culminate in a small system design. (ITEP-301; ICSP-305)
 Class 3, Lab 3, Credit 4
- ITEP-310** **Electronics I**
Registration #0618-310
 An introduction to electronic devices including semiconductor diodes, zener diodes and bipolar transistors. Emphasis will be on the characteristics, operation and biasing of these devices. Included is an introduction to the concept of amplification and use of the small signal parameters of the BJT in common-emitter and common-collector configurations. (ITEP-202, SMAT-420)
 Class 3, Lab 3, Credit 4
- ITEP-311** **Electronics II**
Registration #0618-311
 A continuing course in the analysis and design of electronic circuits. Emphasis will be on the characteristics, operation and biasing of both junction and insulated gate field effect transistors and the use of small signal parameters. Included is an introduction to frequency response of circuits and the depiction of frequency response. (ITEP-310)
 Class 3, Lab 3, Credit 4
- ITEP-312** **Electronics III**
Registration #0618-312
 A continuation course in the analysis and design of simple linear circuits for students who have completed the introductory course sequence in transistor amplifiers. Included is the analysis of multistage transistor amplifiers and the differential amplifier. Emphasis is on the operational amplifier and its applications. Topics include the ideal operational amplifier, non-ideal characteristics, summing amplifiers, and integrators. Also included is an introduction to special purpose electronic devices (SCR, TRIAC, LCD, etc.). (ITEP-311)
 Class 3, Lab 3, Credit 4
- ITEP-320** **Principles of Electronic Design Automation**
Registration #0618-320
 This is an introductory course in design, capture, and validation of digital and analog circuit designs. The automation process will use Valid's EDA software package operating on a UNIX/SUN platform. (ITEP-301, ITEP-310, ICSP-241)
 Class 2, Lab 4, Credit 4
- ITEP-403** **Advanced Circuit Theory**
Registration #0618-403
 An introduction to advanced circuit technique applicable to the electronic, microcomputer and instrumentation applications likely to be encountered by computer engineering technology graduates. Topics include Kirchhoffs Laws, Thevenin's and Norton's Theorems, ideal operational amplifier circuits (summing, non-inverting, integrating, differentiating), LaPlace Transforms of arbitrary time functions and of differential equations, circuit applications of LaPlace transforms, transfer functions, inverse LaPlace transforms by partial fractions for simple and repeated roots, both real and complex. Fourier series analysis is also covered. (ITEP-302 or 312, SMAT-422)
 Class 3, Lab 2, Credit 4
- ITEP-405** **Control Theory**
Registration #0618-405
 A course in the fundamentals of linear control systems, as used from the standpoint of the digital computer. Emphasis on feedback control theory, control system components, digital control systems and solid state control. (ITEP-403)
 Class 3, Lab 2, Credit 4
- ITEP-429** **Advanced Electronics**
Registration #0618-429
 A continuation of advanced circuit techniques applicable to the electronic, microcomputer and instrumentation applications likely to be encountered by computer engineering technology graduates, plus further, more detailed coverage of real operational amplifier circuits and related circuits. This includes comparators, sample and holds, regulators, analog to digital and digital to analog conversion and filters. Topics also include LaPlace solution of first-order step responses, phasors, pole-zero plots, graphical sinusoidal steady-state, and Bode plots. (ITEP-403)
 Class 3, Lab 2, Credit 4
- ITEP-499** **Cooperative Education**
Registration #0618-499
 One quarter of appropriate work experience in industry and third-year status in computer engineering technology. (ITEP-303, ICSP-305; ITES-099)
 Credit 0
- ITEP-538** **Digital Systems Design I**
Registration #0618-538
 An advanced course in the design techniques of complex combinational and sequential logic circuits and subsystems. Emphasis is on the use of systematic design procedures for implementing state machine designs. The internal structure and function of various logic gates and families are analyzed. The problems of interfacing various logic families are discussed. (ITEP-303, 310 or 203)
 Class 3, Lab 3, Credit 4
- ITEP-539** **Digital Systems Design II**
Registration #0618-539
 A study of the design of complete digital systems using combinational and sequential subsystem circuit design and microprocessors. Included is the hardware design used in digital communications systems. Laboratory work is based around the designing, building and modifying of a multifunction microcomputer from individual components. Included are the hardware ramifications of software and operating system design, and small system architecture problems. (ITEP-538)
 Class 3, Lab 3, Credit 4

ITEP-540 **Digital Systems Design III**
Registration #0618-540

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

Class 3, Lab 3, Credit 4

ITEP-571 **Topics in Computer**
Registration #0618-571 **Engineering Technology**

A course for majors in computer engineering technology, with topics as needed for updating technology. Anticipated offerings may include topics in new programming languages, advanced microprocessors and microcomputer systems, and computer communications systems and techniques. (Fifth-year status in computer engineering technology is required.)

Class 3, Lab 3, Credit 4

ITEP-580 **Senior Project**
Registration #0618-580

Selected independent study design project by computer engineering technology students with the approval of the department. Approval must be granted first week of the fall or winter quarter for spring quarter registration. (Fifth-year status in computer engineering technology)

Class/Lab as required, Credit 4

School of Food, Hotel and Travel Management

Dietetics and Nutritional Care

ISMD-213 **Nutrition Science**
Registration #0620-213

The study of specific nutrients and their functions; physiological, psychological, and sociological needs of humans for food; development of dietary standards and guides; application of nutritional principles in planning and analyzing menus for individuals of all ages; survey of current health nutrition problems and food misinformation.

Class 4, Credit 4

ISMD-402 **Dietetics Environment**
Registration #0620-402 **Coordinated Dietetics Program**

Introductory clinical dietetics course. Students interact with a representative sampling of personnel in all areas of dietetics. Supervised observations are planned in food management systems, health care facilities and community nutrition programs.

Class 1, Credit 4, Clinical hours by arrangement

ISMD-525,526 **Advanced Nutrition and**
Registration #0620-525,526 **Diet Therapy I & II**

Biological metabolism and interrelationships of nutrients, enzymes, and other biochemical substances in humans. Etiology, symptoms, treatment, and prevention of nutritional diseases; evaluation of nutritional status, role of the diet in metabolic, gastrointestinal, renal, musculoskeletal, cardiac, endocrine, febrile, and other diseases.

ISMD-525 Class 5, Credit 5

ISMD-526 Class 4, Credit 4

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

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

Class 3, Credit 8, Practicum hours by arrangement

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

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

Class 1, Credit 8, Practicum in hospital by arrangement

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

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

Class 4, Credit 5, Practicum hours by arrangement

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

An intensive integrated study and application of advanced nutrition and diet therapy theories and principles. The course is structured to integrate class lectures with clinical experience in a hospital setting. Designed for senior students in the Coordinated Dietetics Program.

ISMD-560 Class 4, Credit 4

ISMD-561 Credit 4, Clinical hours by arrangement

ISMD-562,563 **Clinical Dietetics III & IV**
Registration #0620-562, 563 **(Coordinated Dietetics Program)**

A continuation of ISMD-560, 561 in the succeeding quarter with the clinical experience being conducted in the hospital.

ISMD-562 Class 4, Credit 4

ISMD-563 Credit 8, Clinical hours by arrangement

Food Management

ISMF-220 **Career Seminar** **Registration #0621-220**

Seminar designed to define career opportunities in the food, hotel, and travel industries. Students receive guidance in developing career objectives. Leading industry executives will participate.

Class 2, Credit 2

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

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

Class 4, Credit 4

ISMF-224 **Decision Making in** **Registration #0621-224** **Food Service Management**

Insights into the dynamics of food service management decisions for cost control with consideration given to availability, quality, and cost of raw ingredients, distribution systems, labor required, available equipment, and merchandisability.

Class 4, Credit 4

ISMF-22S **Principles of Food Production** **Registration #0621-22S**

Introduction to foods and the basic principles involved in the preparation of high quality food. Topics include composition, varieties, availability and function of foods and ingredients. Organization, management and techniques for efficient food production are stressed. Uniform and professional knife and pastry kits are required. (ISMF-22S)

Class 2, Lab 4, Credit 4

ISMF-310 **Commodity Market Analysis** **Registration #0621-310**

Commodity Market Analysis develops a thorough understanding of commodity groups, their supply and demand characteristics, associated import/export policies, and contractual environment. Students will be introduced to the application of computerized information and trading systems.

Class 4, Credit 4

ISMF-315 **Foodservice Marketing** **Registration #0621-315**

This course provides students with a business-to-business perspective of the marketing of products to the foodservice industry. It also provides an understanding of distribution systems and foodservice marketing environments. Both macro and micro marketing environments and issues will be explored. The class will consider various marketing mix elements as they relate to segments of the foodservice industry. Case studies and readings will be utilized to give students realistic opportunities to analyze and develop practical solutions.

Class 4, Credit 4

ISMF-321 **Menu Planning and Merchandising** **Registration #0621-321**

The menu is the main focus of the food service operation, and its relationship to efficient operation, merchandising, theme, and customer satisfaction will be considered. "Truth in menu" issues, layout, copywriting, standardized recipes, and pricing techniques will be explored. A wide variety of menus will be critiqued. The student will plan and produce a menu for a theme restaurant and will also create a cycle or other menu for a specific customer and situation. (ISMF-222)

Class 2, Credit 2

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

Principles of quantity food production including equipment operation, holding techniques, use of standard recipes, conversion of small quantity recipes to large quantity, production techniques, forecasting, temperature control, cafeteria/buffet service, purchasing, and inventory systems. Additionally, various sanitation and safety topics will be explored. A survey of micro-organisms that cause food spoilage and poisoning, with an emphasis on causes of spoilage and their prevention, will be covered. (ISMF-222)

Class 4, Credit 4

ISMF-331 **Restaurant Operations** **Registration #0621-331**

Entry-level production and service skills for line positions currently used in the hospitality industry. Laboratory assignments are in the operation and maintenance of Henry's, a full-service restaurant modeled after industrial, hotel, and restaurant operations. Students will be assigned to defined job descriptions in production and service on a rotating basis. (ISMF-330)

Class 3, Lab 10, Credit 6

ISMF-410 **Food Processing/Quality Assurance** **Registration #0621-410**

An introduction to traditional and contemporary food processing methods with emphasis on applications to foodservice operations. The effect of these technologies on the storage life and sensory qualities of the products will be examined along with common modes of quality loss in foods. Students will be introduced to industry-standard quality assurance measures.

Class 4, Credit 4

ISMF-416 **Product Development** **Registration #0621-416**

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

Class 2, Lab 6, Credit 6

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

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

Class 4, Credit 4

ISMF-499 **Cooperative Education**
Registration #0621-499

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

Class 0

ISMF-S02 **Decorative Techniques**
Registration #0621-502

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

Lab 4, Credit 2

ISMF-511 **Banquet and Catering**
Registration #0621-511

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

Class 1, Lab 12, Credit 4

ISMF-512 **Design and Layout**
Registration #0621-512 **of Food Operations**

Evaluation of different food service facilities with regard to design and layout. Review of layouts in operating full-service facilities and suggestions for innovative ways to utilize the space to its fullest potential. (ISMF-331 or permission of instructor)

Class 2, Credit 2

ISMF-515 **Food Service Concept**
Registration #0621-515 **Development and Planning**

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

Class 4, Credit 4

ISMF-520 **FoodService**
Registration #0621-520 **Computer Applications**

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

Class 4, Credit 4

ISMF-521 **Computerized Models for**
Registration #0621-521 **Decision Making**

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

Class 4, Credit 4

ISMF-522 **Contract Environment of the**
Registration #0621-522 **Food Service Industry**

The course will provide students with the theoretical basis for identifying the legal environment of the food service industry. Special emphasis will be placed on identifying the rights and obligations of the food service operator in the contractual environment of food service operations.

Class 2, Credit 2

ISMF-525 **Restaurant Management**
Registration #0621-525

This course is designed to develop entry-level management competence through the operation of a full-service restaurant with beverage operations. Students will rotate through various management positions. They will be exposed to four major areas: planning, organization, leadership, and control. Use of the school's computer lab in planning is an integral part of the course.

Class 2, Lab 10, Credit 6

ISMF-545 **Beverage Operations**
Registration #0621-545

A study of the principles, methods, and practical applications of beverage management as it applies to the commercial beverage industry. Emphasis in the course is placed on administrative objectives, operational procedures, and internal control.

Class 2, Credit 2

Hotel and Resort Management

ISMH-200 **Hotel Operations**
Registration #0622-200

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

Class 4, Credit 4

ISMH-205 **Hospitality Industry**
Registration #0622-205 **Real Estate**

This course is designed to provide the student with insight into the development of hospitality real estate and the elements that contribute to decisions on construction, development, and expansion of properties. Attention will be given to site selection and development processes as they relate to the commercial hotel, resort, foodservice, and travel locations. Contributing elements of market conditions, financial feasibility, construction needs, and property sizing will be explored.

Class 4, Credit 4

ISMH-210 **Hotel Marketing and**
Registration #0622-210 **Sales Management**

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

Class 4, Credit 4

ISMH-310 **Resort Development**
Registration #0622-310 **and Management**

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

Class 4, Credit 4

ISMH-315 **Hotel Engineering**
Registration #0622-315 **and Maintenance**

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

Class 4, Credit 4

ISMH-355 **Financial Management for**
Registration #0622-355 **the Hospitality Industry**

This course covers several broad areas: hotel accounting concepts and procedures; financial statements for the hospitality industry's corporate finance concepts; and instruments and strategies of corporate finance relative to the industry.

Class 4, Credit 4

ISMH-470 **Leadership and Executive**
Registration #0622-470 **Development**

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

Class 4, Credit 4

ISMH-480 **Personnel and Labor Management**
Registration #0622-480 **for Hospitality Industries**

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

Class 4, Credit 4

ISMH-510 **Convention Management**
Registration #0622-510

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

Class 4, Credit 4

ISMH-530 **Hotel Law**
Registration #0622-530

Policies, laws and liabilities are examined in this course as they pertain to the innkeeper. Focus will be on current management problems and on the legal responsibilities of management. The rights of innkeepers will also be discussed.

Class 4, Credit 4

ISMH-540 **Risk Management for**
Registration #0622-540 **the Hotel Industry**

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

Class 4, Credit 4

ISMH-560 **Tourism Concepts**
Registration #0622-560

This course emphasizes tourism as a system and develops its interrelated and interdependent elements. Major economic, environmental, and socio-cultural concepts are discussed, including interactions between visitors and host communities. The role of private and public sector tourism organizations is introduced by examining tourism destinations throughout the world.

Class 4, Credit 4

ISMH-570 **Tourism Planning and Development**
Registration #0622-570

This course examines the processes involved in planning and developing a tourist's destination, including the required infrastructure. A major focus will be on benefits and impacts associated with tourism development, as well as the strategies for maximizing benefits and minimizing adverse effects.

Class 4, Credit 4

ISMH-580 **Destination Marketing**
Registration #0622-580

This course focuses on the processes and techniques used to promote tourism destinations such as resorts, attractions, and individual communities. Emphasis will be placed on the role that destination marketing organizations such as convention centers, visitors' bureaus and tourism promotion agencies play in marketing a destination. The development of tourism marketing plans and management of inquiry-fulfillment-referral processes will be discussed.

Class 4, Credit 4

Travel Management

ISMT-206 **Travel Distribution Systems** **Registration #0623-206**

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

Class 4, Credit 4

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

This course emphasizes acquiring operational proficiency with American Airlines' SABRE reservation system. Using SABRE's training mode, the course topics addressed include: creating passenger name records (PNRs), itinerary pricing, fare quotes, queues, and flight information. This course is equally divided between lecture and Travel Lab simulations.

Class 4, Credit 4

ISMT-312 **Travel Reservation Procedures** **Registration #0623-312**

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

Class 2, Credit 2

ISMT-314 **Salesmanship Techniques for Travel** **Registration #0623-314**

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

Class 2, Credit 2

ISMT-410 **Meeting Management** **Registration #0623-410**

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

Class 4, Credit 4

ISMT-413 **Corporate Travel Marketing** **Registration #0623-413** **and Sales**

This course focuses on the processes and techniques used to promote tourism attractions and communities to the corporate buyer. Emphasis will be on the role that organizations such as tourist promotion agencies and convention and visitor bureaus play in marketing the convention-usable attributes of a location. How these organizations can be used by the corporate meeting planning and travel manager to compare sites will be discussed.

Class 4, Credit 4

ISMT-420 **Corporate Travel Planning** **Registration #0623-420**

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

Class 4, Credit 4

ISMT-520 **Exhibit Marketing** **Registration #0623-520**

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

Class 2, Credit 2

ISMT-522 **Negotiations and Conflict Management** **Registration #0623-522** **in Hospitality/Tourism**

This course examines the negotiation process within the hospitality/tourism industry by exploring the nature and sources of interpersonal conflict and its dynamics. Collaborative versus competitive approaches to managing conflict are discussed. Role-play situations are used to differentiate and reinforce negotiation strategies.

Class 2, Credit 2

ISMT-524 **Risk Management in Travel/Tourism** **Registration #0623-524**

This course examines the risk management process as it applies to the travel/tourism industry. Topics include insurance mechanisms; property and time element risks; criminal insurance risks (burglary, hiring, safes, credit risks); casualty risk (general liability, business risk); workers' compensation; personal, personnel, and travel insurance.

Class 2, Credit 2

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

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

Class 4, Credit 4

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

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

Class 4, Credit 4

ISMT-535 SABRE Non-Air Applications**Registration #0623-535**

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

Class 4, Credit 4

**ISMT-550 Seminar in Travel/
Registration #0623-550 Tourism Management**

This course surveys various issues and events that influence the travel and tourism industry. Emphasis is also on how these factors will affect the careers of future professionals. This course is intended for students who have completed all of their required cooperative education experience.

Class 4, Credit 4

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

ARMY**First Year****MMSM-201 Introduction to Military Science
Registration #0640-201**

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

Class 1, Lab 1, Credit 2

**MMSM-202 Applied Military Dynamics
Registration #0640-202**

This course is designed to give the student an introduction to some military dynamics. Topics of primary interest are military writing style, experiential small group leadership opportunity, weapons and marksmanship training and an introduction to evaluating and applying first aid.

Class 1, Lab 1, Credit 2

**MMSM-203 Military Heritage
Registration #0640-203**

This course is designed to provide a practical introduction to the basic military organization and rank structure; the historical basis for customs and traditions found in the military, and current discussions on the military and its impact upon society; leadership laboratory.

Class 1, Lab 1, Credit 2

Second Year**MMSM-301 Military Geography
Registration #0640-301**

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

Class 1, Lab 1, Credit 2

**MMSM-302 Psychology and Leadership
Registration #0640-302**

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

Class 1, Lab 1, Credit 2

**MMSM-303 The Military and American Society
Registration #0640-303**

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

Class 1, Lab 1, Credit 2

Third Year**MMSM-401 Military Tactics
Registration #0640-401**

This course stresses practical exercises on basic map reading skills and provides a working knowledge of fundamentals and principles of combat operation as planned for and executed at light infantry squad and platoon level; leadership laboratory.

Class 2, Lab 1, Credit 3

**MMSM-402 Military Communications
Registration #0640-402**

This course provides knowledge and training of basic military skills essential as a junior officer; an introduction to military communication equipment and techniques; the leadership communication process. Leadership laboratory.

Class 2, Lab 1, Credit 3

**MMSM-403 Military Operations
Registration #0640-403**

A continuation of military skills training with emphasis on military intelligence/security, operations at the small unit level; staff functions and leadership laboratory; field training exercise.

Class 2, Lab 1, Credit 3

Fourth Year

MMSM-501 **Combined Arms Operations**
Registration #0640-501

The course introduces the student to the mission, organization, and capabilities of the branches of the Army. Discussions on the tactics of the air/land battle, advanced studies in U.S. and Soviet capabilities and tactics, U.S. NBC defense and U.S. Army intelligence and electronic warfare system; leadership laboratory.

Class 2, Lab 1, Credit 3

MMSM-502 **Military Administration and**
Registration #0640-502 **Logistic Management**

This course includes discussions and seminars on the Army training management system, military justice, supply and property accountability, maintenance management, officer-enlisted personnel management; leadership laboratory.

Class 2, Lab 1, Credit 3

MMSM-503 **Military Ethos**
Registration #0640-503

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

Class 2, Lab 1, Credit 3

MMSM-510 **Senior Seminar and Project**
Registration #0640-510

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

Class 2, Credit 2

AIR FORCE

IMAF-201,202,203 **Leadership Lab I**
Registration #0650-201,202,203

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

Credit 1

IMAF-210, 211,212 **The Air Force Today I, II, III**
Registration #0650-210,211,212

Course series on the basic characteristics of air doctrine; U.S. Air Force mission and organization; functions of U.S. strategic offensive, general purpose, and aerospace support forces; officership; and assessment of written communicative skills.

Credit 1

IMAF-301,302,303 **Leadership Lab II**
Registration #0650-301,302,303

Demonstrates commanding effectively in individual drill positions and flight formations, effective execution of cadet officer functions within parade ceremonies and squadron drill movements. Application of personal leadership to both military and civilian activities and comprehension of field training are covered.

Credit 1

IMAF-401,402,403, **Leadership Lab III, IV, V**
404,405,406,501,502,503
Registration #0650-401,402,403,
404,405,406,501,502,503

Advanced leadership experiences in officer activities gives students opportunity to apply principles learned in labs and courses. Orientation for active duty.

Credit 1

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

College of Business

Accounting

BBUA-301

Financial Accounting

Registration #0101-301

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

Credit 4

BBUA-302

Managerial Accounting

Registration #0101-302

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

Credit 4

BBUA-319

Legal Environment of Business

Registration #0101-319

An introduction to legal principles and their relationships to business organizations. This includes a review of the laws that govern their operations. This course will explore the background and origin of the U.S. legal system, its law enforcement agencies, and the legal procedures used by the government to enforce its laws. Representative topics will include environmental law, bankruptcies, regulatory law, consumer protection, labor relations. A substantial portion of the course will deal with contract law.

Credit 4

BBUA-320

Business Law

Registration #0101-320

This course explores in greater depth the implications of the Uniform Commercial Code to business operations. Representative topics covered include: sales, commercial paper, corporations, partnership, agency. Topical cases and examples are used to help the student grasp the business implications of the law and its nomenclature. (BBUA-319)

Credit 4

BBUA-408,409

Intermediate Accounting I, II

Registration #0101-408, 409

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

Credit 4

BBUA-431

Cost Accounting

Registration #0101-431

This course emphasizes the uses of cost data and cost reports for managerial decisions. Included are problems and procedures relating to job-order, process, standard cost systems, the techniques of overhead distribution, and various cost allocation techniques. The role of the controller's organization in the furnishing of accounting data and reports for managerial planning and control is emphasized. (BBUA-302, junior status)

Credit 4

BBUA-522

Tax Accounting I

Registration #0101-522

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

Credit 4

BBUA-523

Tax Accounting II

Registration #0101-523

A continuation of Tax Accounting I, emphasizing taxation of corporations and partnerships. Includes tax aspects of acquisitions and mergers, as well as international taxation. (BBUA-522, junior status)

Credit 4

BBUA-530

Auditing

Registration #0101-530

A study of the legal, ethical, and technical environment in which the auditor works. Current auditing theory, standards, procedures and techniques are studied. The audit process is studied to ascertain how it leads to the development of an audit opinion. (BBUA-409, junior status)

Credit 4

BBUA-540

Advanced Accounting

Registration #0101-540

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

Credit 4

BBUA-550

Accounting Theory

Registration #0101-550

A comprehensive study of the official pronouncements of the Accounting Principles Board and the Financial Accounting Standards Board. The course will examine alternative theories of accounting. (BBUA-409, senior status)

Credit 4

BBUA-554

Seminar in Accounting

Registration #0101-554

A seminar series covering selected topics in accounting, including management accounting, taxation, international accounting and accounting for non-profit organizations. Specific course topics to be announced when seminar is offered.

(BBUA-302, junior status)

Credit 4

Management

BBUB-011 **Freshman Seminar** **Registration #0102-011**

This course serves as an introduction to college life for College of Business freshmen. Students meet weekly in small groups with a facilitator. Individual sessions focus on getting to know RIT and the College of Business, self-discovery, establishing effective relationships, coping with stress, and other topics important to the group. The seminar is experiential by design and relies on the active participation of each student. Required of all freshmen in the College of Business.

Credit 0

BBUB-310,311 **Air Force Management and Leadership I, II** **Registration #0102-310,311**

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

Credit 5 each

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

BBUB-312 **Career Seminar** **Registration #0102-312**

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

Credit 2

BBUB-405 **Introduction to Work Organizations** **Registration #0102-405**

This course will introduce students to the concept of work organizations and how they function. Students will learn of the different industries in which work organizations fall and how to become and help others become effective members of organization through motivation, leadership, interpersonal conflict management, and stress handling. Additionally, the student will learn about the diverse workforce, social issues, and government regulation of work.

Credit 4 (This is a telecourse)

BBUB-410 **Small Business Management for Non-Business Majors** **Registration #0102-410**

An exploration of the basics of small business management with an emphasis on understanding the role of the small business owner. Major topics include: starting and operating a small business, small business marketing, financial and administrative controls, and governmental interactions with small business. (Junior status or equivalent)

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-432 **Comparative Management** **Registration #0102-432**

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

Credit 4

BBUB-438 **Business Ethics** **Registration #0102-438**

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

Credit 4

BBUB-455 **Human Resources Management** **Registration #0102-455**

An overview of the personnel and human resource function in both large and small organizations. The major topics studied include management of effective performance in relationship to employee selection, training and development, compensation, safety and health, performance evaluation, compensation systems, equal employment, and cultural diversity. Some emphasis is placed on the legal aspects of managing human resources. (BBUB-430, junior status)

Credit 4

BBUB-460 **Management and Leadership** **Registration #0102-460**

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

Credit 4

BBUB-462 **Management Development** **Registration #0102-462**

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

Credit 4

BBUB-490 Entrepreneurship**Registration #0102-490**

The focus of this course is the creation and growth of new ventures. Major topics include: evaluating business opportunities, franchising, the role of small business and entrepreneurship in the economy, problems associated with family firms, sources of financing, and the psychology of the entrepreneur. An integral part of the course will be the development, writing, and presentation of a business plan. (BBUB-430, BBUF-441, BBUM-463, and junior status)

Credit 4

BBUB-507 Business Environment**Registration #0102-507**

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

Credit 4

BBUB-515 Technology Management**Registration #0102-515**

The technological innovation process in management will be studied. Also internal and external factors that influence the rate, timing and success of industrial innovations. Technological innovation as a strategic tool to be used in confronting competition and also as a strategic challenge. Designed for advanced standing juniors and for seniors who may manage in a technology-intensive organization. (BBUB-430, BBUF-441, BBUM-463 and senior status. For non-College of Business students, consent of instructor)

Credit 4

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

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

Credit 4

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

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

Credit 4

BBUB-551 Strategy and Policy**Registration #0102-551**

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

Credit 4

BBUB-552 Business Policy for Food/Hotel/Travel Students**Registration #0102-552**

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

Credit 4

BBUB-554 Management Seminar**Registration #0102-554**

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

Credit 4

Economics

BBUE-405 Intermediate Microeconomics**Registration #0103-405**

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

Credit 4

BBUE-406 Intermediate Macroeconomics**Registration #0103-406**

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

Credit 4

BBUE-407 Managerial Economics**Registration #0103-407**

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

Credit 4 (not expected to be offered in the coming year)

**BBUE-408 Business Cycles and Forecasting
Registration #0103-408**

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

Credit 4 (not expected to be offered in the coming year)

**BBUE-424 International Economics
Registration #0103-424**

A study of the world economic system and the interrelationship between nations. The forces underlying international trade are examined, focusing on the principles of comparative advantage. International borrowing and lending, the exchange rate, balance of payments, the trade deficit, international commercial policy, tariffs, and trade restrictions are central topics. (GSSE-301, 302, junior status)

Credit 4

**BBUE-443 Recent Economic Policies
Registration #0103-443**

A seminar type course on recent monetary and fiscal policies in the United States. Topics will cover the economic background, nature and effects of the policies during the most recent 10-year period. (GSSE-301, 302, junior status)

Credit 4 (not expected to be offered in the coming year)

**BBUE-481 Money and Banking
Registration #0103-481**

Analysis of money, credit, and financial system. Banking operations and the money supply process. The business of commercial banking and the act of central banking. Central bank activities in relation to national and international monetary policies. (GSSE-301, 302, BBUA-301, junior status)

Credit 4 (not expected to be offered in the coming year)

**BBUE-554 Seminar in Economics
Registration #0103-554**

Investigation of advanced problems and policies in economics. Emphasis is on student reports and papers. (Junior status, permission of instructor)

Credit 4 (not expected to be offered in the coming year)

Finance

**BBUF-441 Corporate Finance
Registration #0104-441**

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

Credit 4

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

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

Credit 4

**BBUF-503 Financial Problems
Registration #0104-503**

An examination of problems encountered in many areas of corporate finance. The emphasis is on analytical and decision making techniques used to develop acceptable solutions. The case approach is used extensively. (BBUF-445, junior status)

Credit 4

**BBUF-504 International Finance
Registration #0104-504**

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

Credit 4

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

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

Credit 4

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

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

Credit 4

**BBUF-510 Financial Institutions
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. Primary emphasis on interest rate risk exposure. Also covers loan analysis and various financial policy issues. (BBUF-441, junior status)

Credit 4

**BBUF-525 Theory of Finance
Registration #0104-525**

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

Credit 4

**BBUF-554 Seminar in Finance
Registration #0104-554**

Course will be designed by individual instructor. (Varies by seminar content)(Permission of instructor, junior status)

Credit 4

Marketing

BBUM-463 Principles of Marketing **Registration #0105-463**

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

Credit 4

BBUM-482 Marketing through Retailers **Registration #0105-482**

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

Credit 4

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

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

Credit 4

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

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

Credit 4

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

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

Credit 4

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

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

Credit 4

BBUM-553 Sales Management **Registration #0105-553**

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

Credit 4

BBUM-554 Seminar in Marketing **Registration #0105-554**

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

Credit 4

BBUM-555 International Marketing **Registration #0105-555**

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

Credit 4

BBUM-557 Comparative Marketing **Registration #0105-557**

A study of marketing in selected foreign countries to acquaint the student with its functional role in various economic environments. Comparisons between geographic regions and cultural settings are explored. (BBUM-555, junior status)

Credit 4 (offered upon demand)

BBUM-560 Marketing Communications **Registration #0105-560**

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

Credit 4

BBUM-565 Advanced Marketing **Registration #0105-565 Research**

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

Credit 4 (offered upon demand)

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

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

Credit 4

Decision Sciences

BBUQ-330 Introduction to Data Analysis **Registration #0106-330**

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

Credit 4

**BBUQ-332 Applied Data Analysis
Registration #0106-332**

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

Credit 4

**BBUQ-334 Management Science
Registration #0106-334**

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

Credit 4

**BBUQ-353 Business Forecasting
Registration #0106-353**

An introduction to forecasting methods in business, with an emphasis on data-based, statistical techniques. Extensive use of MINITAB. (BBUQ-330)

Credit 4

**BBUQ-363 Systems Analysis and Design I
Registration #0106-363**

The system development process, with emphasis on the analysis of information and logical design of a system. Topics include: systems development life-cycle, the role of the systems analyst, systems analysis tools and techniques, system performance analysis and feasibility analysis. (ICSA-303)

Credit 4

**BBUQ-401 Operations Management
Registration #0106-401**

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

Credit 4

**BBUQ-406 Quality Control and Improvement
Registration #0106-406**

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

Credit 4

**BBUQ-408,409 Materials & Operations
Registration #0106-408,409 Planning & Control I, II**

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

Credit 4 each

**BBUQ-412 Inventory Management &
Registration #0106-412 Material Control**

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

Credit 4

**BBUQ-415 Purchasing Management
Registration #0106-415**

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

Credit 4

**BBUQ-444 Manufacturing Strategy and Tactics
Registration #0106-444**

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

Credit 4

**BBUQ-464 Systems Analysis and Design II
Registration #0106-464**

A continuation of the system development process, with focus on advanced design issues and an automated systems design tool. (BBUQ-363, junior status)

Credit 4

BBUQ-478 **Systems Simulation**
Registration #0106-478

The development of system models and their manipulation using simulation. Topics include: statistical review, sampling of random events, elementary queuing theory, data collection and analysis for simulation modeling and models validation. A special purpose simulation language, such as GPSS, will be used in team projects that simulate a production process. (BBUQ-330, ICSA-210, junior status)

Credit 4

BBUQ-505 **Information Systems**
Registration #0106-505

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

Credit 4

BBUQ-540 **Microcomputer Hardware**
Registration #0106-540 **and Applications**

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

Credit 4

BBUQ-553 **Information Systems Management**
Registration #0106-553

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

Credit 4

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

The course content depends on the instructor and quarter when offered. Specific content for a particular quarter will be announced prior to course offering. (Permission of instructor)

Credit 4

College of Continuing Education

Business and the Arts

Accounting

CBCA-201

Registration #0201-201

Emphasis is placed on analyzing and recording business transactions, and understanding the results of these transactions. Preparations of basic financial statements required by any business are included.

Credit 4

CBCA-203

Registration #0201-203

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

Credit 4

CBCA-308,309

Registration #0201-308,309

Designed to broaden understanding of accounting practices and improve skills in gathering, analyzing, reporting, and evaluating accounting theory and concepts as they relate to business problems. (CBCA-203)

Credit 4/Qtr.

Business Law

CBCB-301

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

Registration #0202-302

Continuation of CBCB-301 includes law agency, partnerships, corporations, insurance and bankruptcy. Also presents survey of commercial paper, secured transactions, and bank deposits.

Credit 4

CBCB-310

Registration #0202-310

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

Credit 4

Financial Accounting

Managerial Accounting

Intermediate Accounting I & II

Business Law I

Business Law II

Legal Environment of Business

CBCB-335

Registration #0202-335

Introductory course in international business law that covers both the international aspects of traditional business law subjects (sales, commercial paper, corporate law, agency, etc.) as well as those subjects generally considered to be more "environmental" in nature (antitrust law, administrative law, ethics, trade regulation, employment law, criminal law, ecological concerns, etc.).

Credit 2

International Law

Data Processing and Systems Analysis

CBCC-321

Registration #0203-321

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

Credit 4

Data Processing Principles

CBCC-322

Registration #0203-322

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

Credit 4

Data Processing Systems

Finance

CBCD-204

Registration #0204-204

The main objective of this course is to enable you to manage your personal finances more effectively. The course deals with personal budgeting, protection of personal assets, consumer credit, investments, and estate planning.

Credit 4

Personal Financial Management

CBCD-334

Registration #0204-334

An introductory course that leads students to an understanding of international trade, banking, and finance, using microeconomic analysis and a number of relevant examples, both hypothetical and real world. Provides students with an understanding of the theoretical principles of international trade, the function(s) of international financial systems, and the mechanics of international lending. Additionally, the course will explore the benefits of specialization, and conversely, the roadblocks to free enterprise created by various trade policies. This course is an elective for the International Business and Culture Certificate.

Credit 2

International Money, Banking and Finance

General Management

CBCE-200,201, 202 The Management Process **Registration #0205-200,201,202**

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

Credit 4/Qtr. (12 total)

CBCE-203 Organization and Management **Registration #0205-203**

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

Credit 4

CBCE-305 Customer Relations Systems **Registration #0205-305**

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

Credit 4

CBCE-306 Customer Service Technology **Registration #0205-306**

An overview and analysis of technological systems for handling goods and information quickly and cost effectively to maximize customer satisfaction.

Credit 4

CBCE-325 Doing Business in International Markets **Registration #0205-325**

This course provides an orientation to conducting business successfully in the global marketplace. Emphasized are manufacturing, management, marketing, sales, technology transfer, transportation of goods, and those factors that influence commerce in world markets. The course will also introduce the environmental framework of labor, finance, international regulations, competition, cooperative agreements and arrangements, and relevant political and cultural factors. This course is required in the International Business and Culture Certificate.

Credit 4

CBCE-353 Management Science **Registration #0205-353**

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

Credit 4

CBCE-298,398 Special Topics: Management **Registration #0205-298,398**

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

Credit Variable

Small Business Management

CBCE-221 New Venture Development **Registration #0205-221**

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

Credit 4

CBCE-222 Small Business Management 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**

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

Credit 4

Health Care Management

CBCF-310 Survey of Health Care Systems **Registration #0206-310**

An overview of the development, structure, and current forces transforming the health care system. Topics will include the status of the national and regional populations, physician practice and payment, private and government health insurance, the impact of medical technology, manpower issues, hospital services and reimbursement systems, ambulatory care and alternative delivery systems, and mental health and long-term care. (Previous experience or coursework in health care and permission of chair)

Credit 4

**CBCF-320 Health Systems Administration
Registration #0206-320**

A survey of administration in health care facilities focusing on the application of general management principles in the unique health care environment. Issues such as organizational structures, planning and performance monitoring, personnel management, finance and the respective roles of medical professional and administrator in managing the facility will be discussed. (CBCF-310 or previous experience or coursework in health care and permission of chair)

Credit 4

**CBCF-351 Health Care Economics and Finance
Registration #0206-351**

This course will provide a knowledge of the efficiency, effectiveness, and equity of the new economics of health care, and a conceptual and practical knowledge of health care finance, including sources of funding, accounting and reporting, and the influence of third-party payers. No previous work in economics is assumed. (CBCF-310 or 320)

Credit 4

**CBCF-421 Legal Aspects of Health
Registration #0206-421 Care Administration**

An overview of statute and regulation as they apply to the health care field. Topics include an overview of the American legal system, licensure of institutions, licensure and discipline of practitioners, physician-patient relationship, reproductive issues, the right to die, organ donations, medical records, legal liability, malpractice, and labor law. (CBCF-310 or 320)

Credit 4

**CBCF-431 Health Care Quality Assurance
Registration #0206-431**

An introduction to quality assurance in health care. Course will explore past and current definitions of quality and competing concepts of quality assurance; will review existing quality assurance requirements and accrediting organizations, federal and state agencies, and third party payers; will describe and explain quality assurance methods and tools and their application in various settings. (CBCF-310 or 320)

Credit 4

**CBCF-441 Health Planning and Program Development
Registration #0206-441**

A review of the methodology of planning effectively for health care services. The use of data systems, forecasting, and identifying and analyzing problems is explored, along with the process of strategic planning, setting priorities, developing projects, and allocating resources. Students will prepare actual applications for new programs to regulatory agencies. (CBCF-351)

Credit 4

Marketing

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

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

Credit 4

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

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

Credit 4

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

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

Credit 4

**CBCG-333 International Advertising
Registration #0207-333 and Public Relations**

An examination of the various elements that must be considered when embarking on a marketing support program for products or services in countries outside the continental United States. The course will follow the traditional domestic path of marketing support activities of advertising and public relations but will identify the important differences that occur when following that path in international markets. Further, the course will provide experience in methods for dealing with these differences. Major areas of study will include standardization of localization, agency operations, international language or culture considerations, media planning and analysis, international communication, the processes and production of marketing plans, and strategy selection. This course is an elective for the International Business and Culture Certificate.

Credit 2

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

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

Credit 4

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

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

Credit 4

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

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

Credit Variable

Mathematics and Statistics for Business

CBCH-201,202 Mathematics for Business Registration #0208-201,202

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

Credit 4/Qtr.

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

CBCH-351,352 Business Statistics Registration #0208-351,352

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

Credit 4/Qtr.

Personnel Administration

CBCI-224 Interviewing Techniques Registration #0209-224

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

Credit 4

CBCI-225 Recruiting, Training and Supervising Registration #0209-225 Service Industry Personnel

This course examines problems and solutions related to establishing realistic and attractive wages and career paths for employees in service sector businesses. In addition, it explores motivation, training and communication techniques that lead to the kind of quality performance required in service industries and organizations to optimize customer satisfaction.

Credit 2

CBCI-229 Personnel Administration Registration #0209-229

An introduction to personnel administration including an overview and discussion of employment, equal employment opportunity, job evaluation, training, performance appraisal, compensation, benefits, personnel planning, labor relations, and other related topics.

Credit 4

Production Management and Industrial Engineering

CBCJ-209 Production Management Registration #0210-209

The organization of production functions with emphasis on management responsibilities. All levels of factory operation are discussed and relationships between various aspects of production are presented.

Credit 4

CBCJ-305 Fundamentals of Industrial Engineering Registration #0210-305

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

Credit 4

CBCJ-306 Industrial Engineering Economy Registration #0210-306

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

Credit 4

CBCJ-332 International Standards Registration #0210-332

As the marketplace becomes increasingly oriented toward the international exchange of goods and services, the International Organization of Standards continues to develop a set of quality standards assuring that goods and services produced by a supplier are capable of meeting the requirements of customers around the globe. This course will address the emerging developments of international standards in terminology and quality standards. It will also consider manufacturing standardization in such industries as telecommunications and electronics. This course is an elective for the International Business and Culture Certificate.

Credit 2

Logistics and Transportation Management

CBCL-234 Introduction to Logistics Registration #0212-234 and Transportation

Overview of the transportation and logistics industry as a vital part of the nation's social and economic structure. Introduces basic understanding of the functional areas of logistics management and their interrelationships. The purchase and use of transportation services as related to the firm's logistical mission is emphasized.

Credit 4

CBCL-239 Traffic and Transportation Law, Registration #0212-239 Rates, Accounting and Control

Introduces the role of government in the transportation industry. The evolution of past and current regulatory and promotional policies is explored. The determination and utilization of freight rates are examined. Various methods to forecast and control transportation costs also are discussed.

Credit 4

**CBCL-241 International Logistics and Transportation
Registration #0212-241**

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

Credit 4

**CBCL-331 International Trade: Importing and Exporting
Registration #0212-331**

This course introduces students to the logistics, cultural systems, and transportation systems and regulations necessary to transact economic trade throughout the world. Topics include documentation procedures, regulations, related services, and techniques used to reduce the costs of international trade. This course is an elective for the International Business and Culture Certificate.

NOTE: Not for Logistics and Transportation Management majors

Credit 2

Real Estate

**CBCM-201 Basic Real Estate Principles: Salesperson's Course
Registration #0213-201**

Comprehensive study of real estate principles including: law of agency, human rights and fair housing, real estate instruments, financing, valuation and listing, contracts, license law and ethics, closings, land use regulations, and real estate math. Completion of this course satisfies the NYS educational requirement for a real estate salesperson's license. For licensure, participants must meet 90% attendance (40 1/2 hours) requirement and pass the final exam. Individuals interested in licensure only should call 475-5079.

Credit 4

**CBCM-202 Advanced Real Estate Principles: Broker's Course
Registration #0213-202**

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 meet 90% attendance (40 1/2 hours) requirement and pass the final exam. Individuals interested in licensure only should call 475-5079.

Credit 4

**CBCM-203 Real Estate Investment and Finance
Registration #0213-203**

An introduction to real estate investment with emphasis on the purchase and sale of real estate, the acquisition of financing, the selection of appropriate ownership forms, and the use of statistical data in making real estate decisions.

For license renewal this course is approved by NYS Department of State as a 30-hour course with exam.

Credit 4

**CBCM-212 Residential Properties Management
Registration #0213-212**

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

Credit 4

Interdisciplinary Studies

**CIDA-220 Careers and Credits
Registration #0220-220**

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

Credit 2

**CIDA-501 Honors Seminar
Registration #0220-501**

Creative critical thinking and problem solving: an interdisciplinary approach to the generation and evaluation of ideas and solutions. Includes analysis of the conditions limiting creativity and the development of a "tool kit" of strategies and techniques for discovering, inventing, and assessing new, unique, and useful ideas, applications, and solutions. Applicable to a range of life and work situations, from complex environmental concerns to competitive business challenges to family disputes.

Credit 4

Ceramics

**CHAC-201 Introduction to Ceramics
Registration #0222-201**

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

Credit 2

**CHAC-211 Intermediate Ceramics
Registration #0222-211**

An exploration of Japanese wheel-throwing techniques. Students will work with raku stoneware and porcelain, using methods and tools common to Japanese potters. Class projects will concentrate on production techniques with special emphasis being given to glazing and firing procedures. (CHAD-201 or equivalent)

Credit 2

CHAC-301 Advanced Ceramics**Registration #0222-301**

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

Credit 2

CHAC-240 Ceramic Wheel-Throwing Techniques**Registration #0222-240**

A broad survey of wheel-throwing skills with an emphasis on developing the student's ability to create well-designed, functional wares.

Credit 2

CHAC-243 Porcelain Techniques**Registration #0222-243**

An intensive introduction to porcelain with an emphasis on Japanese techniques of throwing, finishing and glazing. Basic wheel-throwing skills are required.

Credit 2

CHAC-245 Earthenware Techniques**Registration #0222-245**

An intensive introduction to earthenware with an emphasis on exploring the characteristics of unglazed, functional and sculptural forms.

Credit 2

CHAC-295 Independent Study: Ceramics**Registration #0222-295**

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

Credit Variable

CHAC-298 Special Topics: Ceramics**Registration #0222-298**

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

Credit Variable

Design**CHAD-201,202,203 Basic Design****Registration #0223-201,202,203**

Study of basic elements of design: line, shape, texture, color, space and their incorporation in design principles as applied to two- and three-dimensional design problems including the graphic arts.

Credit 2/Qtr.

CHAD-211,212,213 Display Design**Registration #0223-211,212,213**

First quarter examines the fundamentals of three-dimensional design. The second and third quarters apply these principles to develop mechanical, graphic and model making manipulative skills and problem solving approaches used by designers in space planning. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience)

Credit 2/Qtr.

CHAD-215, 216,217 Rendering Techniques**Registration #0223-215,216,217**

This course will introduce students to the materials and techniques used by designers in rendering interiors, layouts, products, etc. Marker sketching, perspective, shadowing, media selection, and presentation techniques will be covered. Suggested for all design students. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalent)

Credit 2/Qtr.

CHAD-220 Art for Reproduction**Registration #0223-220**

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

Credit 3

CHAD-224,225 Interior Design**Registration #0223-224,225**

Career orientation. Emphasis on practical aspects of the profession. Details of purchasing all furnishings used in a home. Client centered planning and design. (CHAF-201, 202, 203; CHAD-201, 202, 203 or equivalent)

Credit 2/Qtr.

CHAD-226 History of Interior Design**Registration #0223-226**

Historical survey of period decoration and furniture styles from antiquity to the present.

Credit 2

CHAD-227 Business Aspects of Environmental Design**Registration #0223-227**

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

Credit 2

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

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

Credit 2

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

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

Credit 2

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

The study of enclosed space, using material and the elements of design, line form, texture, and color to develop living space. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent experience)

Credit 2/Qtr.

CHAD-260 Marker Rendering Techniques
Registration #0223-260

Students will be introduced to marker techniques and materials used in rendering layouts, interiors, products and illustrations. Other mediums will be united with marker to develop shadow and highlighting, sketching and presentation techniques.

Credit 2

CHAD-261,262,263 Advanced Design and Typography
Registration #0223-261,262,263

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

Credit 2/Qtr.

CHAD-270 Graphic Communication
Registration #0223-270 for the Non-Artist I

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

Credit 3

CHAD-271 Graphic Communication
Registration #0223-271 for the Non-Artist II

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

Credit 3

CHAD-301,302 Advertising
Registration #0223-301,302

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

Credit 4/Qtr.

CHAD-311,312,313 Graphic Design
Registration #0223-311,312,313

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

Credit 2/Qtr.

CHAD-315,316,317 Advertising Design
Registration #0223-315,316,317

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

Credit 2/Qtr.

CHAD-360 Portfolio Workshop
Registration #0223-360

A workshop designed to help students take what they have learned in art classes (or work situations) and prepare and present a portfolio. Students will produce a resume and cover letter appropriate to their career goals. Projects will be tailored to the needs of individual students, allowing them to compile an accurate representation of their skills in a concise, positive, and beneficial manner. Visits from prominent people in the field showing their work and sharing their experiences.

Credit 2

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

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

Credit Variable

CHAD-298,398 Special Topics: Design
Registration #0223-298,398

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

Credit Variable

Drawing

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

An intense study of the fundamentals of drawing and application of media, designed to develop a flexible, creative mind capable of interpreting ideas. Specific emphasis is placed on problems confronting the student who has had little or no drawing experience.

Credit 2/Qtr.

CHAF-207 **Basic Figure Drawing**
Registration #0224-207

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

Credit 2

CHAF-210 **Interpretive Landscape 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

CHAF-306 **Advanced Drawing**
Registration #0224-306

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

Credit 2

CHAF-307 **Figure Drawing**
Registration #0224-307

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

Credit 2

Painting

CHAF-211 **Introduction to Painting**
Registration #0224-211

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

Credit 2

CHAF-301 **Painting**
Registration #0224-301

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

Credit 2

CHAF-227 **Figure Painting**
Registration #0224-227

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

Credit 2

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

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

Credit 2

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

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

Credit 2

Sculpture

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

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

Credit 2

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

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

Credit 2

Illustration

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

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

Credit 2

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

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

Credit 3

CHAF-230**Collage****Registration #0224-230**

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

Credit 2

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

This course will introduce students to either the Foundational or Italic form of lettering. Students will explore the history, theory, and techniques that have shaped letter forms as we know them today. Emphasis will be on developing skills and knowledge through the study of historic and contemporary forms as well as through the use of a variety of tools and materials. Areas to be studied include majuscules, minuscules, rhythm, spacing, techniques, media, color, design, page layout, and either the mechanics of bookbinding or camera ready art.

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. (CHAF-201, 202, 203 and CHAD-201, 202, 203 or equivalent)

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. (CHAF-296)

Credit 2

CHAF-295**Independent Study: Fine Arts****Registration #0224-295**

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

Credit Variable

CHAF-298**Special Topics: Fine Arts****Registration #0224-298**

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

Credit Variable

Metalcrafts and Jewelry**CHAM-201****Introduction to Metalcrafts and Jewelry****Registration #0225-201**

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

Credit 2

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

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

Credit 2

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

For advanced students in the arts and 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, four-harness loom techniques, finishing, designing, drafting and color effects. May be elected more than once for credit.

Credit 2

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

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

Credit 2

**CHAT-301 Advanced Weaving
Registration #0226-301**

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

Credit 2

**CHAT-295 Independent Study: Weaving/Textiles
Registration #0226-295**

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

Credit Variable

**CHAT-298 Special Topics: Weaving/Textiles
Registration #0226-298**

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

Credit Variable

Woodworking

**CHAW-201 Introduction to Woodworking
Registration #0227-201**

Elementary problems in choice of woods, joinery, finishing, use and care of hand tools, and basic procedures in machine woodworking. Suggested introductory project: Construct a dovetailed box from a hardwood with hand cut dovetails. May be elected more than once for credit. Class limited to 20 students.

Credit 2

**CHAW-211,212, 213 Intermediate Woodworking
Registration #0227-211,212, 213**

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

Credit 2/Qtr.

**CHAW-301 Advanced Woodworking
Registration #0227-301**

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

Credit 2

**CHAW-295 Independent Study: Woodworking
Registration #0227-295**

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

Credit Variable

**CHAW-298 Special Topics: Woodworking
Registration #0227-298**

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

Credit Variable

International Studies

**CHGI-211 Chinese Language and Culture:
Registration #0233-211 China and the Chinese People**

Introduces basic Chinese culture as well as 100 daily conversational sentences. The emphasis in this quarter will be on Chinese culture characteristics, traditional philosophies and religions, beliefs, family structure, political life, economic system and trade practices, especially when these impact on contemporary practices.

Credit 4

**CHGI-212 Chinese Language and Culture:
Registration #0233-212 Communism Ideology and Practice**

Continues an introduction to basic Chinese culture as well as 100 daily conversational sentences. This quarter's emphasis is on the special features of Chinese communism, their trade ideologies and practices, their general relationships with foreign countries, internal developments and conflicts.

Credit 4

**CHGI-213 Chinese Language and Culture:
Registration #0233-213 Contemporary Issues**

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

Credit 4

CHGI-221 **Japan: The Changing Tradition**
Registration #0233-221

What are the foundations of Japan's economic and technological success? This course considers the economy, government, and society of modern Japan and traces its emergence from the first contacts with the West in the 1500s to its present position as a leading economic power. This course may serve as a social science elective.

Credit 4

Deaf Studies

CHGD-211 **Sign Language & Manual**
Registration #0234-211 **Communications: System I**

Develops fluency at a basic level. This course includes introduction and practice of approximately 300 basic signs, theoretical consideration and practice of grammatical features of sign language, fingerspelling and sociolinguistic information regarding the appropriate application of manual communication skills in communicating with deaf persons.

Credit 2

CHGD-212 **Sign Language & Manual**
Registration #0234-212 **Communications: System II**

A continuation of conversational signing skill development. The course includes 300 additional basic signs, continued practice with the grammatical features of sign language, fingerspelling practice, and further sociolinguistic information regarding the appropriate use of manual communication skills between deaf and hearing persons. (CHGD-211 or equivalent sign skill)

Credit 2

CHGD-213 **Sign Language & Manual**
Registration #0234-213 **Communications: System III**

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

Credit 2

CHGD-241 **Aspects & Issues of Deafness I**
Registration #0234-241

Develops knowledge and understanding of the effects of hearing impairment, particularly with regard to the audiological, psychological, educational and vocational implications. Class activities include a simulated deafness experience, films, lectures and discussions.

Credit 3

CHGD-242 **Aspects & Issues of Deafness II**
Registration #0234-242

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

Credit 3

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

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

Credit 2

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

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

Credit 2

Humanities

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

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

Credit 4

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

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

Credit 4

CHGH-203 **Humanities**
Registration #0235-203

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

Credit 4

CHGH-207 **American Politics**
Registration #0235-207

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

Credit 4

CHGH-210 Introduction to Art Appreciation**Registration #0235-210**

Examines the elements involved in the creation of the visual arts (painting, sculpture, architecture) and the factors that affect audience response (line, color, texture, rhythm). Particular emphasis given to historical perspectives and organic unity.

Credit 4

CHGH-230 Introduction to Music Appreciation**Registration #0235-230**

A study of the elements of music (rhythm, melody, harmony), of different musical styles, and of music in the context of history. Emphasized topics include major musical periods (Rococo, Baroque, Classical, Romantic and Modern). Major composers considered are: Bach, Vivaldi, Handel, Mozart, Haydn, Beethoven, Brahms, Chopin, Tchaikovsky, Liszt, Dvorak, Stravinsky and Copeland.

Credit 4

CHGH-260 Introduction to Literature**Registration #0235-260**

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

Credit 4

CHGH-270 Introduction to Philosophy**Registration #0235-270**

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

Credit 4

CHGH-359 Contemporary Moral Problems**Registration #0235-359**

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

Credit 4

CHGH-323 Modern Europe**Registration #0235-323**

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

Credit 4

CHGH-326 Modern America**Registration #0235-326**

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

Credit 4

CHGH-340 Values and Experience**Registration #0235-340**

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

Credit 4

CHGH-341 Symbols, Behavior, Culture and Technology**Registration #0235-341**

A study of symbol and sign systems, emphasizing principles and rules that underlie linguistic behavior. Examines the ways in which behavior reflects and influences culture, and the ways in which miscommunication results from technical, behavioral and cultural factors. This is a science, technology and humanities elective.

Credit 4

CHGH-342 Dimensions of Science**Registration #0235-342**

A survey and exploration of the impact of science on, and its interactions with, other elements of civilization, such as literature, technology, politics, philosophy, the arts, and human values. This is a science, technology and humanities elective.

Credit 4

CHGH-298 Special Topics: Humanities**Registration #0235-298**

Experimental lower-division courses will be offered under this number, titles will appear in each quarter's course listing.

Credit Variable

Communications

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

CHGL-120 Basic Communications**Registration #0236-120**

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

CHGL-204 Dynamic Communications I**Registration #0236-204**

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

Credit 4

CHGL-205 **Dynamic Communications II**
Registration #0236-205

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

Credit 4

CHGL-220 **Communications**
Registration #0236-220

This course consolidates the objectives and content of Dynamic Communication I, CHGL-204, and Dynamic Communications II, CHGL-205. (Requires Pre-test)

Credit 4

CHGL-240 **Interpersonal Communication Skills**
Registration #0236-240

Knowing when to speak, what to say, and how to say it is a prime asset for achieving success in many areas of our lives. This course focuses on techniques for communicating successfully in career, social, and personal interactions. Topics include assessing communication situations, clarifying ideas, listening, persuading, and managing conflicting viewpoints.

Credit 2

CHGL-301 **Professional Presentations**
Registration #0236-301

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

Credit 4

CHGL-302 **Discussion Skills and Leadership**
Registration #0236-302

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

Credit 4

CHGL-307 **Communicating in Business**
Registration #0236-307

This course focuses on the development of those communication skills essential to functioning effectively in the business world. Students learn the process of analyzing communication situations and responding to them appropriately. Topics include reports, memos, letters, oral presentations, and interpersonal skills. (CHGL-205, 220 or equivalent)

Credit 4

CHGL-308 **Technical Report Writing**
Registration #0236-308

Students learn to prepare reports of the sort required by practicing engineers and managers in industry and business. Focus is on developing the ability to analyze audiences and purposes, state problems, design reports, and write and edit them. Assigned reports are discussed and critiqued by peers and instructor. (CHGL-205, 220 or equivalent)

Credit 4

CHGL-315 **Report Writing**
Registration #0236-315

Principles of organizing information into clear, concise reports; techniques for oral technical reports, letters, and memos included. (Formerly CTEF-328)

Credit 2

CHGL-323 **Technical Writing and Editing**
Registration #0236-323

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

Credit 4

CHGL-324 **Research Techniques**
Registration #0236-324

This course focuses on techniques for information generation. Interviewing skills, review and use of literature, and task analysis are included.

Credit 2

CHGL-325 **Instructional Design Principles**
Registration #0236-325

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

Credit 2

CHGL-326 **Document Design**
Registration #0236-326

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

Credit 2

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

With supervision, students apply general principles of technical communication to the process of planning, researching, writing, editing, formatting, and producing a finished manual. (CHGL-323 and 324)

Credit 2

CHGL-328 **Writing for the Sciences**
Registration #0236-328

This course reviews conventions used in presenting the results of scientific investigation in articles for trade journals, general news magazines, textbooks, and proceedings. Includes practice in researching, selecting, and organizing content, citing and verifying references, and preparing manuscripts. (CHGL-220 or equivalent)

Credit 2

CHGL-329 **Oral Skills for Technical Communication**
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 advertising copy. (CHGL-205, 220 or equivalent)

Credit 2

CHGL-332 **Managing the Project**
Registration #0236-332

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

Credit 2

CHGL-333 **Managing Media Presentations**
Registration #0236-333

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

Credit 2

CHGL-340 **Interpersonal Communication**
Registration #0236-340 **for Customer Service**

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

Credit 4

CHGL-360 **Introduction to Public Relations**
Registration #0236-360

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

Credit 2

CHGL-365 **Writing for the Organization I**
Registration #0236-365

Course is designed for non-professional writers whose positions frequently require preparation of public relations correspondence as well as copy for inbound and outbound company publications. Emphasis is on developing clarity, precise use of language, and style in writing letters, reporting information, and creating feature articles. (CHGL-220 or equivalent)

Credit 2

CHGL-366 **Writing for the Organization II**
Registration #0236-366

Introduction to public relations writing at the corporate level, including planning, writing, and producing documents and publications intended to interpret the organization both internally and externally. Provides practice in writing a variety of news and feature copy, including crisis communication, covering meetings, adapting interviews for print, and statements for various media. (CHGL-365 or equivalent)

Credit 2

CHGL-367 **Scripting and Speechwriting**
Registration #0236-367

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

Credit 4

CHGL-393 **Creative Leadership Skills**
Registration #0236-393

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

Credit 4

CHGL-394 **Supervising Communication Services**
Registration #0236-394

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

Credit 4

**CHGL-395 Coordinating Publications Production
Registration #0236-395**

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

Credit 2

**CHGL-396 Communication Seminar
Registration #0236-396**

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

Credit 2

**CHGL-298,398 Special Topics: Communications
Registration #0236-298,398**

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

Credit Variable

**CHGL-411 The Public Relations Campaign
Registration #0236-411**

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

Credit 4

**CHGL-412 Communicating in Print
Registration #0236-412 and Broadcast Media**

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

Credit 4

**CHGL-413 Seminar in Public Relations:
Registration #0236-413 Cases and Solutions**

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

Credit 4

Social Sciences**CHGS-201 Anthropology: Introduction
Registration #0237-201**

Examines the similarities and differences among cultures. The course focuses particularly on the influences of environment, technology, work, authority, kin and non-kin groups, enculturation, religion, folklore, and art in different societies.

Credit 4

**CHGS-211 Psychology: Introduction
Registration #0237-211**

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

Credit 4

**CHGS-221 Principles of Economics I
Registration #0237-221**

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

Credit 4

**CHGS-222 Principles of Economics II
Registration #0237-222**

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

Credit 4

**CHGS-223 Principles of Economics III
Registration #0237-223**

A further elaboration of the elementary principles of economic analysis introduced in Principles of Economics I (macro-economics) and II (micro-economics). Particular emphasis will be placed on the application of these principles to the decision-making process of business and industry, domestically and internationally. (CHGS-221 and CHGS-222)

Credit 4

CHGS-227 **The New Service Economy**
Registration #0237-227

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

Credit 2

CHGS-231 **Sociology: Foundations**
Registration #0237-231

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

Credit 4

CHGS-261 **Political Science: Introduction**
Registration #0237-261

Introduces the discipline of political science. It is designed to acquaint students with the complexities of political issues, political thought and behavior, government structures and processes, public policy, and international affairs.

Credit 4

CHGS-316 **Psychology: Behavior in Industry**
Registration #0237-316

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

Credit 4

CHGS-317 **Psychology or Stress and Adjustment**
Registration #0237-317

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

Credit 4

CHGS-320 **Psychology of Persuasion**
Registration #0237-320

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

Credit 2

CHGS-326 **Communicating Across Cultures**
Registration #0237-326

Communicating across cultures is about managing differences between distinct ways of life and finding common bases for interaction. Each individual's behavior is rooted in the cultural experience of locale, region, and country. During international business travel, the individual will encounter profound cultural differences. How to decipher variations in dress, demeanor, body language, interpersonal and social behavior, and material things in business and social contexts is the subject of this course. How to apply these insights about diversity in a successful accommodation to various host countries is the primary objective of this course. This course is required in the International Business and Culture Certificate.

Credit 4

CHGS-327 **International Economic**
Registration #0237-327 **Policies and Principles**

This course will assist students in preparing to work effectively in both domestic and international economic settings. Emphasis will include policies and principles associated with macroeconomic effects of trade, international monetary instruments, and the economics of major nations and regions of the world. This course is required in the International Business and Culture Certificate.

Credit 4

CHGS-331 **Cultural Diversity: America's**
Registration #0237-331 **Trial and Treasure**

A course designed to inform and stimulate students' understanding of what it will mean to live and work in a society in which ethnic and cultural diversity is the norm. Students will learn the sources and risks of diversity as well as strategies for coping with the effects of their own cultural ethnocentrism and that of others. Learning activities will include media, case studies and a variety of interactive processes.

Credit 4

CHGS-341 **Doing Business in the**
Registration #0237-341 **European Economic Community**

An overview of the evolutionary roots of the Common Market in Europe with a view of both the history of that institution and the forces that compel the EEC trends of today. The course looks at each country in the EEC and notes some of the economic and political features of the agreement and some of the issues, problems and possibilities. Included also will be a review of the changes in Eastern Europe (e.g., German reunification) and the likely effects on the European economic scene. This course is an elective for the International Business and Culture Certificate.

Credit 2

CHGS-342 **Doing Business in Germany**
Registration #0237-342

This course is designed to give students an understanding of German society and culture in general and of German business customs, practices, and attitudes specifically. Its emphasis is on the study of the environment in which business transactions take place in Germany. This course is an elective for the International Business and Culture Certificate.

Credit 2

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 an 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-231,232,233 **Portrait Photography**
Registration #0231-231,232, 233

A foundation course in portraiture, including concepts and psychology of portraiture and the use of professional cameras and studio equipment through lectures, demonstrations, and assigned projects. Stress is placed on understanding facial types and on the appropriate use of light. It is recommended that students who enroll in this course also schedule Portrait Retouching CHGP-331, 332, 333. (CHGP-201, 202, 203 or equivalent)

Credit 3/Qtr.

CHGP-241,242,243 **Commercial Photography**
Registration #0231-241,242, 243

Materials, equipment and techniques with emphasis on the solution of problems in commercial photography. It is recommended that students who enroll in this course also schedule Commercial Retouching, CHGP-321, 322, 323. (CHGP-201, 202, 203 or equivalent)

Credit 3/Qtr.

CHGP-301,302 **Motion Picture Photography**
Registration #0231-301,302

Designed for the amateur, the school teacher and those interested in basic film production. Included will be scripts and story boards, composition, continuity, cutting, editing, sound and presentation.

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, abrasives and dyes. Last quarter includes Ektacolor negatives and major correction of anatomical features.

Credit 1/Qtr.

CHGP-351 **Industrial Photography:**
Registration #0231-351 **Instrumentation**

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

Credit 3

CHGP-352 **Industrial Photography:**
Registration #0231-352 **Audiovisual Techniques**

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

Credit 3

CHGP-353 **Industrial Photography:**
Registration #0231-353 **Special Topics**

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

Credit 3

CHGP-361,362 **Law Enforcement'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 registration. (CHGP-211, 212, 213 or equivalent)

Credit 3

CHGP-401,402,403 **Fashion Photography**
Registration #0231-401,402,403

A course designed to expand the photographer's vision and awareness of the problems of fashion photography. Emphasis on sensitivity to light, the beauty of the model, and, most important, on the development of the student's personal taste in expressing the inherent qualities of the garment. Students should bring to first class examples of past work, whether or not it be fashion photography. (CHGP-201, 202, 203 or equivalent)

Credit 3/Qtr.

CHGP-404,405,405 **Architectural Photography**
Registration #0231-404, 405, 406

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

Credit 3/Qtr.

CHGP-411 **Photography of the Natural World**
Registration #0231-411

Through lectures, field trips, class discussions, and critiques, the student is offered an opportunity to develop an awareness and sensitivity to the beauty of the natural world. There are a number of field trips scheduled to areas such as Letchworth Park, Bergen Swamp, Sapsucker Woods and other appropriate locations. Transparency materials are exclusively in the 35mm format. The student is expected to have his or her own camera, light meter and some type of close-up accessory. May be elected twice for credit. (CHGP-201, 202, 203 or equivalent)

Credit 4

CHGP-431,432,433 **Photographic Communication**
Registration #0231-431,432,433

Photography for people in action situations. The decisive moment and "candid" pictures. Picture stories and sequences. Effective use of available light. Historical perspectives. Use of writing and captions in conjunction with photographic images. Shooting and printing portion of the assignments to be completed outside of class time.

Credit 2/Qtr.

CHGP-295, 298 **Photographic Vision I and II**
Registration #0231-295,298

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

Credit 1 (-295)

Credit 2 (-298)

Photographic Science

CHGR-207, 208,209 **Fundamentals of**
Registration #0238-207,208,209 **Photographic Science**

Principles of sensitometry, photographic chemistry and applied photography. Subject areas include densitometers, sensitometers, logarithms, characteristic curves and photographic response relationships. General emulsion and photographic processing chemistry formulations, time-temperature relationship, chemical balance and process control. The view camera and its use, perspective, depth of field, lighting and proper metering techniques, filters, flash and photography as a pictorial and a scientific instrument. (A background in algebra and trigonometry is suggested)

Credit 4/Qtr.

CHGR-217,218,219 (Lec.) **Photographic Chemistry**
CHGR-224, 225,226 (Lab)
Registration #0238-217,218,219,224,225,226

This course will provide the student with an understanding of the chemical basis of photography necessary to the continued study of photographic science and with a systematic study of the manufacture and properties of silver halide photographic emulsions and processing solutions. Specific topics will be: formation and growth of silver halide crystals; chemical and spectral sensitization; addenda and coating; latent image theory and application of conventional and diffusion transfer processing; comparisons and silver halide and non-silver photographic systems. The course will assume only an introductory knowledge of chemistry, yet science or engineering graduates entering photographic research or involved in other areas of photographic technology will find in the course a basis for their work and for further study. The lecture may be taken by itself. (CHGR-201, 202 and 203 and CHGR-207, 208 or equivalent)

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

CHGR-227,228,229 **Black and White Sensitometry**
Registration #0238-227,228,229

The relation of photographic density to exposure in a light-sensitive silver halide emulsion, including radiation source, exposure measuring devices, sensitometers, chemical development and processing, D-Log curves, densitometers, tone reproduction, and the necessary latent image theory. (CHGR-207, 208, 209 and CTAM-210 or equivalent)

Credit 3/Qtr.

CHGR-237,238 **Radiometry**
Registration #0238-237,238

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

Credit 3/Qtr.

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

Principles of photographic processing solutions, their chemical and sensitometric analysis, the application of statistics and the design of photographic processing machines for precision photographic processing. Identification of processing errors, processing for permanence, modification and restoration of photographic images. Content purpose and criticality of control of the chemical components in black and white and color processing solutions. Current procedures and instrumentation for the analysis and control of processing solutions. Testing for the identification of processing errors. Design of replenishment formulas. Principles of machine design construction materials and processing solution compatibility. Specific examples of use in present day machines. (CHGR-217, 218,219 or equivalent)

Credit 3

CHGR-407,408,409 **Optics**
Registration #0238-407,408, 409

Introduction to geometrical and physical optics applied to photographic systems and optical instruments. (CTAM-251, 252 or equivalents)

Credit 3/Qtr.

CHGR-414,415,416 **Color Sensitometry**
Registration #0238-414,415,416

Photographic measurements, color specifications, spectrophotometry, visual and printing densities, integral and analytical color densitometry, color reproduction, dye deficiencies and masking. (CHGR-227, 228, 229 and CTAM-251, 252,253 or equivalents. Computer programming background also required.)

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

CHGR-417,418,419 **Image Evaluation**
Registration #0238-417,418,419

The course objective is to develop fundamental and rigorous understanding of the problems of evaluating photo-optical systems. Both the subjective and the objective methods of analysis are discussed in considerable detail. The main topics are: point-and-line-spread function of photo-optical systems; derivation of the line-spread function of photographic emulsions; one-dimension image formation and convolution integrals; Fourier analysis and Fourier transforms; auto-correlation and its applications; modulation transfer function of photo-optical systems (MTF). (CHGR-407, 408, 409 and CTAM-305, 328 or equivalent. Computer programming background also required.)

Credit 3/Qtr.

CHGR-421 **Mathematical Methods**
Registration #0238-421 **in Photographic Science**

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

Credit 4

CHGR-520 **Xerography and Electrographics**
Registration #0238-520

The objectives of this course, which is directed towards working engineers, scientists and experienced technicians, are to provide a comprehensive program devoted to the scientific background and practical applications of electro-photography, to emphasize the relationship of silver photography to electrostatic imaging, and to provide practical experience in xerographic image formation and reproduction. Topics covered in lectures, demonstrations, and laboratories include: electrical imaging and electrostatic principles; photoconductivity; the electrical latent image; dry and wet development; image transfer and fusing; and novel technical approaches. The prerequisites assume a background in general physics (especially electricity) and college mathematics or equivalent experience. Fundamental principles of selected subjects will be reviewed.

Credit 3

CHGR-527 **Theory of the Photographic Process**
Registration #0238-527

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

Credit 4

CHGR-528 **Theory of the Color Process**
Registration #0238-528

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

Credit 4

CHGR-529 **Non-Silver Imaging Systems**
Registration #0238-529

The purpose of the course is to examine the more promising nonsilver and unconventional silver halide systems in view of the future requirements in cost, sensitivity, image quality, color rendition, ecology (to compare them to present silver imaging systems), and to consider the reasons for the commercial failure and future prospects of other systems. The course will emphasize the principles and methods of physics and chemistry which have been developed into non-silver photographic systems, rather than the extensive empiricism which has been characteristic of this field. The student will gain an understanding of the principle non-silver systems and today's research and product trends. Topics include: latent-image theory; exposure effects; mechanism of development and spectral sensitization; sensitometry, and image evaluation. (CHGR-527 or equivalent)

Credit 4

CHGR-557,558,559 **Independent Research**
Registration #0238-557,558,559

Individual project involving research in an applied professional or scientific photographic subject carried out under the guidance of a professor. (Permission of chairperson, photography)

Credit 3/Qtr.

Printing

CHGT-201,202,203 **Introduction to Printing**
Registration #0239-201,202,203

Survey of the various phases of production employed in major printing processes, encompassing the major steps from design to finished printed product.

Credit 2/Qtr.

CHGT-207 **Printing Design and Layout**
Registration #0239-207

Fundamentals of layout and design as applied to commercial printing and advertising, including how to design with type, specify type and illustrations, and produce layouts from thumbnail sketches to a completed comprehensive design. Emphasis on technical and printing problems.

Credit 3

CHGT-219 **Estimating**
Registration #0239-219

A basic course in planning production, cost of materials, hour costs, hour rates, estimating time and time standards.

Credit 4

CHGT-221,222,223 **Offset Film Assembly**
Registration #0239-221,222,223

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

Credit 3/Qtr.

CHGT-227 Copy Preparation**Registration #0239-227**

Copy preparation for reproduction; working from layouts; arrangement and handling for paste-up, separation mechanicals, and photographic copy; requirements of reproduction proofs; writing complete specifications for stripping and camera.

Credit 3

CHGT-237 Technology of Typesetting**Registration #0239-237**

An introduction to machine typesetting including hot metal, tape and phototypesetting.

Credit 2

CHGT-251 Paper and Printing**Registration #0239-251**

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

Credit 3

CHGT-265 Lithography I**Registration #0239-265**

This course is designed to introduce the student to the principles and theories of offset lithographic printing. Hands-on presswork is designed to prepare the student for more advanced concepts presented in the next course.

Credit 3

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

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

Credit 3

CHGT-301,302,303 Reproduction Camerawork**Registration #0239-301,302,303**

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

Credit 2/Qtr.

CHGT-407 Ink and Color**Registration #0239-407**

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

Credit 2

CHGT-421 Planning and Finishing**Registration #0239-421**

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

Credit 2

Science and Technology**Mathematics**

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

CTAM-101,102,103 Mathematics

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

CTAM-201,202 Technical Mathematics**Registration #0240-201, 202**

A two-quarter sequence to meet the needs of students enrolled in AAS degree programs. This is an introduction to college algebra and trigonometry covering basic algebraic concepts and operations, algebraic and transcendental (trigonometric, logarithmic, and exponential) functions. (Three years high school math or equivalent.) (Requires pre-test)

Credit 4/Qtr.

CTAM-203 Technical Calculus**Registration #0240-203**

An elementary applied calculus course for students in the AAS program. This course covers the basic differential and integral calculus of algebraic and transcendental functions with applications. (CTAM-202 or equivalent)

Credit 4

CTAM-205 Mathematical Thought and Processes**Registration #0240-205**

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

Credit 4

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

An examination of selected modern mathematical methods used in today's society. This examination includes a study of the nature of these methods, a study of how these methods are used, and a study of the usefulness of these methods in today's society. (CTAM-205)

Credit 4

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

A pre-calculus 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.) (Requires pre-test.)

Credit 4

CTAM-212 Introduction to Statistical Process Control**Registration #0240-212**

An introduction to the methods of statistical process control. Topics include the normal distribution, estimating population characteristics from sample data, probability, development and interpretation of control charts. (CTAM-201 or equivalent)

Credit 4

CTAM-251 Calculus**Registration #0240-251**

Topics include limits, derivatives of algebraic and trigonometric functions, continuity; differentials; related rates; curve sketching; maxima and minima problems; indeterminate forms. (CTAM-210 or equivalent.) (Requires pre-test.)

Credit 4

CTAM-252 Calculus**Registration #0240-252**

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

Credit 4

CTAM-253 Calculus**Registration #0240-253**

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

Credit 4

CTAM-265 Discrete Mathematics I**Registration #0240-265**

An introduction to discrete mathematics with application in computer science and mathematics, with an emphasis on proof techniques. It covers the basics of combinatorics, sets, functions, the natural numbers, and the integers mod n . (CTAM-201, 202 or equivalent)

Credit 4

CTAM-266 Discrete Mathematics II**Registration #0240-266**

A continuation of discrete mathematics with applications in computer science and operations research. It covers finite state machines, relations, graphs, trees, optimization and matching. (CTAM-265)

Credit 4

CTAM-305 Calculus**Registration #0240-305**

Partial differentiation; multiple integrals; solid analytic geometry; vector calculus with emphasis on applications to science and engineering. (CTAM-253 or equivalent)

Credit 4

CTAM-306 Differential Equations**Registration #0240-306**

Ordinary differential equations through n th order with emphasis on first and second order linear. Applications, Laplace Transforms. (CTAM-305 or equivalent)

Credit 4

CTAM-318 Boundary Value Problems**Registration #0240-318**

A continuation of CTAM-306, Differential Equations. Topics covered are Fourier Series, and introduction to partial differential equations; series solutions of differential equations; applications of the material covered. (CTAM-306 or equivalent)

Credit 4

CTAM-328 Engineering Mathematics**Registration #0240-328**

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

Credit 4

CTAM-341,342 Engineering Statistics**Registration #0240-341,342**

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

Credit 4/Qtr.

CTAM-407 Linear Algebra**Registration #0240-407**

Topics covered in this course are: vector spaces; systems of linear equations; linear transformations and matrices; determinants; characteristic roots and vectors; similarity of matrices and quadratic forms; application of the above. (CTAM-252 or equivalent)

Credit 4

CTAM-417 Numerical Analysis**Registration #0240-417**

This course covers linear difference equations; numerical methods for solving equations; interpolation, iteration, and approximating procedures; error analysis or related methods; empirical formulas; and problems involving computer applications. Where applicable, the computer will be used in solving problems. (FORTRAN or BASIC Programming and CTAM-306 or equivalents)

Credit 4

CTAM-420 Complex Variables**Registration #0240-420**

A study of the calculus of complex functions. Cauchy Theory leading to residue theory and conformal mapping. (CTAM-305 or equivalent)

Credit 4

Electrical (Applied Science)

CTBE-401 (Lec.) **Circuit Analysis**
CTBE-406 (Lab)
Registration #0241-401,406

Circuit parameters, Ohm's Law, 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-461, 462,463 **Electrical Engineering Principles**
Registration #0241-461,462,463

A course for non-electrical majors. Electric and magnetic circuits, electrical measurements, electronic devices, transformers, power systems, machines, and control circuits. (CTAM-305 and CTCP-303 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, center of mass and centroids, moments and products of inertia, work, velocity, acceleration, kinetic energy, momentum, rigid body motion, rotation, work, potential energy, conservative forces and impulse. (CTCP-302 and CTAM-305)

Credit 4/Qtr.

CTBM-344 (Lec.) **Strength of Materials I**
CTBM-354 (Lab)
Registration #0242-344,354

Stress, strain, Hooke's Law, shear, torsion, shear and bending in beams, moment diagrams and deflection of statically determinate beams. (CTBM-341 or equivalent)

Credit 4, Lec. 3, Lab 1

CTBM-345 **Strength of Materials II**
Registration #0242-345

A continuation of the study of the way engineering materials behave. Slope and deflection of statically indeterminate beams, analysis of special beams, reinforced concrete beams, shear center, bending or torsion stresses combined with direct stresses, combined stresses for general types of loading. Mohr's circle, column analysis, energy of strain and impact, Castigliano's theorem. (CTBM-344 and 354)

Credit 4

CTBM-401 **Thermodynamics I**
Registration #0242-401

Fundamental properties of thermodynamic systems: perfect gases, state and energy equations, laws of thermodynamics, and properties of pure substances. (CTCP-302 and CTAM-306 or equivalent)

Credit 4

CTBM-402 **Thermodynamics II**
Registration #0242-402

Thermodynamic properties of steam and refrigerants: fluids, heat transfer, mixtures of gases and vapors, internal combustion cycles and vapor power cycles. (CTBM-401 or equivalent)

Credit 4

CTBM-403 **Thermodynamics III**
Registration #0242-403

Additional material on vapor power cycles and internal combustion engines, reactive systems, and fundamentals of heat transfer. (CTBM-402 or equivalent)

Credit 4

CTBM-411 **Fluid Mechanics I**
Registration #0242-411

The basic properties of fluids are described. The principles of fluid behavior are investigated and applied to practical problems. Forces developed by fluids in motion are also examined. Major topics include incompressible viscous flow and boundary-layer theory. Films showing flow phenomena are used to supplement the lecture material. (CTBM-401 or equivalent)

Credit 4

CTBM-412 **Fluid Mechanics II**
Registration #0242-412

Introduction to special flow systems. Major topics include potential flow, compressible flow, and the behavior of fluids in open channels, dimensional analysis and its relation to model flow-testing. Lectures are supplemented with films. (CTBM-411)

Credit 4

CTBM-551 **Machine Design I**
Registration #0242-551

Statics of linkage mechanisms, kinematics and dynamics of linkages, analytical methods of solution based on vector analysis, graphical methods, and additional vector methods of solution. (CTBM-345 or equivalent)

Credit 3

CTBM-552 **Machine Design II**
Registration #0242-552

Kinematics of cam mechanisms, dynamic analysis of cams and some vibrational analysis, cam synthesis, stress analysis of machine design, including the selection of materials. (CTBM-551)

Credit 3

CTBM-553 **Machine Design III**
Registration #0242-553

Design of machine elements (shafts, springs, gears, bearings, clutches and brakes), vibration analysis, material selection, additional analytical and graphical solutions. (CTBM-552)

Credit 3

Chemistry

CTCC-211,212,213 **General Chemistry**
Registration #0244-211,212,213

For chemistry majors and others who desire an in-depth study of general chemistry; atomic structure, chemical bond, properties of elements and compounds, states of matter, solutions, acids and bases, oxidation-reduction reactions, chemicals calculations, qualitative and quantitative analysis. (Three years of high school math or equivalent, including intermediate algebra)

Credit 3/Qtr.

CTCC-216 **Qualitative Inorganic Analysis**
Registration #0244-216

A lecture-laboratory course designed to present and illustrate the principles of the methodology of qualitative inorganic cation and anion analyses. (Concurrent with CTCC-213 or equivalent)

Credit 2

CTCC-217,218 **Quantitative Analysis**
Registration #0244-217,218

A lecture-laboratory course designed to illustrate the techniques and skills required for volumetric and gravimetric quantitative analysis. (Concurrent with CTCC-211, 212 or equivalent)

Credit 2/Qtr.

CTCC-231 (Lec.) **Organic Chemistry**
CTCC-236 (Lab)
Registration #0244-231,236

An introductory course in the science of organic chemistry. A survey of the nomenclature of organic molecules and a discussion of the structure and properties of the various classes of organic compounds is presented. (CTCC-213 or equivalent)

Credit 5, Lec. 3, Lab 2

CTCC-232,233 (Lec.) **Organic Chemistry**
CTCC-237,238 (Lab)
Registration #0244-232,233,237, 238

Fundamental principles of organic reactions are examined for the various types of organic chemicals. Nomenclature, stereochemistry, physical characterization techniques, and reaction types are stressed. Laboratory; preparation of various types of organic chemicals. Emphasis is on the techniques of separation and identification. (CTCC-231 or equivalent)

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

CTCC-241,242 (Lec.) **Engineering Chemistry**
CTCC-246, 247 (Lab)
Registration #0244-241,242,246, 247

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

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

CTCC-313 (Lec.) **Introduction to Physical Chemistry**
Registration #0244-313

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

Credit 3

CTCC-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. (SCHP-443 or equivalent)

Credit 3

CTCC-562 **Photochemistry**
Registration #0244-562

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

Credit 3

CTCC-598 **Topics in Chemistry: Spectrometric**
Registration #0244-598 Identification of Organic Compounds

A practical approach to the elucidation of the structure of organic compounds through detailed analysis of their infrared, ultraviolet-visible, nuclear magnetic resonance and mass spectrometric properties. The emphasis is on the solution of real problems. (CTCC-233 or equivalent)

Credit 3

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

Faculty-directed study of chemical topics on a tutorial basis. (Consent of instructor)

Credit 1

Physics

CTCP-201,202,203 (Lec.) **College Physics**
CTCP-206,207,208 (Lab)
Registration #0245-201,202,203, 206,207, 208

A basic course in physics using algebra and trigonometry; topics covered: statics, dynamics, harmonic motion, sound, heat, fluid-flow, wave motion, optics, electricity and magnetism. Emphasis on understanding of basic principles and problem solving. (CTAM-202. Students who have not taken CTAM-202 must take a math qualifying exam.)

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

CTCP-301,302,303 (Lec.) **Physics**
CTCP-306,307,308 (Lab)
Registration #0245-301,302,303,306,307,308

Physics for engineering and science students. The following topics are covered: statics, dynamics, harmonic motion, wave motion, sound, thermodynamics, fluid-flow, optics, electricity and magnetism. Calculus is used freely. (CTAM-253 or equivalent)

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

CTCP-457 **Modern Physics**
Registration #0245-457

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

Credit 4

CTCP-458 **Modern Physics**
Registration #0245-458

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

Credit 4

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

Elementary particles, nuclear structure, nuclear reactions, fission, fusion. Nuclear power, accelerating machines. (CTCP-457 or equivalent)

Credit 4

Contemporary Science

CTCS-221 **Contemporary Science: Biology**
Registration #0246-221

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

Credit 4

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

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

Credit 4

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

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

Credit 4

CTCS-224 **Contemporary 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. (A Telecourse offering)

Credit 4

CTCS-289 **Contemporary Science:**
Registration #0246-289 **Mechanical Universe**

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

Credit 4

Computer Programming

CTDP-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. (ICSA-200 or permission of advisor)

Credit 4

CTDP-318 **APL Programming Techniques**
Registration #0249-318 **and Applications**

Topics include APL programming and style, function definition and recursive programming. APL report formatting features, file I/O subsystem, graphic I/O and business systems applications. Programming projects will be required. (A high-level programming language)

Credit 4

CTDP-320 **Computer Programming for Engineers**
Registration #0249-320

Computer programming in FORTRAN. Application emphasis is on numerical methods. Programming projects are required. (CTAM-305)

Credit 4

CTDP-330 **PL/1 Programming**
Registration #0249-330

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

Credit 4

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

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

Credit 4

Computer Systems

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

Basic concepts and overview of computer science. The topics include historical development, algorithms, flowcharting and programming in BASIC. Exposure to assembler language, hardware concepts, software concepts, binary and hex numbers and logic. Application of the computer to various disciplines. Not for computer science majors. (High school intermediate algebra)(Also a Telecourse offering)

Credit 4

CTDS-201 Applications Software **Registration #0250-201**

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

Credit 4

CTDS-203 Advanced Topics in Application Software **Registration #0250-203**

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

Credit 4

CTDS-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. (Consult department for prerequisite)

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. (Consult department for prerequisite)

Credit 4

CTDS-430 Numerical Methods **Registration #0250-430**

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

Credit 4

CTDS-440 Operating Systems **Registration #0250-440**

A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlocks, resource management, memory management, overlays, static and dynamic relocation, virtual memory, file systems, logical and physical I/O, device allocation, process and resource protection. (Consult department for prerequisite)

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-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. (Consult department for prerequisite)

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. (Consult department for prerequisite)

Credit 4

CTDS-530 Discrete Simulation **Registration #0250-530**

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

Credit 4

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

Review of significant advances in computer science which have occurred in the last few years. Designed to give graduating students an overview of recent technological and theoretical advances. Reports on outside readings. (Senior year standing)

Credit 4

CTDS-565 Computer Systems Selection **Registration #0250-565**

A study of computer systems design, 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. (Consult department for prerequisite)

Credit 4

Lower Division Manufacturing Technology

CTEF-328

Report Writing

Registration #0255-328

Now offered within Communications as CHGL-315, registration #0236-315

Machine Shop

NOTE: All courses must be taken in the proper sequence in each program. For additional information call department, 475-5021.

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 gaging and the use of optical flats are used in the second and third quarters.

Credit 1/Qtr.

CTIS-104 to CTIS-109

Advanced Machine Shop I, II

Registration #0266-104,105,106,107,108,109

Advanced work on lathes, milling machines and grinders; explanations and demonstrations of more difficult problems; assemblies and temporary tooling. Some work done entirely in metrics. Must accurately handle tool room layout, machining, and measuring equipment. Special emphasis on skill, neatness and accuracy. (CTIS-203)

Credit 1/Qtr.

CTIS-111 to CTIS-119

Instrument Making

Registration #0266-111 to 119 & Experimental Work I, II, III

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

Credit 1/Qtr.

CTIS-121 to CTIS-129

Tool and Die Making I, II, III

Registration #0266-121 to 129

Planning and making accurate, complete tool and die assemblies. Emphasis is on accuracy of the individual parts and the fitting of the assembled tool or die. Samples from the forming and blanking dies are inspected for quality. (CTIS-106)

Credit 1/Qtr.

TLDT-051

Shop Mathematics

TLDT-052

Shop Algebra

TLDT-053

Shop Geometry

TLDT-054

Shop Trigonometry

These courses are now offered through the Learning Development Center and can be found under Learning Development Center-Technical.

CTIS-161,162

Heat Treatment

Registration #0266-161,162

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

Credit 2/Qtr.

CTIS-201,202,203 (Lec.)

Machine Shop

CTIS-206,207,208 (Lab)

Registration #0266-201, 202, 203,206,207, 208

Machine shop theory and techniques involving basic machine tools, machining theories and practices. Explanations, demonstrations and working out of basic problems in measuring, layout and cutting tools, with lathe, milling, drilling and grinding work. Must register for lecture and lab.

Credit 2/Qtr.

CTIS-204 (Lec.)

Machine Shop

CTIS-209 (Lab)

Registration #0266-204, 209

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

Credit 6

CTIS-281

Numerical Control (Mill)

Registration #0266-281

This course is designed to offer the student the fundamentals and techniques in numerical control part programming explanations and demonstration of EIA and ASCII punched tape coding. Point to point and contour programming, linear and circular interpolation, looping and macros. Special canned cycles are introduced and used along with the hands-on experience. (Phase I Machine Shop diploma or equivalent)

Credit 3

CTIS-282

Numerical Control (Lathe)

Registration #0266-282

Code System and format as used by industry for writing programs in contour, linear and circular interpolation along with safe and efficient tooling techniques. Canned turning, facing, drilling and threading cycles will be covered with compensation for tooling radius. Bar feed programming along with straight and taper threading. Will include hands-on. (Phase I Machine Shop diploma programs or approval of machine shop counselor)

Credit 3

CTIS-283

Computer Programming

Registration #0266-283

for Numerical Control

Course emphasizing programming for numerically controlled machine tools with point-to-point and straight-line milling capabilities. Pattern manipulations utilizing programs developed for a computer system will be stressed. Part programming output consisting of original input information, necessary information for post-processors for various machine tools with graphical output of optimum cutter path on a plotter interfaced to the computer. CAM (computer aided manufacturing) is introduced utilizing the E-Z CAM computer aided system. (CTIS-281 or 282 or programming experience)

Credit 3

Learning Development Center-Technical

TLDT-011,012,013 **Mathematics** Registration #1710-011,012,013

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

Credit 0

TLDT-020 **Basic Communications** Registration #1710-020

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

Credit 0

TLDT-051 **Shop Mathematics** Registration #1710-051

Elements of computational mathematics designed to increase analytical ability to solve complicated shop problems. This course includes fractions, decimals, percents, conversion to the metric system, tolerances, use of calculator, area, and volume. Additional application problems such as tapers included as time permits.

Credit 0

TLDT-052 **Shop Algebra** Registration #1710-052

Elements of algebra with applications in shop problems. Topics included are algebraic operations, solutions of equations, rearrangement of formulas, ratio, and proportion. Applications are in gears and pulleys, speeds and feeds, and gears.

Credit 0

TLDT-053 **Shop Geometry** Registration #1710-053

Elements of geometry with applications in shop problems. Topics included are lines, points, planes, angles, triangles, polygons, circles, and the Pythagorean theorem. Applications are learned through constructions. Additional material in compound angles is included if time permits.

Credit 0

TLDT-054 **Shop Trigonometry** Registration #1710-054

Elements of basic trigonometry with applications in shop mathematics. Topics included are the six basic trigonometric functions, simple applications, machine diagrams, law of sines and cosines, and numerical control (both incremental and absolute).

Credit 0

Emergency Management

CEMP-201 **Earth Sciences for** Registration #0285-201 **the Emergency Manager**

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

Credit 4

CEMP-202 **Man-Made Hazards** Registration #0285-202

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

Credit 4

CEMP-301 **Emergency Management** Registration #0285-301 **Laws and Regulations**

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

Credit 4

CEMP-302 **Emergency Planning and Methodology** Registration #0285-302

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

Credit 4

CEMP-330 **Health, Safety, and Security Abroad** Registration #0285-330

A non-culture-specific survey of personal health and safety issues abroad. The anatomy of international terrorism is discussed, including major groups in Europe, Africa, and the Middle East; their tactics; and protective measures to be taken by targets and general public, with special emphasis on travel. Kidnapping and hostage behavior are discussed. Criminal activity is discussed in the context of types of generalized social structures that may be encountered abroad. Finally, health issues are discussed, including common health hazards, features of selected overseas health care systems, insurance, and extra protective measures that should be taken in underdeveloped areas.

Credit 2

CEMS-475 **Special Wastes****Registration #0286-475**

A survey of the techniques used to process and dispose of hazardous and infectious wastes. The course will focus on federal and state regulations regarding hazardous waste, techniques for rendering special wastes inert, hazardous waste landfills, and other disposal options. (CEMS-360, 362, SCHG-201, 202, 221, 222)

Credit 4

CEMS-480 **Environmental Regulatory Law****Registration #0286-480**

An overview of environmental law and regulations pertaining to solid waste management at the federal and state levels, with emphasis on New York State. Topics include the federal Resource Conservation and Recovery Act, especially Subtitle D; state environmental statutes and regulations for solid waste management; environmental impact assessments; state environmental policy laws; and the New York State regulatory process for solid waste management facilities. (CEMS-201)

Credit 4

CEMS-510 **Integrated Solid Waste****Registration #0286-510****Management Seminar**

This seminar integrates knowledge gained in previous courses, presents special topics not covered elsewhere, such as emerging solid waste technologies, and prepares the student for the project paper to be written in CEMS-511. (Open only to fifth-year EM (SW) majors)

Credit 4

CEMS-511 **Senior Project Paper****Registration #0286-511**

This course consists of independent work demonstrating the ability to solve a significant solid waste management problem in a comprehensive fashion. The problem will focus on future or emerging technologies as well as current techniques. (CEMS-510)

Credit 4

College of Engineering

Undeclared Engineering

Required Courses

EEENG-210 Introduction to Engineering **Registration #0302-210**

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

Class 2, Credit 1 (F)

Computer Engineering

Required Courses

EECC-200 Introduction to Computer **Registration #0306-200** Engineering

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

Class 1, Credit 1 (F)

EECC-250 Assembly Language Programming **Registration #0306-250** for Computer Engineers

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

Class 4, Credit 4 (S)

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

The course covers the specification, analysis, and design of digital systems. The rapid growth of digital computers, control devices, instruments, and communication equipment requires a basic knowledge and general methodology that can be adapted to rapidly evolving changes and constraints. The study of combinatorial and sequential systems will consider the use of standard modules such as decoders, encoders, multiplexers, shifters, ROMs, PLAs, adders, registers, and counters. The laboratory will provide more insight 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 concurrently)

Class 3, Lab 3, Credit 4 (W)

EECC-361 Modeling of Linear Systems **Registration #0306-361**

This course provides an introduction to mathematical modeling of linear systems. Time domain models: homogeneous first- and second-order systems, simultaneous systems and linear algebra method of solution, nonhomogeneous systems. Frequency-domain models: systems functions, Laplace and Fourier transforms and inverse transform. Overview of digital simulation. Mechanical and electrical systems will be studied; assignments will make use of Advanced Continuous Simulation Language (ACSL). (SMAM-306)

Class 4, Credit 4 (S)

EECC-452 Linear Control Systems **Registration #0306-452**

This course provides a comprehensive introduction to the essential theories and techniques for the analysis and design of continuous linear systems. The modeling and control of dynamic systems will be studied using the frequency domain approach and the state space approach. Students will be required to verify their linear control system design projects using computer simulation techniques. (EEEE-352, SMAM-306, EECC-361)

Class 4, Credit 4 (S, SR)

EECC-550 Computer Organization **Registration #0306-550**

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

Class 4, Credit 4 (S, SR)

EECC-551 Computer Architecture **Registration #0306-551**

This course provides the critical tools to quantitatively analyze uniprocessor computer performance. Instruction set architecture alternatives are described, and examples are presented of each alternative, such as load-and-store, CISC, stack, etc. Techniques to enhance performance, such as pipelining, cache memory, and memory hierarchy, are presented. The use of vector processing, such as is used in supercomputers, is described and analyzed. Finally, the impact of input/output on computer performance is described.

Class 4, Credit 4 (F, W)

EECC-553 Digital Control Systems **Registration #0306-553** Design

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

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

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

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

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

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

This course covers the specification, analysis, design, and implementation of digital systems. The hierarchical and structured design methodology is introduced. Both synchronous and asynchronous sequential machines are studied. It covers the MSI/LSI modules, PALs, and EPROMs and their use in design. Design for testability is emphasized. (EECC-341, EECC-560)

Class 3, Credit 3 (S, SR)

EECC-630 **Introduction to VLSI Design**
Registration #0306-630

An introduction to the design and implementation of Very Large Scale (VLSI) systems. Basic NMOS devices and circuits are described. From this base, a variety of methods for designing both combinational logic and state machines is developed, with emphasis on the use of regular structures such as programmed logic arrays. System architecture and use of Computer Aided Design (CAD) tools will be stressed. (EECC-341 or ICSS-400 or EEEE-240; Basic Electronics; fourth- or fifth-year standing)

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

EECC-655 **Projects in Computer**
Registration #0306-655 **Engineering**

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

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

EECC-672 **Special Topics**
Registration #0306-672 **in Computer Engineering**

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

Class 4, Credit 4

EECC-694 **Data and Computer**
Registration #0306-694 **Communications**

This course provides a unified view of the broad field of data and computer communications. Emphasis will be on the basic principles underlying the technology of data and computer communications. Critical issues in data communication networks as well as the current and evolving standards in computer communication architecture will be discussed. The topology, access control, and performance of various types of local area networks will be studied in detail. (Fifth-year standing in Computer Engineering or permission of instructor)

Class 4, Credit 4 (S)

Technical Electives

EECC-620 **Design Automation of**
Registration #0306-620 **Digital Systems**

Design automation deals with the use of computers as a tool or aid in the design and manufacturing of digital systems. Topics covered will include systematic methods for digital design; the VHDL hardware description language; simulation techniques at system level, register-transfer level, and logic element level; partitioning of digital systems; placement; routing; and design rule checking. (EECC-550 or ICSS-520, or ICSS-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 and circuits 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-683 **Document Image Processing**
Registration #0306-683

This course is suitable for both undergraduate and graduate students interested in document image processing. Several topics will be covered in the field, including input scanning, output printing, and image processing. Interpolation techniques for scaling and resolution conversion will be discussed. Rotation, edge extraction, halftoning, and compression of digital images will be covered. Feature extraction and recognition of image characters will be described. The course will provide a framework for showing the relationships among these various topics in electronic document processing.

Class 4, Credit 4 (S)

EECC-699 **Independent Study**
Registration #0306-699

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

Credit variable: 1 to 4 quarter credits

EECC-720 **Electronic Design Automation**
Registration #0306-720

The creation of large complex electronic systems has grown beyond the capabilities of people without computer support; successful completion of large design projects requires that computers be used in virtually all aspects. This course will investigate some basic design automation tools and algorithms in order to understand their capabilities, limitations, and internal operations. Topics covered will be the VHDL hardware description language, simulation techniques, design synthesis, placement and routing, and design verification methods. Laboratory projects in the use and creation of design automation tools will be required. (EECC-561 or equivalent; EECC-630, 730 suggested)

Class 4, Credit 4

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

This course will emphasize the impact of VLSI and communication issues on computer architecture. Topics covered will include highly concurrent, multiprocessor and fault-tolerant computer systems as well as data flow architectures. Modeling techniques for system verification will also be included. (EECC-551 or ICSS-720)

Class 4, Credit 4 (W)

EECC-730 **VLSI Design**
Registration #0306-730

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

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

EECC-731 **VLSI Design Projects**
Registration #0306-731

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

Class 4, Credit 4 (W)

EECC-740 **Analytical Topics for Computer Engineers**
Registration #0306-740

This course begins by reviewing signal and system analysis techniques for analyzing linear systems. It includes Fourier techniques and moves on to present fundamental computational techniques appropriate for a number of applications areas of computer engineering. A section on numerical linear algebra will include techniques for analyzing discrete time signals and systems. Other major course areas are symbolic logic and discrete optimization techniques, including computer representations of networks, shortest-path problems and minimum spanning tree problems. (ICSA-705 or equivalent)

Class 4, Credit 4 (F)

EECC-741 **Design for Testability**
Registration #0306-741

This course will introduce the concepts of failure mechanisms and fault modeling in digital circuits. It describes various test strategies for the digital systems. Techniques to integrate design and test for VLSI circuits will be included. Design for autonomous test, SCAN-PATH concepts, and testability analysis will be discussed. Built-in-self test (BIST) techniques will be detailed. Concepts of easily testable logic will be introduced. In addition, testability bus and the boundary-scan techniques will be included for system-level testability.

Credit 4(F)

EECC-756 **Multiple Processor Systems**
Registration #0306-756

This course will cover the general guidelines, methodology, and approaches for the design, development, and use of single and multi, micro or minicomputer systems. The 16-bit and 32-bit microprocessors have vast address spaces and virtual memory capability, incorporate complex I/O facilities, and permit rapid execution of cost-saving, high-level languages. The hardware and software support available for these microprocessors also makes them a cost-effective alternative to minicomputers. Distributed systems based on microcomputer technology will be investigated with emphasis on interconnect structures, intercommunications, software and hardware. The course will include a laboratory workshop in which each student will be required to design, implement, and test one or more parts of a practical system. Emphasis will be placed on engineering ability and management skill to meet proposed technical goals on time and within budget. (Graduate standing in Computer Engineering with at least three core courses completed or permission of instructor)

Class 4, Credit 4 (S)

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

Formal models and concepts in fault diagnosis. Test generation. Design for testability techniques. Design techniques to achieve fault tolerance. System evaluation techniques. The design of practical fault-tolerance system. Fault-tolerant design of VLSI circuits and systems. (ICSS-400 or EEEE-650 or EEEE-750, EECC-561 or ICSS-720)

Class 4, Credit 4 (S)

EECC-759 **Digital Interfacing Principles**
Registration #0306-759

The objective of this course is to give graduate students basic concepts of interfacing to microcomputer bus systems, including familiarity with various peripheral components currently available. Students will gain experience in the actual implementation of microcomputer systems. The course is hardware oriented, but some assembly-language software will be required to make the experimental systems operational.

Class 3, Lab 3, Credit 4 (F)

EECC-772 **Special Topics in Computer Engineering**
Registration #0306-772

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

Credit variable (no regular course schedule)

EECC-784**Registration #0306-784**

This is a graduate-level course that emphasizes the computational and algorithmic techniques required for processing digitized pictorial images. The acquisition and quantization of digital images is described, followed by analysis and filtering techniques. Segmentation, projection, and reconstruction techniques are discussed. Finally, bi-level image processing is discussed, including contour filling and thinning techniques. Programming projects will be required. (Competence in calculus, engineering math, and structured programming is required.)

Class 4, Credit 4 (no regular course schedule)

Digital Image Processing Algorithms**EEEE-310****Registration #0301-310**

This course introduces the student to the potential of the digital computer for solving engineering problems. In addition, it is designed to further hone the student's skill in the proper use of the C programming language. Algorithmic topics include solving linear, nonlinear and transcendental equations; solving systems of linear equations; interpolation and numerical differentiation; numerical integration; curve fitting and data smoothing using the method of least squares; and systems of ordinary differential equations. Advanced topics in the course will include an introduction to data structures and to techniques for handling and operating on large arrays of data. The course will also introduce the student to the use of application software such as MatLab for the solution of engineering problems.

Class 3, Credit 3 (W, SR, Ext. day S)

Numerical Methods**EECC-890****Registration #0306-890**

An independent engineering project or research problem to demonstrate professional maturity. A formal written thesis and an oral defense are required. The student must obtain the approval of an appropriate faculty member to guide the thesis before registering for the thesis. Thesis credit may be accumulated to earn the 5 credits required for the MS degree.

Credit variable

Thesis**EEEE-345****Registration #0301-345**

Introduction to computer programming using the C programming language on the RIT VAX system and on personal computers. The course includes an introduction to good programming practices, such as top-down planning, structured programming, modularity, debug strategies, and a strong emphasis on program clarity and documentation. Flow charting will be covered, and programming models will include straight line, branching, and looping programs. Students will be introduced to C data types, variables, operators, expressions, and standard C control structures. C functions will be studied thoroughly, and the student will learn additional C features such as pointers, arrays, structures, and unions. Throughout the course the student will do a wide variety of computer programming exercises, all of which will be chosen from real engineering problems that the student will see in future courses. In addition, application programs such as plotting routines and mathematical libraries will be introduced.

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

C Programming for Engineers**Electrical Engineering****EEEE-203****Registration #0301-203**

This course is designed to give the entering first-year student an overview of electrical engineering and to help integrate the incoming student into the RIT EE community. Topics to be discussed include the electrical engineering course of study at RIT, the cooperative work experience, an overview of RIT facilities, and career options in electrical engineering. In addition this course will give the student an opportunity to interact with EE faculty, upper division students, and other first-year EE students.

Credit 1 (F)

Electrical Engineering Freshman Seminar**EEEE-351****Registration #0301-351**

Covers the fundamentals of DC circuit analysis, starting with the definition of voltage, current, resistance, power, and energy. Linearity and superposition, together with Kirchoff's Laws, are applied to the analysis of circuits having series, parallel, and other combinations of elements. Circuits with both dependent and independent voltage and current sources are studied. These concepts are generalized into branch, loop, mesh, and nodal analysis. Thevenin, Norton, and maximum power transfer theorems are proved and applied. Inductance and capacitance are introduced, and the response of RL and RC circuits to step inputs is established. In preparation for the study of electronics, the ideal operational amplifier is discussed and basic inverting and non-inverting amplifier circuits are analyzed.

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

Circuit Analysis I**EEEE-240****Registration #0301-240**

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

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

Introduction to Digital Systems

EEEE-352 **Circuit Analysis II**
Registration #0301-352

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

Class 3, Credit 3 (F, W, Ext. day F)

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

This course is intended for non-majors. The goal of the course is to provide an overview of digital logic and microcomputers. Concepts such as number systems and Boolean algebra are introduced. Digital design concepts concentrating on SSI and MSI circuits are discussed. Students learn about sequential circuits and memory elements along with arithmetic circuits. All of these elements build to microprocessor hardware concepts and software skills at the machine and assembly language level.

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

EEEE-365 **Introduction to**
Registration #0301-365 **Microcomputers**

Introductory course on microcomputers. Begins with computer architecture, including detailed discussion of the memory unit and the central processing unit, its registers, and their functions. This is followed by a study of computer arithmetic, logic operations, number systems, and codes. Computer programming is introduced at the machine assembly language levels with emphasis on computer instruction sets and addressing modes. Flow charts for straight line, branching, and looping programs are studied. Effective programming techniques are compared. Concepts of input/output are studied in detail. Emphasis is placed on program-controlled I/O. The course includes extensive hands-on exercises. Finally, microcomputer testing concepts are introduced.

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

EEEE-380 **Electrical Engineering Lab I**
Registration #0301-380

This laboratory course has been designed to accompany the lectures of EEEE-351 (Circuits I). It will introduce the student to the use of the oscilloscope and other common laboratory instruments. It is also designed to introduce the student to the use of engineering workstations in the design process for both analog and digital electronic circuits. (EEEE-240; corequisite EEEE-351).

Credit 1 (S, Ext. day S)

EEEE-390 **Electrical Engineering Lab II**
Registration #0301-390

This laboratory course has been designed to accompany the lectures of both EEEE-352 (Circuits II) and EEEE-441 (Electronics I). It will continue exposure of students to common laboratory instruments and to the structure of electronic design. The use of the engineering workstations in the design process is emphasized. The design, simulation, construction, and evaluation of a single-stage electronic amplifier is required. (EEEE-380; corequisite EEEE-352 and EEEE-441).

Credit 1 (F, W, S, SR, Ext. day S)

EEEE-395 **Electrical Engineering Lab III**
Registration #0301-395

This laboratory course has been designed to accompany the lectures of both EEEE-453 (Linear Systems I) and EEEE-442 (Electronics II). It continues the integration of the engineering workstation into the electronic design program. The design, simulation, construction, and evaluation of a multistage amplifier is required. The evaluation will include DC operating points, transient response, and steady-state frequency response. (EEEE-390; corequisite EEEE-453 and EEEE-442).

Credit 1 (F, W, S, SR, Ext. day F)

EEEE-441 **Electronics I**
Registration #0301-441

Introduction to electronics and the basic principles of small signal analysis of circuits with non-linear components. The course covers the use of ideal operational amplifiers in non-linear applications such as comparators and circuits with hysteresis. The PN junction is introduced, followed by a study of basic junction and field-effect transistor function. The course is primarily concerned with such fundamental semiconductor devices as circuit elements, dwelling principally on diode applications and simple BJT and FET transistor amplifier stages. Study includes rectification and power supply filtering and the basic operation and biasing of bipolar and junction field effect transistors. Analytical techniques include the development of linear-equivalent circuits, load line construction, small signal analysis of single amplifier stages, and waveform prediction. Emphasis is on developing skills required for circuit design. (EEEE-351)

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

EEEE-442 **Electronics II**
Registration #0301-442

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

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

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

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

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

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

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

Class 4, Credit 4 (S, SR)

**EEEE-471 Electromagnetic Fields I
Registration #0301-471**

The primary objective is to study electrostatic and magnetostatic fields and the physical laws that govern their behavior. At the same time, analytical techniques are developed that serve as a good foundation for solving electromagnetic problems. The following topics are discussed: review of vector algebra, vector calculus and the orthogonal coordinate systems—cartesian, cylindrical, and spherical coordinates; electrostatic fields—Coulomb's law, Gauss's law, the electric potential, conductors, and dielectrics in static electric fields, polarization, electric flux density and dielectric constant, boundary conditions, capacitance, electrostatic energy and forces; solution of electrostatic problems—Poisson's and Laplace's equations, method of images; steady electric currents, conduction current density and resistance; static magnetic fields—Ampere's law, the vector magnetic potential, Biot-Savart's law, the magnetic dipole, magnetization, magnetic field intensity, permeability, boundary conditions, self and mutual inductance, magnetic energy and forces.

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

**EEEE-472 Electromagnetic Fields II
Registration #0301-472**

The primary objective is to study the propagation, reflection, and transmission of electromagnetic waves in unbounded regions and in guiding structures such as two-conductor transmission lines and rectangular waveguides. The following topics are discussed: Faraday's law of electromagnetic induction; time varying fields and Maxwell's equations, boundary conditions, and the wave equations; uniform plane waves in free space and in conductive regions; polarization—linear, circular, and elliptical; the Poynting theorem and electromagnetic power; wave reflection, and transmission at normal incidence from plane boundaries—multiple dielectric interfaces, the complex reflection coefficient, and wave impedance; oblique incidence at plane dielectric boundaries—perpendicular and parallel polarization; TE and TM waves in rectangular waveguides—propagation and dispersion characteristics, attenuation losses, power transmission. The laboratory portion of the course discusses the theory of two-conductor transmission lines—transmission line equations, transients on transmission lines, pulse and step excitations, reflection diagrams, sinusoidal steady state solutions, standing waves, the Smith Chart, and impedance matching techniques. A few experiments are conducted to illustrate fundamental wave propagation and reflection concepts.

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

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

This is a first course in the study of linear control systems and their physical behavior, including stability and transient response. This is approached through the classical methods of the Laplace domain. Topics include transfer function models of physical systems, signal flow graph, transient and stability analysis of closed loop systems using classical techniques of root locus, and Bode diagrams. Design of feedback systems, lag and lead compensators, designs using root locus, and frequency response techniques. Students are expected to use computer-aided design packages (ACSL, CTRL-C, etc.) in both class assignments and in the laboratory projects.

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

**EEEE-521 Introduction to Photonics
Registration #0301-521**

A course that introduces application of the principles and practices of modern optics to problems in information processing and transmission systems. Topics include a review of electromagnetic wave propagation, geometric optics, optical polarization, interference and diffraction, Fourier optics, and a discussion of topics from contemporary optics. (EEEE-453,472)

Class 4, Credit 4 (S, SR)

**EEEE-531 Electromechanical Energy
Registration #0301-531 Conversion**

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

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

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

This course provides the basics of the formation, transmission, and reception of information over communication channels. Spectral density and correlation descriptions for deterministic and stationary random signals. Amplitude and angle modulation methods (e.g., AM and FM) for continuous signals. Carrier detection and synchronization. Phase-locked loop and its application. Introduction to digital communication. Binary FSK and PSK. Noise effects. Optimum detection: matched filters, maximum-likelihood reception. Computer simulation. (SMAM-351, EEEE-453)

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

EEEE-544 **Semiconductor Electronics**
Registration #0301-544

The objective of this course is to teach students the physical mechanisms that govern operation of the most widely used semiconductor devices. Topics include semiconductor fundamentals, pn junction diodes, bipolar and field-effect transistors, and metal-oxide semiconductor capacitors. The course emphasizes the relationships between the physical and structural parameters of these devices and their electrical performance. (EEEE-442)

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

EEEE-545 **Digital Electronics**
Registration #0301-545

The objective of this course is to study the principles of digital electronic circuits with emphasis on MOS (CMOS in particular) and their use in logic circuits. It is expected to serve as a prerequisite for digital systems design and VLSI design. Topics include review of basic logic principles, study of MOS devices and their models, basic logic structures using MOS devices, circuit characterization and performance estimation, design structures of logic systems, memory, registers and system timing, practical realities and ground rules, and bipolar digital circuits. The laboratory portion of the course will introduce the student to fabrication of integrated circuits, simulation of digital circuits, and design of basic logic circuits using workstations and software packages. (EEEE-240, 544)

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

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

Topics covered include continuation of the linear systems concepts from EEEE-453, except that in this course they are applied to discrete signals and systems. The origins of discrete sequences and systems; an introduction to sampling of continuous signals and the sampling theorem; a description of discrete systems via difference equations and convolution; the z transform and inverse z transform; system transfer function; system frequency response function and interpretation of frequency response; an introduction to the design of digital filters; filter block diagrams for FIR and IIR filters; the discrete Fourier transform, its properties and its application to the solution of signal processing problems; and a brief introduction to fast algorithms for computation of the discrete Fourier transform are discussed. (EEEE-453)

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

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

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

Credit 4

EEEE-599 **Independent Study**
Registration #0301-599

A supervised investigation within an electrical engineering area of student interest. (Permission of instructor)

Class variable, Credit variable

EEEE-605 **Robotic Vision**
Registration #0301-605

An introductory course on computer vision with special emphasis on its use in a manufacturing environment. The course will develop an understanding of how information obtained from images can be used for industrial automation. Topics include image formation and sensing, effects of lighting, image recognition, binary images, geometrical properties, image segmentation, gray scale image processing, enhancement, edge detection, 3-D structure, motion analysis, industrial applications. In the laboratory portion of the course, students are required to use and experiment with the set of available image processing algorithms. Students are also required to do a project in which image processing techniques are applied to solve practical problems. (EEEE-554)

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

EEEE-614 **Design of Digital Control Systems**
Registration #0301-614

This course adds to the analytical skills developed in EEEE-513 and EEEE-554 and applies them to sampled data systems and digital control systems. The stress in this course is on classical design techniques based on the Z-Transform. Root locus, Bode, Bode diagrams, and the direct method of design are discussed and examples presented. The student is expected to utilize available computer-aided design packages (ACSL, CONTROL-C, etc.) in both class assignments and in laboratory projects. Each student is required to participate in the design of a digital control system or detailed design of a system component as the laboratory portion of the course. (EEEE-513,554)

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

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

The primary objective is to study the theory and design of microwave components and circuits. The course begins with a review of basic EM theory, TEM waves in transmission lines, and TE and TM waves in rectangular waveguides (topics covered in EEEE-472). The following are discussed in this course: microstriplines and striplines; TE and TM waves in cylindrical waveguides; the scattering matrix description of multiport microwave circuits; waveguide tees, directional couplers, and phase shifters; microwave integrated circuit components—branchline couplers, power dividers, hybrid ring couplers, and phase shifters; rectangular, cylindrical, and coaxial cavity resonators; waveguide and coaxial line filters, and waveguide frequency meters; microwave integrated circuit high pass and band pass filters; ferrite components such as the isolator and the circulator. The laboratory portion of the course illustrates the various microwave component design and microwave measurement techniques using state-of-the-art equipment. Also required is a design project on the design of a microwave component.

Class 3, Lab 3, Credit 4 (W)

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

This is a design course in antennas. The primary objective is to study the fundamental principles of antenna theory and apply them to the analysis and design of antennas. Emphasis will be on the design procedures for some practical and popular antenna configurations, e.g., the dipole; thin linear antennas; linear arrays—broadside and endfire and phased arrays; non-uniform amplitude linear arrays—the binomial array and the Dolf Tschebyscheff array; planar arrays; the Yagi-Uda array; E-plane and H-plane sectoral horns; the pyramidal horn; the parabolic reflector; and microstrip antennas. The student will also be exposed to the measurement techniques of antenna characteristics such as radiation pattern, gain, and input impedance using state-of-the-art equipment. The primary part of the course is a design project involving the design, construction, and testing of an antenna. The project will require a report and a presentation with a demonstration.

Class 3, Lab 3, Credit 4 (S)

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

This course deals with the design of both synchronous and asynchronous digital systems. The accent is on design methodologies for final implementation on programmable logic devices. Design techniques are based on top-down design using ASM charts and bubble diagrams along with microprogramming applications. Design strategies for testability are discussed along with their impact on performance. The practical aspects of component interconnection (crosstalk, noise, transmission line effects) with effects on performance are also surveyed. The laboratory portion of the course consists of two distinct projects proposed, designed, implemented, and tested by the student. The design laboratory is supported by the SUN4 workstations and the VALID design software.

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

EEEE-651 **ASIC Design**
Registration #0301-651

A technical elective course that will introduce students to the fundamental principles of Application Specific I.C. (ASIC) design. Both circuit design and system design will be covered. The students will also be introduced to CAD tools for schematic capture, placement, and routing of standard cells. The projects will be designed and simulated using commercial CAD tools, and will be fabricated by MOSIS. Top-down design using a hardware description language (VHDL) will be included. (EEEE-650)

Class 4, Credit 4 (S)

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

This course is designed to give the student detailed knowledge of the hardware and software organization of 8-bit microprocessor systems with an emphasis on design. Memory system design, including dynamic RAMs and DMA control, will be studied. Peripheral interfacing, serial and parallel I/O, including interrupts, will be considered. Special attention will be given to interfacing microcomputers with the analog world, including the use of A/D and D/A converters. Software organization as well as design tools will be discussed. Design case studies of typical microcomputer-based systems will be examined. (EEEE-365)

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

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

This course will cover both the hardware and software aspects of 16-bit microcomputer systems. The architecture, timing, and enhanced instruction sets will be discussed. Memory and serial and parallel I/O interfacing techniques, including standard interface chips, will be examined. Modular programming concepts and the software tools will be introduced. Use of A/D and D/A converters to interface with the analog world will be discussed.

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

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

An introduction to the processing techniques and systems used in the fabrication of integrated circuits (primarily silicon). Topics include crystal growth and wafer preparation, crystalline defects, solid state diffusion, thermal oxidation, ion implantation, epitaxy, metallization, plasma fundamentals, sputter deposition and etching, ion milling, plasma etching, reactive ion etching, and overall process design and integration (bipolar, NMOS, CMOS). The students will use CAD tools such as ICE (computer-aided integrated circuit layout), SUPREM (process modeling), and SPICE (device and circuit modeling). This course is a prerequisite for EEEE-676, I.C. Processing Laboratory, in which students actually do process wafers in the clean room and fabricate and test integrated circuits. (EEEE-544)

Class 4, Credit 4 (SR, F)

EIEI-202 **Computing for Industrial**
Registration #0303-202 **Engineering**

A first course in computer programming for engineers and, in particular, industrial engineers. The course involves extensive development of programming skills required in the engineering disciplines.

Class 4, Credit 4 (W)

EIEI-301 **Computer Tools for Increased**
Registration #0303-301 **Productivity**

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

Class 2, Credit 2 (W)

EIEI-401 **Introduction to Operations**
Registration #0303-401 **Research I**

An introduction to the methodology of mathematical problem formulation. Investigation of mathematical programming techniques including linear programming and special types of linear programming problems such as the transportation and assignment algorithms. (SMAM-328 or permission of instructor)

Class 4, Credit 4 (F)

EIEI-402 **Introduction to Operations**
Registration #0303-402 **Research II**

A survey of elementary mathematical models within the field of systems and industrial engineering. Areas of study include queuing theory, network analysis, and inventory theory. (SMAM-351, SMAM-306 or permission of instructor)

Class 4, Credit 4 (F)

EIEI-415, 516 **Human Factors I, II**
Registration #0303-415,516

A survey of human factors from 1) physiological constraints of the human; 2) behavioral/psychological characteristics of the human; and 3) the psycho-motor skills ability of the human. Emphasis is placed on practical applications of each area. (SMAM-352 or permission of instructor)

Class 3, Lab 2, Credit 4 (F-516, S-415)

EIEI-420 **Work Measurement and**
Registration #0303-420 **Analysis I**

Methods of measuring and analyzing work, human capabilities, micromotion, memomotion study, process and operation analysis. Emphasis placed on methods of operation analysis as applied to the design and evaluation of man-machine systems. (Permission of instructor)

Class 3, Lab 2, Credit 4 (F)

EIEI-422 **Systems & Facilities Planning**
Registration #0303-422

A basic course in plant layout. Topics covered include project-quantity analysis, flow of materials, relationship charts, activity charts, material handling systems, and factors influencing the layout design. The course includes basic drafting application as well as state of the art computer aided layout design. (EIEI-401 or permission of instructor)

Class 3, Lab 2, Credit 4 (S)

EIEI-481 **Management Theory and**
Registration #0303-481 **Practice**

Development of the fundamental principles of the industrial enterprise. Internal organization as well as general economic conditions are considered. Emphasis is placed on the role of behavior science. (Permission of instructor)

Class 4, Credit 4 (S)

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

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

Class 4, Credit 4 (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 (F)

EIEI-530 **Engineering Design**
Registration #0303-530

A case study approach of ten real world experiences in engineering design. (Permission of instructor)

Class 4, Credit 4 (S)

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

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

Class 4, Credit 4 (S)

EIEI-630 **Computer-Aided**
Registration #0303-630 **Manufacturing II**

To familiarize students in Industrial Engineering with the basic concepts and techniques needed to specify, design, and implement systems that are computer controlled. Emphasis is on real-time data acquisition and process control as related to computer-aided manufacturing. Physical simulations relate to real-world systems such as automated storage and retrieval systems, material handling systems, flexible manufacturing systems using robots. Topics include real-time programming, interface electronics, and microprocessor-based data acquisition systems and programmable controllers. (EIEI-503, permission of instructor)

Class 3, Lab 3, Credit 4

The following courses can be used as professional electives within industrial engineering and are offered subject to sufficient demand. You should consult with your advisor for advice on professional electives outside of the industrial engineering discipline.

**EIEI-450 Applied Human Factors
Registration #0303-450 Design of Experiments**
An applied approach to the problem of how one goes about running a study or experiment in human factors. (EIEI-511 or permission of instructor)
Class 4, Credit 4

**EIEI-482 Production Control I
Registration #0303-482**
A basic course in production control emphasizing the systems approach. Topics covered include forecasting, mathematic inventory models, material requirements planning and scheduling including PERT. (EIEI-511 and EIEI-503, or permission of instructor)
Class 4, Credit 4

**EIEI-483 Production Control II
Registration #0303-483**
A design course in production control. Each student is asked to design, test, and implement a complete production control system for an operating plant. (EIEI-482)
Class 4, Credit 4

**EIEI-504 Introduction to Operations
Registration #0303-504 Research III**
A course intended to provide an integrated view of advanced programming techniques and their applications to industrial problems. Selected topics might include a working knowledge of PGERT, QGERT, etc. (EIEI-401, 402 or permission of instructor)
Class 4, Credit 4

**EIEI-505 Simulation Modeling Techniques
Registration #0303-505**
This course is intended to increase simulation modeling skills primarily in the areas of network and discrete event simulations. Emphasis will be placed on methods of model construction, design of simulation experiments, model validation and output data analysis. Student will utilize these techniques to analyze the performance of production systems. (EIEI-503, SMAM-352 or permission of instructor)
Class 4, Credit 4

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

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

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

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

**EIEI-599 Independent Study
Registration #0303-599**
A supervised investigation within an industrial engineering area of student interest. (Permission of instructor)
Class variable, Credit variable

**EIEI-625 Computer-Aided
Registration #0303-625 Manufacturing I**
To introduce the area of computer aided manufacturing (past, present and future). Emphasis will be placed on advantages/disadvantages, methods, applications and availability of current systems. Topics include numerical control language, group technology, flexible manufacturing systems, robotics, automatic process planning and adaptive control. (Permission of instructor)
Class 4, Credit 4

**EIEI-690 Seminar in Computer
Registration #0303-690 Integrated Manufacturing**
This course is designed to provide a broad overview of current technology and management practice and trends related to the evolving factory of the future. It is designed as a multi-disciplinary offering for upper-division undergraduate and graduate students enrolled in any RIT program. The course follows a seminar format. Topics of discussion include quality assurance, robots, CAD, group technology, MRP, flexible manufacturing systems, material handling, and systems integration through computer applications.
Class 3, Credit 3

Mechanical Engineering

The prerequisites are listed after each course description. A course which does not list a prerequisite may be taken by any student matriculated in the BSME program. When senior- or upper-level standing is specified as prerequisite, it means such standing in the BSME program.

EMEM-203 **Freshman Seminar** **Registration #0304-203**

This course is designed to give the entering first-year student an overview of mechanical engineering and to help integrate the incoming student into the RIT community. Topics to be discussed include the program of study, the cooperative work experience, an overview of the RIT facilities, and career options in mechanical engineering. In addition this course will give the student an opportunity to interact with the faculty, upper division students, and other first-year students.

Credit 1 (F)

EMEM-211 **Introduction to Graphics** **Registration #0304-211**

The freshman course is designed to introduce the student to engineering in general and also to develop fundamental skills in engineering graphics communications. The course is intended for students with little or no engineering drawing. Students with experience in high school or the equivalent may take a qualifying examination for an exemption from this course. The course work conforms to ANSI standards.

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

EMEM-311 **Computer Aided Design** **Registration #0304-311**

This one-quarter course teaches design drafting that concentrates on: computer graphic drawing techniques; geometric dimensioning and tolerancing; and production piece part and assembly drawing requirements. The last portion of the course is devoted to a project. The student learns to convert functional requirements to production drawing callouts. The course includes instruction in isometric sketching of part applications. (EMEM-211)

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

EMEM-331 **Mechanics I** **Registration #0304-331**

This course is intended for students majoring in electrical and industrial engineering. Statics: equilibrium, the principle of transmissibility of forces, couples, centroids, trusses, frames, machines and friction. Introduction to strength of materials: axial stresses and strains, statically indeterminate problems, thin-walled pressure vessels, direct shear, torsion, and bending. (Prerequisite: SPSP-311; corequisite: SMAM-253)

Class 4, Credit 4 (F, W)

EMEM-332 **Mechanics II** **Registration #0304-332**

This course is meant for students majoring in industrial engineering. Topics include dynamics of particles and rigid bodies with an introduction to mechanical vibrations, kinematics and kinetics of particles and rigid bodies, work, energy, impulse momentum, and vibrations. Emphasis is on problem solving. (EMEM-331)

Class 4, Credit 4 (S)

EMEM-335 **Elements of Statics** **Registration #0304-335**

This two-credit-hour course is intended as an introduction to the principles of statics for non-mechanical engineering students with a view to providing adequate background for a subsequent course in dynamics. This basic course treats the equilibrium of particles and rigid bodies under the action of forces. Topics include forces, couples, equilibrium, centroids, and friction. (Prerequisite: SPSP-311; corequisite: SMAM-253)

Class 2, Credit 2 (W)

EMEM-336 **Statics** **Registration #0304-336**

This basic course treats the equilibrium of particles and rigid bodies under the action of forces. It integrates the mathematical subjects of calculus, vector algebra, and simultaneous algebraic equations with the physical concepts of equilibrium. Topics covered include concepts of force and moment, trusses, frames, machines, shear force and bending moment diagrams and equations, friction, fluid statics, centroids and moments of inertia. (Prerequisite: SPSP-311 and SMAM-252; corequisite: SMAM-253 and SMAM-305)

Class 4, Credit 4 (F)

EMEM-342 **Introduction to FORTRAN** **Registration #0304-342** **Programming**

This course introduces the students to the fundamentals of programming through the learning of the FORTRAN language. Topics covered include structured programming techniques using sequential IF-THEN-ELSE and DO WHILE structures. Various forms of the input/output are learned including formatted I/O and END-OF-FILE detection. Writing programs using Function and Subroutine subprograms is stressed. Proper documentation techniques along with efficient usage of the computer systems and a brief introduction to word processing are also covered.

Class 3, Credit 3 (W, S)

EMEM-343 **Materials Processing** **Registration #0304-343**

This course involves a study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Topics covered include cutting processes, casting, forming, powder metallurgy, welding, and processing of plastics. Students make a project in the lab portion of the course.

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

EMEM-344 **Materials Science** **Registration #0304-344**

This course deals with the structure and properties of metallic, organic, and ceramic materials as related to structural imperfections, atom movements, and phase changes. The intent of the course is to develop a basic understanding of the structure/properties relationship in materials and their behavior in service environments. (SCHG-208)

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

EMEM-347 **Engineering Mechanics** **Registration #0304-347**

This is a basic course in the fundamental principles of the mechanics of deformable media including stress, strain, deflections, and the relationships between them. The basic loadings of tension, compression, shear, torsion, and bending are also included. Engineering Mechanics Lab (EMEM-348) is to be taken concurrently with this course. (EMEM-336)

Class 4, Credit 4 (W)

EMEM-348 **Engineering Mechanics**
Registration #0304-348 **Laboratory**

A basic laboratory course to be taken concurrently with Engineering Mechanics, EMEM-347. This course illustrates the mechanical behavior of common engineering materials. Students investigate a material's response to axial loads and perform experiments in simple torsion and beam bending. Students are also introduced to basic experimental techniques and effective report writing. (Prerequisite: EMEM-336; corequisite: EMEM-347)

Lab 2, Credit 1 (W)

EMEM-349 **Elements of Dynamics**
Registration #0304-349

This is a basic course for non-mechanical engineering students in the fundamentals of dynamics of particles and rigid bodies with introduction to mechanical vibrations. Topics include kinematics and kinetics of particles and rigid bodies, work, energy, momentum and vibrations. (EMEM-331 or EMEM-335)

Class 3, Credit 3 (W, S)

EMEM-359 **Dynamics**
Registration #0304-359

This is a basic course in the plane kinematics and kinetics of particles, and plane kinematics of rigid bodies. Newton's Laws, the energy method, and the method of impulse-momentum are applied to a variety of particle problems. Systems of particles are used to introduce the student to rigid bodies. Absolute and relative motion are used to investigate the kinetics and kinematics of systems of rigid bodies. Newton's Laws, the work energy principle and the method of impulse-momentum are also applied to a variety of rigid body problems. (EMEM-336, SMAM-306)

Class 4, Credit 4 (S, SR)

EMEM-410 **Three-Dimensional**
Registration #0304-410 **Computer-Aided Design**

This is an elective course which introduces students to three-dimensional computer-aided design using the Intergraph CAD system. Topics include design file creation and manipulation, element construction and manipulation, levels, text placement, cells, graphic groups and working sets, and dimensioning. A student completing this course becomes an experienced system user and qualified for related co-op work and/or further study of the interactive analysis software packages. (EMEM-311)

Class 1, Lab 2, Credit 2 (F, W)

EMEM-413 **Thermodynamics**
Registration #0304-413

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

Class 4, Credit 4 (F, W)

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

This course includes the physical characteristics of a fluid: density, stress, pressure, viscosity, temperature, vapor pressure, compressibility; descriptions of flows: Lagrangian and Eulerian; stream lines, path lines, streak lines; classification of flows. Fluid statics: hydrostatic pressure at a point, pressure field in a static fluid, manometry, forces on submerged surfaces, buoyancy, standard and adiabatic atmospheres; flow fields and fundamental laws: the flux vector, systems and control volumes, Reynolds Transport theorem, integral control volume analysis of basic equations for stationary and moving control volumes; inviscid Bernoulli and the Engineering Bernoulli equations, some applications; incompressible flow in pipes; laminar and turbulent flows, separation phenomenon; dimensional analysis: Buckingham's pi-theorem, similitude, model studies. (EMEM-413) (Corequisite EMEM-416)

Class 4, Credit 4 (S, SR)

EMEM-416 **Thermal Fluid Science**
Registration #0304-416 **and Energy Lab I**

This course is to be taken concurrently with Fluid Mechanics (EMEM-415). This laboratory course contains four laboratory experiments and one project. The experiments cover the following areas: the steam power plant, vapor compression refrigeration, Reynolds pipe flow apparatus and centrifugal pumps (Corequisite EMEM-415; prerequisite EMEM-413)

Lab 3, Credit 1 (S, SR)

EMEM-431 **Thermodynamics**
Registration #0304-431

A basic course in thermodynamics and heat transfer for Electrical Engineering students. The course contains applications of the first and second law to closed and open systems and elementary heat transfer considerations for electrical engineers. (SPSP-312)

Class 4, Credit 4 (F, W)

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

This course places particular emphasis on the analysis of fatigue failure. The design and analysis of machine components are considered in regard to factors of safety. (EMEM-347, EMEM-348)

Class 4, Credit 4 (F, W)

EMEM-440 **Numerical Methods**
Registration #0304-440

This course involves a study of the numerical methods for modelling and solving engineering problems using computers and interpreting and analyzing the numerical results obtained. Topics include roots of algebraic and transcendental equations, solutions of homogeneous and non-homogeneous systems of linear algebraic equations, numerical integration and differentiation, and ordinary differential equations. Problems will be taken from the student's background in statics, strength of materials, dynamics, mathematics and thermodynamics. Students are expected to write a number of programs. (EMEM-342 or equivalent computer experience, SMAM-318, and third-year standing)

Class 4, Credit 4 (F, W)

EMEM-464 **Design for Manufacture**
Registration #0304-464

In this course the student learns how to design parts for economical manufacture and how to design assemblies with the optimum number of parts. It is a project-based course and includes lectures on the creative process. The course uses both manual and software techniques to calculate assembly design efficiencies and software techniques to determine part and part tooling costs.

Class 4, Credit 4 (S, SR)

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

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

Class 4, Credit 4 (F, W)

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

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

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

EMEM-543 **Response of Dynamic Systems**
Registration #0304-543

This course deals with the modeling of lumped parameter systems, and the response of these systems to step or harmonic excitation. The dynamics of mechanical, electrical, thermal, and fluid lumped parameter systems are investigated. Mathematical models are developed and used to study their system response. Alternate system designs are also investigated via modeling techniques. Projects associated with this course introduce students to the use of the ACSL systems simulation software. Students are required to generate ACSL models and execute them to investigate the influence of various system parameters. A computer laboratory course, EMEM-545, must be taken concurrently with this course. (EMEM-439; corequisite: EMEM-545)

Class 4, Credit 4 (F, W)

EMEM-545 **Dynamics Laboratory**
Registration #0304-545

Companion laboratory for EMEM-543. The lab will contain experiments concerning mechanical, electro-mechanical, and thermo-fluid systems parameter characterizations and system response phenomena. Digital computer simulation of system response, and advanced data acquisition techniques are extensively covered. (Corequisite: EMEM-543)

Lab 2, Credit 1 (F, W)

EMEM-550 **Transport Phenomenon**
Registration #0304-550

This is a fundamental course in transport phenomenon leading to advanced topics in heat transfer and fluid flow theory. The students are introduced to the boundary layer theory in external and internal flows. (EMEM-514)

Class 4, Credit 4 (F, W)

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

This is a companion laboratory course for Transport Phenomenon (EMEM-550), and it consists of four laboratory experiments and one project. The experiments cover the following areas: subsonic wind tunnel, laser Doppler anemometer, flow meters and thermistor and thermocouple response. (EMEM-550)

Lab 2, Credit 1 (S, SR)

EMEM-560 **Introduction to**
Registration #0304-560 **Aerospace Engineering**

This course lays the foundation for studies in aerospace engineering. Topics include the history of aviation, basic aerodynamics, airfoils, wings and other aerodynamic shapes, airplane performance, stability and control, propulsion, and aircraft structures. (EMEM-415, EMEM-439)

Class 4, Credit 4 (F, W)

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

This is a student project course encompassing both analytical and experimental work. (Fourth- or fifth-year standing)

Class variable, Credit variable (F, W, S, SR)

EMEM-630 **Senior Design Project I**
Registration #0304-630

This is the first of a two-course capstone design sequence. Students work in design teams in an environment approximating an industrial setting. Emphasis is placed on teamwork and on developing good oral, written, and interpersonal communication skills. In this first course, student teams complete the final design of a mechanical system after identifying possible alternative concepts. Their final design must be supported by sound engineering analyses and by engineering drawings necessary to build a prototype. (Fifth-year standing)

Class 4, Credit 4 (F, W)

EMEM-631 **Senior Design Project II**
Registration #0304-631

This is the second of the two-course capstone design sequence. The same student teams who worked together in Senior Design I return to build and test a *working* prototype of their final design completed in Senior Design I. Nonworking prototypes are not acceptable, and some redesign work may be required to make the system work. Continued emphasis is placed on teamwork and on developing good oral, written, and interpersonal communication skills. (EMEM-630)

Class 4, Credit 4 (S)

Technical Electives

(All technical elective courses have a minimum of 25 percent engineering design content. These are offered at least every other year.)

EMEM-605 **Applications in Fluid Mechanics** **Registration #0304-605**

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

Class 4, Credit 4 (F,W)

EMEM-615 **Robotics** **Registration #0304-615**

This is an applied course in the fundamentals and applications of industrial robots. Topics include microprocessors, computer vision, drive systems, sensors, gripper design, safety, economics, design for assembly, flexible manufacturing systems, and case studies. Major emphasis is placed on a term project involving an actual industrial problem. (EMEM-437, EMEM-439)

Class 4, Credit 4 (F, W)

EMEM-618 **Computer-Aided Engineering and Design** **Registration #0304-618**

This course introduces the mechanical engineering student to the procedures and techniques used to integrate the computer into the engineering and design cycle. The student is exposed to the computer hardware and software used in mechanical design; that is, mechanical drawing, solids modeling, finite elements, etc. The student will use software on the academic computing system, the Intergraph CAD laboratory, and personal computers. Concepts associated with the design of interactive graphics display programs for design applications will be presented. A design project is selected from one or more of the topics covered. (EMEM-437, 440, 543)

Class 3, Lab 2, Credit 4 (S)

EMEM-620 **Introduction to Optimal Design** **Registration #0304-620**

This course is an introduction to some basic optimization techniques for engineering design synthesis. Topics covered include: basic concepts, the general problem statement, necessary conditions of optimization, numerical techniques for unconstrained optimization, constrained optimization through unconstrained optimization, and direct methods. Numerical solutions are obtained by interfacing with available software. A design project is required. (EMEM-440, EMEM-543, EMEM-437)

Class 4, Credit 4 (F, W)

EMEM-635 **Heat Transfer II** **Registration #0304-635**

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

Class 4, Credit 4 (S, SR)

EMEM-643 **Control Systems** **Registration #0304-643**

This course introduces the student to linear control systems, their physical behavior, and their design and use in augmenting engineering system performance. Topics include control system behavior characterization in time and frequency domains, stability, error, and design. This is accomplished through classical methods that employ the use of Laplace transforms, block diagrams, feedback control, root locus, Nyquist plots, and Bode diagrams. A companion laboratory will provide students with significant hands-on experience.

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

EMEM-652 **Fluid Mechanics of Turbomachinery** **Registration #0304-652**

This course examines the basic principles applicable to all turbomachinery as well as the consideration of the operating and design characteristics of several basic classes of turbomachinery. It includes a major design project. (EMEM-415)

Class 4, Credit 4 (S, SR)

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

This is a design-oriented course in mechanical vibrations and noise control with emphasis on design applications and instrumentation. Free and forced vibrations of one degree of freedom systems are covered including machinery unbalance and isolation, Fourier analysis, numerical and experimental analysis and design methods. Modal analysis of multi-degree of freedom systems is introduced. Industrial acoustics and noise control techniques are also introduced. In addition to laboratory exercises in each area of vibration, a design project is assigned. (EMEM-543)

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

EMEM-660 **Refrigeration and Air Conditioning** **Registration #0304-660**

This is a basic course in the principles and applications of refrigeration and air conditioning involving mechanical vapor compression and absorption refrigeration cycles, associated hardware, psychrometrics, heat transmission in buildings, and thermodynamic design of air conditioning systems. Students are expected to do a design project. (EMEM-413, EMEM-514)

Class 4, Credit 4 (S)

EMEM-671 **Aerostructures** **Registration #0304-671**

A course in the principles of deformable bodies as applied to the analysis and design of aircraft and space vehicle structures. Topics include the study of bending and torsion of thin-walled multi-cell beams and columns, wing and fuselage stress analysis, and structural stability. Strain energy concepts and matrix methods are utilized throughout the course. (EMEM-437, EMEM-518)

Class 4, Credit 4 (S, SR)

EMEM-672 **Dynamics of Machinery** **Registration #0304-672**

This course treats the fundamentals of dynamic design of machinery. Topics include dynamic analysis of mechanisms, graphical kinematics, the method of virtual work applied to dynamical systems, cam design and balancing. The digital computer and machine plotting are used. Major emphasis is placed on a term project. (EMEM-543)

Class 4, Credit 4 (S, SR)

EMEM-673 **Aerodynamics Laboratory**
Registration #0304-673
 This is a companion laboratory for EMEM-671 and EMEM-675. (EMEM-560, corequisites EMEM-671 and EMEM-675)
 Lab 3, Credit 1 (S, SR)

EMEM-675 **Aerodynamics**
Registration #0304-675
 This course presents the essentials of aerodynamic theory. Topics include airfoil theory, wings of finite span, inviscid potential flows, laminar and turbulent boundary layer, compressible flows, wave drag, and aerodynamic design. (EMEM-560 or EMEM-550 with instructor's consent)
 Class 4, Credit 4 (S, SR)

EMEM-678 **Propulsion**
Registration #0304-678
 This course covers the fundamentals of propulsion, including the basic operating principles and design methods for flight vehicle propulsion systems. Topics include air-breathing engines (turbojets, ramjets, turboprops, and turbofans), as well as liquid and solid propellant chemical rockets. (EMEM-514 and EMEM-550 or EMEM-560)
 Class 4, Credit 4 (F,W)

EMEM-682 **Flight Dynamics**
Registration #0304-682
 This course deals with the three-dimensional dynamics of aircraft, including general aircraft performance, stability, and control. Topics include determination of range, endurance, and rate of climb; simulation of aircraft trajectory; static and dynamic stability; and aircraft control. (EMEM-560)
 Class 4, Credit 4 (F, W)

EMEM-694 **Stress Analysis**
Registration #0304-694
 This course deals with numerical and experimental analyses of stressed mechanical components. The governing state properties are reviewed and definitions and relationships between stress, strain, and deformations; two- and three-dimensional coordinate transformations are discussed. The finite element method is introduced and the student is presented with simple instructional software programs which demonstrate the finite element analysis and computer graphic pre- and post-processing of data files. Commercial finite element programs are discussed and demonstrated. A design project is assigned. Experimental methods are presented including strain gages, photoelasticity, and brittle coating. (EMEM-437 and EMEM-440)
 Class 4, Credit 4 (S, SR)

Free Elective Courses

Typically at least three electives from the list are offered every year.

EMEM-637 **Laser Engineering**
Registration #0304-637
 Laser Engineering studies the applications of lasers as engineering tools. Background physics relevant to the operation of a laser and the interaction of light with matter are given. Safety regulations are discussed and specific applications in industry are covered. (SPSP-314)
 Class 4, Credit 4 (TBA)

EMEM-650 **Gas Dynamics**
Registration #0304-650
 An intermediate course in compressible fluid flows. One-dimensional isentropic flows through a nozzle, normal shocks, moving shocks, shock tubes, supersonic inlets, diffusers, wind tunnels. Oblique shocks and applications. Prandtl Meyer expansion fan and reflections of shocks. Two- and three-dimensional compressible flows. Theory of characteristics. Linearized flows. Thin airfoil theory, supersonic nozzle design. (Senior standing)
 Class 4, Credit 4 (TBA)

EMEM-651 **Viscous Flows**
Registration #0304-651
 A course in fluid mechanics covering incompressible laminar and turbulent boundary layers. General properties of Navier-Stokes equations, some exact solutions. Boundary layer equations, some exact and approximate solutions for two-dimensional steady flows. Boundary layer controls. Three-dimensional boundary layers. Transition of boundary layers. Theories of turbulence. (EMEM-516)
 Class 4, Credit 4 (TBA)

EMEM-680 **Advanced Thermodynamics**
Registration #0304-680
 This course involves an in-depth study of the second law of thermodynamics and its consequences. The course further deals with thermodynamics of reacting and non-reacting mixtures, chemical equilibrium, thermochemistry, Nernst theorem, and Onsager relations. (EMEM-414)
 Class 4, Credit 4 (TBA)

EMEM-685 **Advanced Strength of Materials**
Registration #0304-685
 Student study statically indeterminate problems for beams; frames; continuous beams; beams of variable cross section, reinforced concrete beams; beams on elastic foundations and torsion; limit analysis; energy methods with applications to beams, curved bars, and frames; rotating disks; introduction to composite materials. (EMEM-437 and EMEM-440)
 Class 4, Credit 4 (TBA)

EMEM-687 **Engineering Economy**
Registration #0304-687
 This elective course deals with a study of cost concepts, nominal and effective interest rates, and selection among alternatives using present, annual, and future worth methods as well as rate of return methods. Depreciation and income taxes are also considered. (Fifth-year standing)
 Class 4, Credit 4 (TBA)

EMEM-690 **Environment and the**
Registration #0304-690 **Engineer**

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

Class 4, Credit 4 (TBA)

EMEM-692 **Analysis for Engineers**
Registration #0304-692

Particle differentiation, chain rule, total differential and optimization problems; multiple integration and manipulation of multiple integrals; linear constant coefficient ordinary differential equations; matrix algebra; and vector calculus or complex variables. (SMAM-306 or equivalent)

Credit 4 (TBA)

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

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

Credit 4

Microelectronic Engineering

EMCR-201 **Introduction to**
Registration #0305-201 **Microelectronics**

This course will provide the student with introductory and career information about the profession of microelectronic engineering. Students study how integrated circuits are made and design and fabricate a custom integrated circuit as part of the laboratory. Students use the Integrated Circuit Facility for the laboratory portion of this course.

Class 3, Lab 3, Credit 4 (F)

EMCR-215 **Introduction to Microelectronics—**
Registration #0305-215 **Transfer**

This course contains approximately 75 percent of the material covered in EMCR-201 and EMCR-350. For transfer students.

Class 3, Lab 3, Credit 4 (F)

EMCR-221 **Introduction to Microlithography**
Registration #0305-221

This course provides an introduction to the fundamentals of imaging and photographic science. Topics include: radiometry and photometry, exposure, silver halide materials, photoresists, speed and spectral sensitivity, sensitometry, optics, resolving power, limits of optical microlithography, measurement and control of line width, special exposure effects, and contact and printing systems.

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

EMCR-350 **Integrated Circuit**
Registration #0305-350 **Technology**

An introduction to integrated circuit technology and the physics, chemistry and metallurgy of manufacturing with an emphasis on photolithography. The laboratory includes safety, laboratory techniques, processing and testing. Students design and build an integrated circuit. (EMCR-201)

Class 3, Lab 3, Credit 4 (S)

EMCR-520 **VLSI Design**
Registration #0305-520

A study of transistors in saturation, active and cutoff regions including normal and inverse operation. T2L, I2L, ECL, PMOS, NMOS, and CMOS logic. VLSI design methodologies are discussed and simple design projects are completed. (EMCR-560, EEEE-442)

Class 4, Credit 4 (S, SR)

EMCR-530 **Electromagnetic Fields I**
Registration #0305-530

A study of electrostatics and magnetostatics important to the understanding of the physics of semiconductor devices and microelectronic processing. (SMAM-328, SPSP-313)

Class 4, Credit 4 (F, W)

EMCR-540 **Electromagnetic Fields II**
Registration #0305-540

A study of time varying electromagnetic fields important to optical and electrical systems. Topics include Maxwell's equations, wave equations, electromagnetic propagation in free space and guided structures, concepts of reflection, transmission and matching. (EMCR-530)

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

EMCR-560 **Device Physics**
Registration #0305-560

A basic course dealing with the physics of semiconductor devices. Topics include physics of semiconductor materials, metal-semiconductor contacts, PN junctions, bipolar transistors, MOS structures and field effect transistors. (EEEE-441, SPSP-315)

Class 4, Credit 4 (F, W)

EMCR-573 **Microlithography I**
Registration #0305-573 **Laboratory**

Laboratory course to be taken concurrently with PIMG-563. Topics emphasize photolithographic process characterization techniques. (PIMG-221, EMCR-350)

Lab 3, Credit 1 (S, SR)

EMCR-575 **Microlithography II**
Registration #0305-575 **Laboratory**

Laboratory course to be taken concurrently with PIMG-563. Topics emphasize advanced lithographic processes. (PIMG-563, EMCR-573)

Lab 3, Credit 1 (F, W)

EMCR-599 **Independent Study**
Registration #0305-599

A supervised investigation within a microelectronic area of student interest. (Permission of instructor)

Class variable, Credit variable

College of Fine and Applied Arts

School of Art and Design

FADC-301,302,303 Introduction to Graphic Design Registration #0402-301,302,303

An introduction to the field of graphic design through explorations of formal and perceptual understanding and control; deals with point, line, shape, color, pattern, organizational systems, Gestalt principles, dimension interaction and communications. The relationship of typography and photography to graphic design is included. Recommended course work also includes concentrated work in typography, photography, and art for reproduction methods. (Foundation program or equivalent required) Prerequisite for major in Graphic Design.

Lab 9, Credit 4 (offered each year)

FADC-401,402,403 Graphic Design (Junior Major) Registration #0402-401,402,403

Creative problem solving experiences relating to visual communication imagery based on strong emphasis of formal design values and their utilization for the communication of ideas and information. Assignments oriented to building a working knowledge of communication media areas such as print, photography, typography, etc. Media Center facility available for extension and application of studio experiences. (FADC-301, 302, 303 or equivalent)

Lab 12, Credit 6 (offered each year)

FADC-411,412,413 Graphic Design Registration #0402-411, 412,413

An elective providing the opportunity to carry on problem solving in graphic design. Each quarter concentrates on a specific design topic of study (such as design for reproduction, design of self-promotional material, typography, or computer graphics)

Lab 6, Credit 3 (offered each year), Elective

FADC-501,502,503 Graphic Design (Senior Major) Registration #0402-501,502,503

Advanced creative problem solving experiences relating to visual communication imagery based on a strong emphasis of formal design values and their utilization for the communication of ideas and information. Assignments oriented to include thematic graphic design applications such as visual identity, signage, audio-visual, packaging, photography, marketing, or computer graphics.

Lab 18, Credit 9 (offered each year)

FADC-511,512,513 Graphic Design Registration #0402-511,512,513

A professional elective providing the opportunity to work in aspects of graphic design. Each quarter concentrates on specific topics of design study.

Lab 6, Credit 3 (offered on sufficient demand), Elective

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

An elective offering basic instruction and involvement in industrial, interior and packaging design projects. Each quarter concentrates on a specific topic of design study.

311—Furniture/Space

312—Packaging

313—Industrial Design

Lab 6, Credit 3 (offered each year), Elective

FADD-320 Graphic Visualization Registration #0403-320

Graphic visualization techniques for the development and presentation of concepts for three-dimensional designs. Familiarization with various media in developing and improving graphic communication skills of value to the designer.

Lab 6, Credit 3 (offered on sufficient demand)

FADD-411,412,413 Design Applications Registration #0403-411,412,413

An elective that provides basic instruction in three dimensional computer graphics applications for designers.

Lab 6, Credit 3, Elective

FADU-301,302,303 Industrial and Package Design Registration #0442-301,302,303 (Sophomore Core)

An introduction to the fields of industrial and package design. Emphasis is on basic skills and processes for 3-dimensional design conceptualization and development.

301—Graphic Visualization of Objects

302—O-Datum, decimal, and Engineering Drafting

303—Forms and Functional Studies

Lab 9, Credit 4 (offered each year)

FADU-401,402,403 Industrial Design II Registration #0442-401,402,403 (Junior Major)

The acquisition of a technical and theoretical base in industrial design. Application of communicative and problem-solving skills to comprehensive design projects involving form.

401—Design development of small equipment through sketches and quick study mock-ups, together with the introduction to materials and processes

402—The integrated development of human factors and consumer product design, emphasizing understanding, style, function, and safety

403—The application of style, fashion and graphics as they apply to product form

Lab 12, Credit 6 (offered each year)

FADU-501,502,503 Industrial Design III Registration #0442-501,502,503 (Senior Major)

The application of design methods and skills to professional level projects in industrial design.

501—Advanced product development based on a corporate design program providing technical information, marketing concerns and outside review of work

502—History of 20th century furniture design is reviewed as a context for designing furniture for a defined market. Professional practice including writing contracts or letters of agreement, business and contractual agreements

503—A special student-interest project in industrial design including resume and portfolio design. Design issues and ethics are explored through examination of biographical material.

Lab 18, Credit 9 (offered each year)

**FADI-301,302,303 Interior Design
Registration #0444-301,302,303 (Sophomore Core)**

An introduction to interior design. Emphasis is on the basic skills and processes for spatial relationships, design conceptualization, and development.

301—Architectural Visualization

302—Architectural Drafting

303—Spatial Studies and Relationships

Lab 9, Credit 4 (offered each year)

**FADI-401,402,403 Interior Design II
Registration #0444-401,402,403 (Junior Major)**

The acquisition of a technical and theoretical base in interior design. Application of communicative and problem-solving skills to comprehensive design projects involving space and including environmental control, decorative arts and materials.

Lab 12, Credit 6 (offered each year)

**FADI-501,502,503 Interior Design III
Registration #0444-501,502, 503 (Senior Major)**

The application of design methods and skills to professional level projects in interior design with an emphasis on space planning, construction documents, furniture, professional practices and career development.

Lab 18, Credit 9 (offered each year)

**FADK-401,402,403 Packaging Design II
Registration #0440-401,402,403 (Junior Major)**

The course progresses through a series of interrelated experiments, covering analysis and visual translation of package form and function, package structure, production processes, package trends, materials, and package graphics.

Lab 9, Credit 4 (offered each year)

**FADK-501,502,503 Packaging Design III
Registration #0440-501,502,503 (Senior Major)**

The course will further investigate analysis and visual translation of package form and function, package structure, production processes, package trends, construction, materials and package graphics. A strong emphasis will be placed on preparation of a portfolio.

Lab 9, Credit 4 (offered each year)

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

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

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

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

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

Lab 9, Credit 4 (offered each year)

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

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

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

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

A structured introduction to the fundamentals of design and color with media exploration in two dimensions, concentrating on concept development, visual recognition and organization, and skill development through creative problem solving.

Lab 6, Credit 3 (offered each year)

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

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

Lab 6, Credit 3 (offered each year)

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

Drawing in variety of media. Introduction to line, form, and color as elements of pictorial and object description and presentation. Drawing systems utilizing perspective, visualization, and spatial illusion.

Lab 6, Credit 3 (offered each year)

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

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

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

**FADP-301,302,303 Introduction to Fine Arts
Registration #0405-301,302,303 (Sophomore Core)**

Fine arts core for painting, painting-illustration, printmaking and printmaking-illustration. Emphasis is placed on drawing and the objective mastery of form and space from a variety of visual sources including the human figure. Development of basic techniques, materials and concepts for further study in painting, printmaking and illustration. (Foundation program or equivalent required)

Lab 9, Credit 4 (offered each year)

**FADP-311,312,313 Medical Illustration
Registration #0405-311,312,313 (Sophomore Major)**

Emphasis is placed upon drawing and the objective mastery of form and space from a variety of visual sources, including the human figure, during fall and winter quarters. For spring quarter carbon dust illustration techniques will be introduced, thus beginning a sequence of illustrative techniques leading to mastery of medical illustration.

Lab 9, Credit 4 (offered each year)

FADP-320 **Color**
Registration #0405-320

One-quarter course dealing with the examination of basic color phenomena by visual comparison. Study the differences between light and pigment. Class problems exploring such relationships as intensity, vibration, temperature, after-image, spatial effects and image-ground distortion.

Class 3, Lab 3, Credit 3 (offered each year)

FADP-321, 322,323 **Illustration**
Registration #0405-321,322,323

One-quarter course exploring the art of illustrators; their relation to audience, publishers, and media. Studio problems will develop and expand basic concepts of illustration.

Studio sessions will be devoted to illustrative problems that reflect the class study for that period. Class critiques at appropriate times.

Class 3, Lab 3, Credit 3 (offered each year)

FADP-401, 402, 403 **Painting (Junior Major)**
Registration #0405-401,402,403

Second year of painting in a three-year degree sequence. Development of mastery of painting media and the experience of drawing. Emphasis placed upon individual solutions and expression.

Lab 12, Credit 6 (offered each year)

FADP-404,405,406 **Painting-Illustration**
Registration #0405-404,405,406 **(Junior Major)**

One day of painting and one day of illustration per week. Emphasis is on development of media and concept through creative problem solving relating to painting, illustration and drawing.

Lab 12, Credit 6 (offered each year)

FADP-411, 412, 413 **Painting**
Registration #0405-411,412,413

An elective providing the opportunity for exploration of personal expression through a painting medium.

Lab 6, Credit 3 (offered each year), Elective

FADP-421,422,423 **Medical Illustration**
Registration #0405-421,422,423 Applications (Junior Major)

Development of range and mastery of medical illustration techniques. Laboratory sessions scheduled in bio-medical illustration with computerized projects related to medicine.

Lab 12, Credit 8 (F, W) 421, 422 (offered each year)

Lab 6, Credit 5 (S) 423 (offered each year)

FADP-430 **Medical Illustration**
Registration #0405-430 **Gross Anatomy**

Dissection and study of the human body is presented with such topics as developmental comparative and applied anatomy. Emphasis is directed toward osteology, radiographic anatomy.

Required of all students in the medical illustration program, offered through the University of Rochester Medical Center, with a tuition surcharge.

FADP-450 **Drawing Problems**
Registration #0405-450

Study of traditional and contemporary means of developing form and space in drawing. Individual drawing projects exploring drawing as a conceptual tool or as a fine art medium.

Lab 6, Credit 3 (offered each year)

FADP-501,502,503 **Painting (Senior Major)**
Registration #0405-501,502, 503

The third year of advanced painting completing a major course of study in the fine arts. Concentrated studio production focused upon individual creative solutions. Individual and group presentations of work in an exhibition format is encouraged, as is the development of a visual portfolio of one's work. Advanced drawing incorporated into studio procedure.

Lab 18, Credit 9 (offered each year)

FADP-504,505,506 **Painting-Illustration Option**
Registration #0405-504, 505,506 **(Senior Major)**

Continuation of third-year painting and illustration. **Painting:** Emphasis is focused upon individual creative solutions. Individual and group presentations of work in an exhibition format is encouraged, as is the development of a portfolio. **Illustration:** Emphasis is on craft and problem solving, through such topics as book and juvenile illustration, research material and drawing approach. The student will be encouraged to expand in a personal direction and will be helped in the preparation of a portfolio.

Lab 18, Credit 9 (offered each year)

FADP-511,512,513 **Painting**
Registration #0405-511,512,513

An elective that provides further exploration of personal expressive styles through a painting media.

Lab 6, Credit 3 (offered on sufficient demand), Elective

FADP-531,532,533 **Advanced Medical Illustration**
Registration #0405-531,532,533 **(Senior Major)**

Advanced medical illustration techniques. Graphic design related to illustrative and photographic practice. Lab sessions to be scheduled in operating room facilities. Jointly sponsored by RIT and the University of Rochester.

Lab 12, Credit 6 (offered each year)

FADR-401,402,403 **Printmaking (Junior Major)**
Registration #0406-401,402,403

A three quarter sequence in printmaking. Specific technical assignments, individual growth and development through personal statements is stressed in lithography, intaglio and relief printing. Expansion and development in combined and complex print forms are encouraged. A limited edition portfolio project is developed with the participation of all students.

Lab 12, Credit 6 (offered each year)

FADR-404,405,406 **Printmaking-illustration**
Registration #0406-404,405,406 **(Junior Major)**

One day of printmaking and one day of illustration per week. Emphasis is on development of media and concept through creative problem solving relating to printmaking, illustration and drawing.

Lab 12, Credit 6 (offered each year)

FADR-411,412,413 **Printmaking**
Registration #0406-411,412,413

An elective providing the opportunity to explore personal statements through one of the following: lithography, etching, woodcut, papermaking.

Lab 6, Credit 3 (offered each year), Elective

FADR-501,502,503 **Printmaking (Senior Major)**
Registration #0406-501,502,503

Continuation of third-year printmaking. Expanding the technical involvement in paper making, photo etching and photo litho. Opportunity is presented for involvement in developing a more concentrated and personal art form through any singular technique or combination. A limited edition portfolio project is developed with the participation of all students. Encouragement is offered for students to exhibit professionally in regional and national exhibitions. Emphasis is placed on preparing a strong professional body of prints.

Lab 18, Credit 9 (offered each year)

FADR-504,505,506 **Printmaking/Illustration**
Registration #0406-504,505,506 **Option (Senior Major)**

Continuation of third year printmaking and illustration. **Printmaking:** Expanding the technical involvement with paper making, photo etching and photo litho. The student has the opportunity to specialize in the direction of natural ability and interest. A limited edition portfolio project is developed with the participation of all students. **Illustration:** Emphasis is on craft and problem solving, through such topics as book and juvenile illustration, research material and drawing approach. The student will be encouraged to expand in a personal direction and will be helped in the preparation of a portfolio.

Lab 18, Credit 9 (offered each year)

FADR-511,512,513 **Printmaking**
Registration #0406-511,512,513

An elective that provides further exploration of printmaking with emphasis on personal statement.

Lab 6, Credit 3 (offered on sufficient demand)

FADS-411,412,413 **Sculpture**
Registration #0407-411,412,413

Traditional sculptural concepts will evolve through a variety of processes and materials—predominately clay, plaster, cement, stone, paper, and metal. The human figure is presented as a subject for study and for use as a springboard to invention.

Lab 6, Credit 3 (offered each year)

School for American Craftsmen

FSCC-200 **Ceramics Materials and**
Registration #0409-200 **Processes (Freshman Major)**

The focus of study deals with a personal view of functional ceramic ware. Techniques presented include wheel throwing, hand building, glazing, decorating, and kiln firing. The history of pottery and ceramics sculpture as well as clay and glaze chemistry is offered.

Lab 15, Credit 5 (offered each year)

FSCC-251,252,253 **Ceramics Elective I**
Registration #0409-251,252,253

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

Lab 6, Credit 3 (offered each year)

FSCC-300 **Ceramics Materials and**
Registration #0409-300 **Processes (Sophomore Major)**

Ceramic projects challenge the student to develop conceptual attitudes and widen the scope of creativity. Projects undertaken provide training and experience in a variety of hand-forming/wheel-throwing techniques and firing methods.

Lab 15, Credit 5 (offered each year)

FSCC-351,352,353 **Ceramics Craft Elective II**
Registration #0409-351,352,353

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

Lab 6, Credit 3 (offered on sufficient demand)

FSCC-400 **Ceramics Materials and**
Registration #0409-400 **Processes (Junior Major)**

Personal interpretation of the issues in contemporary ceramics will be investigated. Each student will develop a proposal to be approved by the faculty. The proposal will enhance self expression and a personal direction in clay.

Lab 15, Credit 5 (offered each year)

FSCC-500 **Ceramics Techniques and Thesis**
Registration #0409-500 **(Senior Major)**

Sequential course for three quarters focusing on thesis development of a body of work that reflects self expression, and a personal direction in clay. This research and thesis project will stress a high level of aesthetic content and skilled execution.

Lab 24, Credit 8 (offered each year)

FSCF-225,226,227 **Art and Civilization**
Registration #0410-225,226,227

Survey of the history of art from prehistory to the present, with particular attention given to the social and cultural backgrounds of art production and to the relationship between the arts: architecture, sculpture, painting, and decorative arts and crafts. Lectures, independent study, discussion groups, assigned gallery visits, papers, reports.

Class 3, Credit 3 (offered each year)

FSCF-300 **History of Design**
Registration #0410-300

Explores the historical precedents of two and three dimensional design including fine arts, industrial, graphic and environmental design. The course will provide a foundation for individual decisions on planning and designing to complement and enhance present and future environments.

Class 3, Credit 3 (offered each year)

FSCF-310 **History of Crafts**
Registration #0410-310

Explores creative thinking and designing in the area of crafts through the ages with special emphasis on clay, fibers, glass, metal and wood. The course highlights the artistic achievements of the craftsmen of the past to enable present students to view their own time in its historical perspective and thereby understand more thoroughly their creative heritage and the efforts of contemporary craftsmen.

Class 3, Credit 3 (offered each year)

FSCF-320 **History of Art Criticism**
Registration #0410-320

A study of what makes art "good" (philosophical theories of art and the aesthetic experience) and what art criticism is and does (types and principles of art criticism) with direct applications to the life and work of the artist and craftsman/designer.

Class 3, Credit 3 (offered each year)

FSCF-330 **Philosophy in Art**
Registration #0410-330

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

Class 3, Credit 3 (offered each year)

FSCF-340 **Symbols and Symbol Making**
Registration #0410-340

A concentrated study of the nature of sign and symbol as visual metaphor paralleling legend, myth, folklore, and fairy tale as verbal metaphor; analysis of Freudian and Jungian theories about symbolic/metaphoric communication; and application of the theories to contemporary examples. The course is designed to help the artist, designer, and craftsman produce more effective visual communication.

Class 3, Credit 3 (offered each year)

FSCF-350 **Asian Art**
Registration #0410-350

A study of the art of India, China, and Japan in the area of painting, printmaking, sculpture, architecture and the crafts with emphasis on their implications for contemporary artists, designers and craftsmen.

Class 3, Credit 3 (offered each year)

FSCF-360 **18th & 19th Century Art**
Registration #0410-360

The development of the arts in these two centuries in the areas of painting, printmaking, sculpture, architecture, and the crafts with emphasis on their influence of 20th century styles and focusing on their impact on the artist/craftsman/designer.

Class 3, Credit 3 (offered each year)

FSCF-370 **20th Century Art**
Registration #0410-370

The development of the arts in the 20th century in the areas of painting, printmaking, sculpture, architecture, and the crafts with focus on their impact on the artist/craftsman/designer.

Class 3, Credit 3 (offered each year)

FSCF-380 **Contemporary Art**
Registration #0410-380

A study of the painting, printmaking, sculpture, architecture and crafts from the 1960s to the present year with focus on the current American scene.

Class 3, Credit 3 (offered each year)

FSCF-420 **American Art**
Registration #0410-420

A survey of the development of the visual arts (art, architecture, crafts, design, sculpture) in America from pre-Colonial times through 1865.

Class 3, Credit 3 (offered each year)

FSCF-430 **Dada and Surrealism**
Registration #0410-430

Explores the Dada and Surrealist movements in Europe and the United States from 1916 through the post-World War II period. Emphasis is on identifying the major works of artists involved in these aesthetic developments. Ideology and formal ideas will be analyzed in paintings, literary works, films, and objects.

Class 3, Credit 3 (offered each year)

FSCF-440 **Conceptual Art**
Registration #0410-440

Explores the mid-1960s movement in which artists began to regard the phenomenon of art making more in terms of process or concept and less in terms of the end product. The student will be acquainted with various facets of theory and design-oriented works in the United States, Canada, South America, and Europe.

Class 3, Credit 3 (offered each year)

FSCF-450 **Pop Art and Pop Culture**
Registration #0410-450

This course will explore the social, cultural, and political context within which this movement of the 1960s developed. Emphasis will be on artists in New York and Britain. Lectures, discussions, and films will comprise the course content.

Class 3, Credit 3 (offered each year)

FSCF-460 **Media Advertising and Consciousness**
Registration #0410-460

The function of this course is to provide a discourse on the interaction of media and advertising through both historical and theoretical means. The historical part of the course will deal with the social impact of industry on "modern life" at the turn of the century. The theoretical part of the course will discuss the impact of advertising and media on social consciousness.

Class 3, Credit 3 (offered each year)

FSCF-566 **Special Topics**
Registration #0410-566

Consideration of special art historical themes, areas, and topics not covered in regular courses.

Class 3, Credit 3 (offered each year)

FSCG-200 **Glass Materials and Processes (Freshman Major)**
Registration #0411-200

A basic survey course of the properties, techniques and technology of glass, plus an overview of glass history. Individuals are encouraged to participate in a variety of hot and cold glass techniques: blowing basic shapes, stemware, color applications, stained/leaded glass, lamination, polishing, sand casting, and slumping/fusing. Basic knowledge of technique lays the foundation for concept development.

Lab 15, Credit 5 (offered each year)

FSCG-251,252,253 **Glass Elective I**
Registration #0411-251,252,253

A survey course emphasizing furnace glassblowing and stained glass as a means of personal expression and appreciation. A portion of the course is a basic investigation of the history, chemistry, techniques and technical aspects of glass.

Lab 6, Credit 3 (offered each year)

FSCG-300 **Glass Materials and**
Registration #0411-300 **Processes (Sophomore Major)**

Techniques of stationary/multi-sectional mold blowing, color overlay, graphal, and latticino are examples of continued emphasis on blown glass. Neon bending, sealing and bombarding; gravity casting, pate-de-verre, engraving, fabrication and architectural stained glass are offered. In-depth history of glass and the decorative arts, plus practical chemistry of glass, batching and LEC will be learned.

Lab 15, Credit 5 (offered each year)

FSCG-351,352,353 **Glass Elective II**
Registration #0411-351,352,353

Prerequisite: Glass Elective 251, 252, or 253. This course provides an opportunity for more advanced work in both hot and cold glass. Emphasis is placed upon individual expression with glass and may involve slumping, casting, blowing, cutting, polishing or sculptural construction.

Lab 6, Credit 3 (offered on sufficient demand)

FSCG-400 **Glass Materials and**
Registration #0411-400 **Processes (Junior Major)**

Design projects from decorative arts companies are undertaken. Knowledge of glass studio design/construction, equipment and business practices is acquired. The journeyman's series piece is planned, designed and executed. Techniques of enameling, electroforming and advanced casting processes are investigated. The conceptualization process is further developed through spatial/environmental projects.

Lab 15, Credit 5 (offered each year)

FSCG-500 **Glass Techniques and Thesis**
Registration #0411-500 **(Senior Major)**

Based upon the three previous years of investigation, the senior-level glass student will present a proposal which will be offered as evidence of qualification for the baccalaureate degree. The senior will present a resume, portfolio and a research paper related to his/her exhibition at the end of the academic year.

Lab 24, Credit 8 (offered each year)

FSCG-520 **Stained Glass**
Registration #0411-520

An elective relating advanced individual exploration using structural elements of color design and visual expression. Fabricating techniques involve cutting, shaping, soldering, leading, foiling, glazing stained glass.

Lab 6, Credit 3 (offered on sufficient demand)

FSCM-200 **Metalcrafts Materials and**
Registration #0412-200 **Processes (Freshman Major)**

Sequential course for three quarters, introducing basic exercises in the use of equipment and metalcrafts techniques through hollowware and jewelry design in various metals. Included will be the discussion of metal design utilizing the techniques of fabrication, forging, raising and basic gem setting.

Lab 15, Credit 5 (offered each year)

FSCM-251,252,253 **Metalcrafts Elective I**
Registration #0412-251,252,253

An elective course providing an opportunity for introductory study in metals in the area of either hollowware or jewelry.

Lab 6, Credit 3 (offered each year)

FSCM-300 **Metalcrafts Materials and**
Registration #0412-300 **Processes (Sophomore Major)**

Sequential course for three quarters, introducing gold work, repousse and chasing and moldmaking. Analysis of design and production problems relating to hollowware and jewelry.

Lab 15, Credit 5 (offered each year)

FSCM-351,352,353 **Metalcrafts Elective II**
Registration #0412-351,352,353

An elective course providing an opportunity for more advanced study in metals, either hollowware or jewelry.

Lab 6, Credit 3 (offered on sufficient demand)

FSCM-400 **Metalcrafts Materials and**
Registration #0412-400 **Processes (Junior Major)**

Sequential course for three quarters, introducing flatware, spinning and machine tool processes. Introduction to industrial manufacture and advanced gem setting.

Lab 15, Credit 5 (offered each year)

FSCM-500 **Metalcrafts Techniques and**
Registration #0412-500 **Thesis (Senior Major)**

Sequential course for three quarters, providing individual research in technique and design. A final presentation, to include a resume, photographs and renderings of work, is required.

Lab 24, Credit 8 (offered each year)

FSCT-200 **Textile Materials and**
Registration #0413-200 **Processes (Freshman Major)**

Sequential course for three quarters, providing fundamentals of fabric design, yarn calculation, and pattern drafting. Analysis of equipment and problems. Practice in basic weaves. Experiments in design and weaving of sample warps of drapery, linens, upholstery, and suiting fabrics. Study of qualities and color combinations of various yarns. Yardage weaving. Printing procedures; silk screen techniques.

Lab 15, Credit 5 (offered each year)

FSCT-251,252,253 **Textile Elective I**
Registration #0413-251,252,253

A basic course in design and techniques in textiles. Each quarter a different area of study is undertaken in quilt making, natural basketry, crochet, soft sculpture, or other non-loom textile processes.

Lab 6, Credit 3 (offered every year or alternate year)

FSCT-300 **Textile Materials and**
Registration #0413-300 **Processes (Sophomore Major)**

Advanced weaving processes with problems related to design will be studied. Use of multi-harness weaving, basic computer knitting, Brother Knitting Machines, basic garment sewing constructions, and experimentation with various textile processes will be explored. A journeyman study is the culminating experience.

Lab 15, Credit 5 (offered each year)

FSCT-351,352,353 **Textile Elective II**
Registration #0413-351,352,353

An elective course providing an opportunity for more advanced study in textiles. Each quarter a different area of study is undertaken in printing, basketry, non-loom, stitchery, pattern weaving, or tapestry.

Lab 6, Credit 3 (offered on sufficient demand)

**FSCT-400 Textile Materials and
Registration #0413-400 Processes (Junior Major)**

Analysis of fabric development, using handweaving and computerized AVL and Macomber looms, will be provided. Explores surface design using hand- and computer-generated designs for various printing processes. The designing of specific projects and industrial and architectural art forms, including pricing, papers, and reports.

Lab 15, Credit 5 (offered each year)

**FSCT-500 Textile Techniques and
Registration #0413-500 Thesis (Senior Major)**

Development of new directions. A senior thesis of creative work and a written report is required. Development of a professional resume and business letters.

Lab 24, Credit 8 (offered each year)

**FSCT-520 Business Practices for the
Registration #0413-520 Craftsperson**

Fundamental craft business practices, including setting up a business, basic record keeping, banking, pricing, government regulations, insurance, marketing, and studying operations.

Class 3, Credit 3 (offered every other year)

**FSCW-200 Woodworking Materials and
Registration #0414-200 Processes (Freshman Major)**

Sequential course for three quarters, covering function and care of hand and machine woodworking tools. Wood as a material: history, kinds, qualities, sources. Fundamental techniques of wood fabrication, including basic joinery, turning, and finishing.

Lab 15, Credit 5 (offered each year)

**FSCW-220 Woodworking Materials and
Registration #0414-220 Processes (Freshman AOS Major)**

A sequential course for three quarters covering the fundamental techniques and aesthetics of woodworking. Topics covered include the care and use of hand and machine tools, wood as a material, its basic properties, basic joinery and fundamental techniques of wood fabrication, and finishing. The course includes a machine maintenance program.

Lab 18, Credit 5 (offered each year)

**FSCW-231,232,233 Technical Drawing
Registration #0414-231,232,233 (AOS Major)**

A sequential course for three quarters covering basic drafting technique as it is used for purposes of both design and presentation. Topics covered include lettering, use of instruments, dimensioning, basic layout techniques and formats, orthographic projection, sectioning, auxiliary views, axonometric drawing, perspective sketching and visualization, measured perspective and presentation techniques.

Lab 3, Credit 2 (offered each year)

**FSCW-251,252, 253 Wood Elective I
Registration #0414-251,252,253**

An elementary course in design and techniques in woodworking. Hand and power tools will assist in the making of small scale wood objects.

Lab 6, Credit 3 (offered each year)

**FSCW-300 Woodworking Materials and
Registration #0414-300 Processes (Sophomore Major)**

Sequential course for three quarters, covering advanced design, layout and construction. Plywood construction, chairmaking and chest of drawers technique. Historical development of furniture; papers and reports.

Lab 15, Credit 5 (offered each year)

**FSCW-320 Woodworking Materials and
Registration #0414-320 Processes (Sophomore AOS Major)**

A sequential course for three quarters covering advanced topics of woodworking. This is an intensive studio course focusing on both aesthetic and technical problems. Topics include the use of man-made materials, drawer and solid wood carcass construction, issues related to production work and student initiation of specific interest projects. The course includes a machine maintenance program.

Lab 24, Credit 7 (offered each year)

**FSCW-331,332,333 Furniture History
Registration #0414-331,332,333 (AOS Major)**

A sequential course for three quarters covering a survey of the history of furniture from Egyptian times to the present. There is particular attention given to the social, functional, technological, and cultural background of furniture use and production. The lives, works and influence of known furniture designers and craftsmen will be emphasized. The course will include lectures, independent study, reports, and designing furniture based on historical models.

Lab 3, Credit 2 (offered each year)

**FSCW-341,342,343 Wood Professional Practices
Registration #0414-341,342,343 (AOS Major)**

A sequential course for three quarters covering topics associated with the profession of woodworking. These include employment options, portfolio, resume writing, business cards and stationery, marketing, customer relations, contracts and other legal issues, record keeping, banking, insurance, taxes, location and layout of a shop and electrical and machinery considerations. The course will include lectures, independent study, assigned studio visits, papers, reports, and guest speakers.

Lab 3, Credit 2 (offered each year)

**FSCW-351,352,353 Wood Elective II
Registration #0414-351,352,353**

An elective course providing an opportunity for more advanced study in wood. Hand and power tools will assist in the small scale making of wood objects.

Lab 6, Credit 3 (offered on sufficient demand)

**FSCW-400 Woodworking Materials and
Registration #0414-400 Processes (Junior Major)**

Sequential course for three quarters covering advanced concepts in furniture and woodworking, drawer construction, wood sculpture, and veneering. Emphasis will be placed on enlarging student's vocabulary of form.

Lab 15, Credit 5 (offered each year)

College of Graphic Arts and Photography

School of Photographic Arts and Sciences

All courses in the School of Photographic Arts and Sciences are offered at least once annually, except as noted.

Fine Art Photography

PPHA-207 **Still Photography** Registration #0921-207

In the first quarter students become familiar with the 35mm camera, processing and printing. The work is restricted to black-and-white photography. The aesthetics and basic understanding of photographic practice are covered. The second and third quarters deal with more advanced techniques and principles of photography. This series of courses is available for students who are not majoring in photography.

Class 1, Lab 6, Credit 3

PPHA-208 **Still Photography II** Registration #0921-208

A basic studio course for the hobbyist or someone who occasionally uses photography in his or her work. Covers how to light and photograph 2-D work (copy) such as drawings, paintings, or old photographs; and how to light and photograph 3-D objects (inanimate) and people. Ideas of portraiture are discussed and explored in a natural (rather than commercial) manner, both of one person and then of two people. The idea of self-portrait also is discussed and explored. (PPHA-207 or a working knowledge of developing film and making enlargements)

Class 1, Lab 4, Studio 2, Credit 3

PPHA-209 **Still Photography III** Registration #0921-209

A one-quarter course in which students determine their own theme, develop and shape it into picture book form with the use of some words. (PPHA-207 or a working knowledge of developing film and making enlargements; permission of instructor)

Class 1, Lab 6, Credit 3

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

Covering the history and aesthetics of photography from 1839 to the present, with special emphasis on the development of photographic seeing, and its related effect on other media. A survey of the numerous processes and how their development affected the image making of their particular period, i.e., daguerreotypes, collotypes, ambrotypes, etc. Student projects are designed to illuminate phases of photographic history best understood by personal visual exploration.

Class 3, Credit 3

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

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

Class 2, Lab 8, Credit 4

PPHA-323 **Photo Media Survey** Registration #0921-323

Students will experiment with image combinations and alterations such as collage, montage, hand coloring, xerox, hand-coated emulsions, etc. Lectures will introduce historical perspective on artists using these techniques and also will feature demonstrations of various imaging systems and their integration.

Class 1, Lab 4, Credit 3

PPHA-401,402,403 **Photography as a Fine Art I** Registration #0921-401,402,403

The major emphasis is placed on the individual's learning to identify and articulate a personal response to his or her environment through the medium of photography. Students design their own projects and work under the guidance of the professor. Traditional silver, as well as non-silver, photography techniques may be utilized. (PPHA-313)

Class 3, Field trip 2

PPHA-411,412,413 **Contemporary Issues** Registration #0921-411, 412, 413

An examination of many thought-provoking and/or controversial issues in photography from 1950 to the present through a series of lectures, readings and discussions. Topics to be covered include post-modernism, genderism, pornography, censorship, altered images, connoisseurship, and others. The course format allows review and exploration of such themes as the landscape, the nude, portraiture, conceptual art, trompe l'oeil and so on. Students will prepare an oral debate or a written term paper.

Class 2, Credit 2

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

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

Class 2, Lab 8, Credit 4

PPHA-506,507,508 **Photo Media Workshop** Registration #0921-506,507,508

Photo Media Workshop emphasizes visual problem solving utilizing alternative photographic processes. The first quarter features work with emulsions on various surfaces; the second deals with visual books; and the third quarter covers generative systems including electrostatic, offset printing and other methods of altering images. The course is best when taken in order, but students may join in at any quarter. (PPHA-323)

Class 2, Lab 4, Credit 4

PPHA-521,522,523 **Color Photography Workshop**
Registration #0921-521,522,523

Emphasis is on the creative and aesthetic aspects of color photography and other color imaging systems. Students are provided with an opportunity to explore the variety of ways in which color photographs can be produced, reproduced, sequenced, displayed and preserved. A personal portfolio of work presented as color prints, color transparencies, a slide presentation, an exhibition or as an art book is required for each quarter. (Basic color course)

Class 2, Lab 4, Credit 4 (not offered every year)

PPHA-535 **Gallery Management**
Registration #0921-535 **Display**

A basic, hands-on course in gallery operation to include gallery management and aesthetics. Course work is done with actual shows in the RIT photo gallery and other galleries where appropriate.

Class 2, Credit 1 (not offered every year)

PPHA-551,552, 553 **Special Topics Workshop**
Registration #0921-551,552,553

Topics of current or special interest designed to broaden and intensify the students' ability to use photography as a means of communication and expression.

Class 1-2, Lab 4-15, Credit 3-9

PPHA-560 **Semiotics and Advertising**
Registration #0921-560 **Photography**

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

Class 2, Lab 4, Credit 4

PPHA-599 **Independent Study**
Registration #0921-599

Learning experiences not provided by formal course structure may be obtained through use of an independent study contract.

Credit 1-9

Biomedical Photography

PPHB-201,202,203 **Biomedical Photography I**
Registration #0901-201,202,203

Basic photography course for biomedical photographers with emphasis on theory, craftsmanship and visual communication. Patient photography, close-up and other photography as a foundation for future biomedical photography.

Class 4, Lab 4, Studio 4, Credit 6

PPHB-211 **Survey of Biomedical**
Registration #0901-211 **Photography**

Career opportunities, typical biomedical photography settings, types of photography performed. Ethical, professional, and personal relationships with patients, physicians, research and staff personnel.

Class 1, Credit 1 (S only)

PPHB-301,302,303 **Biomedical Photography II**
Registration #0901-301,302,303

Further study and practice of theory and principles used in biomedical photography, including photomacrography, photomicrography, hospital photography techniques, infrared and ultraviolet radiation, biological field studies. (PPHB-203)

Class 2, Lab 10, Credit 5

PPHB-331,332,333 **Preparation of Biomedical**
Registration #0901-331,332,333 **Visuals**

Study of basic principles of effective visual communication and design. Student will produce slide presentations and exhibition displays as well as anatomical demonstrations using cell animation techniques. (PPHB-203)

Lecture 2, Lab 2, Credit 3

PPHB-350 **Photomacrography**
Registration #0901-350

Photomacrography is a technique that provides a universal depth of field in photomacrograph while producing an isometric projection at the same time. A thin sheet of light is projected onto a three-dimensional subject at a right angle to the optical axis of the camera lens within the depth of field to be photographed. The subject is then precisely moved along this optical axis while the camera shutter is open. Out-of-focus areas remain in darkness and are not recorded during the time the illuminated strip is exposed. Students will learn the principles and applications of this technique, producing images of exceptional clarity in black-and-white as well as color. The precise and often unique disciplines required to make these images prepare the students for other scientific photographic tasks as well as fulfill an existing need for scanning photomacrographs in the biological sciences. (PPHB-301, 302; PPHB-331, 332; PPHB-401)

Class 1, Credit 4

PPHB-401,402 **Advanced Photography in**
Registration #0901-401,402 **Biomedical Communications**

Sophisticated and creative applications of photography serving the needs of the scientific community. Students explore a variety of specialized photographic techniques and a variety of philosophies. Assignments are performed which are similar to those encountered in biomedical and research institutes. (PPHB-303; basic color course)

Class 2, Lab 6, Credit 4

PPHB-425 **Producing Audiovisual**
Registration #0901-425 **Presentations I**

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

Credit 4

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

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

Class 2, Lab 8, Credit 4

PPHB-551,552,553 **Special Topics in**
Registration #0901-551,552,553 **Photography**

A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper-level students.

Credit variable

PPHB-599 **Independent Study**
Registration #0901-599

A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.

Credit variable

Film/Video

PPHF-201 **Film Production I**
Registration #0902-201

A fundamental course in film production. Filmmaking as a means of interpretation and expression. A combined theoretical/practical approach to media continuity. Production will be in Super 8 (non-sync) format. Students furnish film, tape and processing. Equipment is furnished by the department.

Class 3, Lab 4, Credit 5

PPHF-202 **Film Production II**
Registration #0902-202

A fundamental course in narrative film production. Filmmaking as a means of interpretation and expression with emphasis on the narrative. A combined theoretical/practical approach to the film medium. Production will be in super 8 (non-sync) format. Students furnish film, tape and processing. Equipment is furnished by the department.

Class 3, Lab 4, Credit 5

PPHF-204,205,206 **History and Aesthetics of the**
Registration #0902-204,205,206 **Moving Image**

A non-scholarly exploration of the history and aesthetics of film. Emphasis is on determining the unique characteristics of the medium, how those characteristics are used as a means of interpretation and expression, and their relevance to other kinds of non-verbal image making. (Must be at least a second-year student)

Class 3, Credit 3

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

A basic course for novices. Emphasis is on videotaping and the use of the medium as an interpretive and expressive medium. A combined theoretical/practical approach to the dynamics of the medium.

Two short video projects are required. 1/2" beta equipment, including editing facilities, is provided by RIT. Students must purchase a minimum of two 60-minute, 1/2" video cassettes.

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

PPHF-208 **Introduction to Portable**
Registration #0902-208 **Video II**

In this course the student applies the basic video skills acquired in PPHF-207 to the design and realization of mature narrative imagery. Progress is supervised by the instructor through regular screenings and conferences with the student. (PPHF-207)

Class 3, Lab 3, Credit 4 (W)

PPHF-210 **Materials and Processes of**
Registration #0902-210 **the Moving Image I**

This course is primarily designed to familiarize students with the basic technical concepts of filmmaking. By taking this course, students should gain an understanding of the technical procedures required to commit an image to the medium of film in a professional manner.

Lec. 1, Demo. 2, Credit 2 (F)

PPHF-220 **Creative Processes I**
Registration #0902-220

An examination of the various creative approaches necessary to bring an initial idea to the screen. There is an emphasis on appreciating the differences of individual creativity. The course exposes the student to various methods of organizing and articulating approaches to the creative problems of film making.

Class 2, Credit 2

PPHF-221 **Creative Processes II**
Registration #0902-221

A discipline specific follow-up to the more general theories of PPHF-220. The course varies in its approach from year to year, i.e., one year it may take the whole quarter to study one film. (PPHF-220)

Class 2, Credit 2

PPHF-310 **Materials and Processes of**
Registration #0902-310 **the Moving Image II**

A technical survey of the tools and materials used in video production. (PPHF-210, PPHF-202)

Lec. 2, Credit 2 (F)

PPHF-311 **Portable Video Production**
Registration #0902-311

An examination of the practical, technical and aesthetic considerations of portable video production. Work involves single system 3/4" shooting and editing. Skills are developed in visual continuity, storyboarding, graphics, camera work, lighting, sound and off-line insert editing. Viewings and discussion of student work, application workshops, outside readings and viewings supplement lecture presentation and production work. (PPHF-202, 208)

Class 2, Lab 4, Credit 4 (F)

PPHF-312 **Documentary and**
Registration #0902-312 **Multi-Camera Video**

In addition to continuing the documentary work of the first quarter, lab meetings will introduce and develop real-time television skills. This includes the scripting, staging and directing of a multi-camera unedited production. Lectures include broadcast history, ratings, cable and satellite television along with additional viewings and discussions of documentary work. Each student will produce a studio interview show as well as a "mini-documentary." (PPHF-311)

Class 2, Lab 4, Credit 4 (W)

PPHF-321 **Writing for Film and Video I**
Registration #0902-321

This course explores the writing of non-fiction and fiction for theatrical and non-theatrical films and television. Experience in the writing of fiction concentrates on the elements of dramatic construction. The exploration of non-fictional writing examines information gathering techniques and methods of investigation. Both non-fiction and fiction are treated as expository, story-telling forms. Students are responsible for writing film or television scripts on subjects of their own choosing and for completing several brief written exercises in areas such as character, dialogue, the interview, suspense, and plot. Although this course is designed primarily to meet the needs of film and television majors, it is not restricted to those students.

Class 2, Lab 3, Credit 3 (W)

PPHF-322 **Writing for Film and Video II**
Registration #0902-322

Continuation of PPHF-321. (PPHF-321 or consent of instructor)

Class 2, Lab 3, Credit 3 (S)

PPHF-324 **Introduction to Animation and Graphic Film Production I**
Registration #0902-324

An introduction to the techniques and practices of graphic and animated film production. This course provides training and practical experience in a wide variety of approaches to single frame motion picture production. Students produce a number of short film exercises utilizing both existing and original artwork. Some techniques covered in the course are: direct modification of the film surface, cell, ink, and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is required. No prerequisites.

Class 3, Lab 2, Credit 4 (F)

PPHF-325 **Introduction to Animation and Graphic Film Production II**
Registration #0902-325

A continued introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a number of approaches to single frame filmmaking in addition to those covered in PPHF-324. Some techniques covered in the course are: three-dimensional animation; optical printing; computer animation; and hand-drawn sound. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is **not** required. (PPHF-324)

Class 3, Lab 2, Credit 4 (W)

PPHF-326 **Animation and Graphic Film 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-350 **Directing the Actor for Film and Video**
Registration #0902-350

A course in basic directorial techniques with emphasis on the special problems peculiar to film and video production. Class meetings are organized around the presentation of scenes prepared by student directors.

Studio 4, Class 1, Credit 3

PPHF-404 **Senior Project Seminar**
Registration #0902-404

A required course for third-year film/video majors and the prerequisite for PPHF-541, Senior Project. Students will discuss and generate a written plan for their senior film and/or video projects and will select an advisor from among the film/video faculty. (PPHF-412)

Class 1, Credit 1 (S)

PPHF-405 **Advanced Video**
Registration #0902-405

A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing and store, computer imaging and animation are some of the topics covered. (PPHF-313, PPHF-310)

Class 3, Credit 3

PPHF-410 **Materials and Processes of 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-202, 310)

Class 1, Lab 2, Credit 2 (F) ..

PPHF-411 **Introduction to 16mm Film Production**
Registration #0902-411

An introduction to all aspects of professional film production. Students produce short projects while learning basic shooting and editorial procedures and equipment handling and maintenance.

Class 3, Lab 4, Credit 5

PPHF-412 **16mm Film Production I**
Registration #0902-412

An advanced class in filmmaking. Students plan and shoot a 16mm film project to be edited and completed during the spring quarter, PPHF-413. (PPHF-411)

Class 3, Lab 4, Credit 5

PPHF-413 **16mm Film Production II**
Registration #0902-413

Students edit, mix sound and complete the 16mm project begun in PPHF-412. (PPHF-412)

Class 3, Lab 4, Credit 5

PPHF-420 **Sound Recording**
Registration #0902-420

Specialized information and work in sound to give information and lab work beyond the regular course and to encourage the beginning of vocational level work in sound. Each student prepares a mixed sound track to professional quality standards.

Lec. 1, Lab 2, Credit 3 (F)

PPHF-427 **Microcomputer Animation I**
Registration #0902-427

This course provides an introduction to animation created through the use of a digital computer, rather than with traditional motion picture techniques. A survey of various computer animation hardware/software combinations precedes actual production of animated sequences, both with and without sound, which are then recorded on computer disk, motion picture film, or video. (PPHF-324)

Class 2, Lab 4, Credit 4 (W)

PPHF-428 **Microcomputer Animation II**
Registration #0902-428

This course provides practice in microcomputer animation. Students produce a finished animated project on film or videotape with sound. Emphasis is placed upon various post-production strategies which involve such techniques as combining computer animation with live action, the addition of film and video special effects, and combining computer animation with existing film or video imagery. (PPHF-427)

Class 2, Lab 4, Credit 4 (S)

PPHF-430 **Advanced Sound Recording**
Registration #0902-430

Continuing the work in PPHF-420 to include the decision level in the employment of various sound equipment and including more complex work in multi-track recording and mixing. (PPHF-420 or permission of instructor)

Class 2, Lab 2, Credit 3

PPHF-434 **Advanced Video**
Registration #0902-434

A thorough survey of the state-of-the-art methods and the hardware involved with electronic imaging. Large format computer editing and field recording, digital frame grabbing and store, computer imaging and animation are some of the topics covered. (PPHF-202,310)

Class 3, Credit 3

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

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

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

PPHF-541 **Senior Production I**
Registration #0902-541 **(Film/Video)**

Continuation of the introduction to business and legal factors begun in the basic film and video production activities. The course assists the student in detailed budgeting and shooting, script preparation and breakdown. Final project shooting begins this quarter. (PPHF-413)

Class 1, Lab 6, Credit 6 (F)

PPHF-542 **Senior Production II**
Registration #0902-542 **(Film/Video)**

Continuing the senior project shooting phase to completion. Production teams meet as sections with faculty whose experience matches the kind of production involved. (PPHF-541)

Class 1, Lab 6, Credit 6 (W)

PPHF-543 **Post Production**
Registration #0902-543 **(Film/Video)**

Completion of senior projects. Includes a review of post-production techniques. (PPHF-542)

Class 1, Lab 6, Credit 4 (S)

PPHF-551,552,553 **Special Topics in**
Registration #0902-551,552,553 **Film/Video**

A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper-level students.

Credit Variable

PPHF-599 **Independent Study**
Registration #0902-599

A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA or 3.0 or greater.

Credit variable (F, W, S)

General Photography

PPHG-200 **Photography I**
Registration #0903-200 **(Summer transfer)**

An intensive 10-week summer course for students entering the transfer programs in Professional Photographic Illustration and Imaging and Photographic Technology. This is the minimum photographic education needed to gain entry to second-year standing and replaces PPHL- and PPHT-201, 202, 203. Since this course is such an intensive offering, some previous photographic experience is highly advisable.

Class 10, Lab 20, Credit 12

PPHG-290 **Introductory Photographic**
Registration #0903-290 **Workshop**

A basic credit course in photographic techniques designed for the college student. The course will be directed to meet the needs of a variety of students: the industrial or business student desiring accurate visual records, the art and design student, as well as the hobbyist. Units of work to be covered include basic camera handling; 35mm and roll film processing; projection printing and controls; contact proofs; photographic lighting elements and techniques of successful photographs; and best methods of using black-and-white and color films. Field trips for developing outdoor techniques will be offered. Students will be expected to furnish their own supplies and cameras.

Credit 6

Professional Photographic Illustration

PPHL-201,202,203 **Applied Photography I**
Registration #0904-201,202,203

An introduction to the major in Applied Photography which will give the student broad experience in various areas of photography, to assist in making vocational decisions and understanding visual communications. The curriculum emphasizes both craft and visual problem solving during the first two quarters. The third quarter continues the attitudes of the previous quarters and allows the student to concentrate in an area of interest from an offering of courses established by the department.

Class 4, Studio 4, Lab 4, Credit 7

PPHL-205,206 **Creative Problems**
Registration #0904-205,206

This course is designed to make students aware of their own creative problem solving potential. Emphasis is placed on students' personal environments, enthusiasms and experiences. Attention is given to individual thinking and seeing. This will be accomplished through lectures and individual group assignments.

Class 3, Credit 3

PPHL-207 **Introduction to Color**
Registration #0904-207

A one-quarter course introducing color as a new element in making photographs. The course will offer a theoretical, technical and aesthetic foundation in color photography. The student will gain familiarity with the materials through shooting assignments. Emphasis will be placed on developing printing skills.

Class 2, Lab 4, Credit 3

PPHL-300 **Photography II, BFA Transfer**
Registration #0904-300

A concentrated 10-week summer course for students entering the transfer program in photographic illustration. Students must have had previous photography, design and an AAS degree (or its equivalent) from another institution. All selections will be verified by portfolio. This course is designed for exclusive admission to the complete third/fourth-year BFA program.

Credit 15 (SR)

PPHL-311,312,313 **Applied Photography II**
Registration #0904-311,312,313

Advanced applied photography in black-and-white and color with emphasis on craftsmanship, problem solving, and visual communications. Major technical emphasis and introduction to studio electronic flash and large format photography. Further emphasis is placed on the development of the student's ability to apply creative thinking and contemporary techniques in executing meaningful and effective photographs. (PPHL-203)

Class 4, Studio 5, Credit 5

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

A lecture/presentation offering the specific interests and passions of the faculty. The range is academically wide and varied. (Second-year status)

Class 1, Credit 1 (W)

PPHL-340 **Narrative/Documentary**
Registration #0904-340 **Editorial Workshop**

A major course in photojournalism and editorial photography. Emphasis will be placed on the development of intuitive photographic responses.

The objective of this five-week workshop will be to orient as well as challenge the students to photographically explore the nature of their subject matter and to visually communicate in a contemporary editorial spirit those responses and feelings to daily and weekly assigned projects that will be made in color slides and black-and-white prints.

A majority of these projects will be photographed on location throughout western New York and perhaps other not so distant environments including NYC. The educational direction of the workshop will be to visually explore photographic attitudes in approaching and solving photographic/photojournalism problems. The historic and aesthetic nature of photojournalism through documentation, recording, and personal responses will be applied as well as discussions through slide presentation and lecture on the nature of editorial magazines in the United States, Europe, and South America.

Critiques will be held after each project is edited and presented, enabling the student to obtain direct feedback from his peers and the instructor. The eagerness to learn, work hard, explore, and care is very important.

Students will be expected to furnish their own 35mm cameras and supplies. Several publications may be used.

This course may be used by BFA photo students for major credit. Limit 12 students.

Credit 8 (SR)

PPHL-416,417,418 **Photojournalism I**
Registration #0904-416,417,418

This course will explore the use of the photographic image in narrative, documentary and editorial form. The emphasis of the course will allow the students a variety of experiences. There will be emphasis on publication and public need. (PPHL-313)

Class 4, Field 5, Credit 5

PPHL-434 **Advertising Illustration**
Registration #0904-434

A course built strictly to the standards of professional photography. Only those students who seriously aspire to be professional craftspeople should enroll. The assignments are specific and vary from strictly commercial to advertising illustration. In addition, the student is encouraged to specialize in the direction of his or her own natural ability and interests. Approximately 2/3 of the photography will be in color. (PPHL-443)

Lec. 1, Critique 2, Studio 6, Credit 4 (F)

PPHL-437,438,439 **Visual Communications**
Registration #0904-437,438,439 **Workshop**

Primarily a photographic course; however, emphasis is placed on experimental approaches to communications. Visual and psychological purposes of media will be explored. This course presupposes a basic background in design, as well as in photography.

Class 2, Lab 8,* Credit 4

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

PPHL-441,442,443 Advertising Photography I
Registration #0904-441,442,443

A course in visual problem solving with photography. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. (PPHL-313)

Class 4, Studio 5, Credit 5

PPHL-451,452 Portrait Photography I & II
Registration #0904-451,452

The lecture period is devoted to discussion of the current portrait project and its problems, to lighting demonstrations, posing and draping models, composition and make-up. Basic, advanced, contemporary lighting is stressed, with a special emphasis on more advanced repeatable lighting techniques. Professional quality portraits are analyzed for lighting and finishing, as well as composition. Students are encouraged to orally analyze their own work and their shortcomings.

The studio period allows students the opportunity to work on projects under the supervision of the instructor. Students also are encouraged to create something beyond the basic project and to choose the proper models for the project. Students are taught to "see the lightings," and are permitted to use either mazda or speed lighting. These "lightings" are very adaptable to commercial, illustration, and fashion photography. Professional quality is required throughout the course. Work of inferior quality will not be accepted. (PPHL-313 or equivalent)

Class 3, Studio 2, Credit 4 (F, W)

PPHL-453 Advanced Portrait
Registration #0904-453 Photography

This course brings together the skills of the first two terms and encourages the student to develop a personal approach to portrait photography through a term-long, self-directed project. (PPHL-452 or equivalent)

Lec. 2, Studio 4, Credit 4 (S only)

PPHL-455 Studio Photo/Still Life
Registration #0904-455

A summer session course in visual problem solving with photography, emphasizing still-life techniques. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. Students may enroll in this course and PPHL-456 together, as an alternative for PPHL-441, 442, 443 (with department chairperson's approval; note that this is two credits less than PPHL-441, 442, 443) or take one or both sessions as photo electives. (PPHL-313 or equivalent)

Credit 7 (SR)

PPHL-456 Studio Photo/People
Registration #0904-456

A summer session course in visual problem solving with photography, emphasizing people in the studio. Studio and other controlled environments are stressed. Advertising and editorial solutions and applications are explored. The skills involved with both product rendering and concept illustration will be covered. Students may enroll in this course and PPHL-455 together, as an alternative to PPHL-441, 442, 443 (with department chairperson's approval; note that this is two credits less than PPHL-441, 442, 443) or take one or both sessions as photo electives. (PPHL-313 or equivalent)

Credit 7 (SR)

PPHL-461 Studio Operations
Registration #0904-461

A one-quarter business course for all photography school students. This course will cover basic business concepts necessary for the operation of a small studio or free-lance business on a practical level. Job hunting, self-promotions, business promotions, bookkeeping, and legal aspects of business will be addressed.

Class 2, Lab 2, Credit 4

PPHL-462 The Personal Document
Registration #0904-462

A combination studio and location class that introduces the student to the concepts of using personal experience and lifestyle as information and inspiration towards image making and taking. A variety of issues will be dealt with such as public and personal events, cultural, social, personal and intercultural symbols. The course will cover the written word and its effect and influence on the photograph, and advanced black-and-white printing. Layout and presentation, and their effect on the audience the work is designed to serve will be included. (PPHL-313, or permission of instructor)

Credit 7 (SR)

PPHL-465 On Location Photo
Registration #0904-465

This course will cover the techniques and equipment necessary to complete an "on location" assignment for a corporate report, brochure, or audiovisual presentation. Students will be encouraged to meet professional standards while developing a strong personal point of view. (PPHL-313 or equivalent)

Credit 6 (SR)

PPHL-470 Environmental Portraiture
Registration #0904-470

A course involving the selection of various persons as subjects and learning of their skills and specialties. The student will interview subjects, define what they do and where they do it, and design a photograph that shows the viewer the subject's job or avocation and the environment in which the subject operates.

Class 1, Critique 2, Studio/Location 4

PPHL-516,517,518 Photojournalism II
Registration #0904-516,517,518

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

Class 4, Field 5, Credit 5

PPHL-535,536 Advanced Color Seminar
Registration #0904-535,536

This is a portfolio preparation course. It concentrates on the shooting, structure, and presentation of a body of work. Completion of a four-part thematic assignment and three individual photographic assignments are required. All assignments are non-specific in nature, allowing the student the freedom of his or her own direction. As part of the course requirements, each student will choose an appropriate portfolio format and will begin to show a portfolio. (Fourth-year standing or instructor's permission; PPHL-443,418 or instructor's permission)

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

PPHL-541,542,543 Advertising Photography II
Registration #0904-541,542,543

A course that brings together the artistic and technical input of the first three years of the program and directs the student towards the application of the acquired skills through a series of professionally oriented assignments. (PPHL-443 or equivalent)

Class 4, Studio 5, Credit 5

PPHL-551 Special Topics
Registration #0904-551

Advanced topics of current or special interest, varying from quarter to quarter, selected from the field of professional photographic illustration. Special topics announced in advance. (Not offered every quarter. Consult coordinator of the Professional Photographic Illustration Program.)

Credit variable

PPHL-599 Independent Study
Registration #0904-599

A student-proposed advanced project sponsored by an instructor. Approval of the proposal by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.

Class, Credit variable

Photo Systems Management

PPHM-401 Photo Process Control
Registration #0905-401

Analytical methods of studying photographic processes; methods of obtaining data about processes, including chemical and physical factors; methods of making process adjustments, including automatic control methods.

Class 2, Lab 6, Credit 4 (F)

PPHM-440 Basic Photo Lab Operations
Registration #0905-440

A 10-week summer course that provides an opportunity for students of disciplines other than photography or business to gain an understanding of all aspects of the modern photo laboratory. Course is organized to allow the student to take Materials and Processes of Photography (PPHT-210) concurrently.

Class 6, Lab 18, Credit 12 (SR)

PPHM-441,442,443 Basic Photo Lab Operations
Registration #0905-441,442,443 I, II, III

An introduction to the concepts of automated film processing, in black-and-white and color. Theoretical concepts of film processing as well as practical production concepts will be explored and practiced in the laboratory. The concepts of semi-automatic production printers, their set-up, production control, and operation will be practiced in a production environment. The flexibility and capability of enlargers for use in custom production will be covered, along with the production of duplicate slides and internegatives.

Class 2, Lab 6, Credit 4

PPHM-521,522 Advanced Photo Lab Operations I, II
Registration #0905-521,522

This two-course sequence offered during the senior year gives the student the opportunity to become familiar with the operation and control of automated photo processing equipment in a production environment. The course will also include the training and supervision aspects of operating a photo processing installation. (PPHM-440, PPHM-443)

Class 2, Lab 6, Credit 4 (F, W, S, SR)

PPHM-525 Photo Lab Management
Registration #0905-525

This course is designed to provide the student with the background knowledge necessary to plan, set up, and operate a photo processing laboratory. Included in this course will be a study of production methods, work flow, equipment, and personnel utilization. Production line costing methods will be discussed, along with monitoring procedures for quality, waste, and cost control. (Permission of the instructor)

Class 4, Lab 4 (S)

PPHM-530 Photo Lab Materials
Registration #0905-530

This senior-year course offers the student the opportunity to study the factors that go into the refurbishing or building of photo processing installations. The maintenance of equipment no longer manufacturer-supported will also be covered.

Class 2, Lab 2 (F)

PPHM-551,552,553 Special Topics in
Registration #0905-551, Photographic Processing and
552,553 Finishing Management

A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered.

Credit Variable

PPHM-599 Independent Study
Registration #0905-599

A student-proposed advanced project sponsored by an instructor. Approval of the proposal by department chairperson and director of the school.

Credit variable

Imaging and Photographic Technology

PPHT-201,202,203 Photography I
Registration #0920-201,202,203

A study of the fundamentals of photography with emphasis on the development of the needed creativity, craftsmanship, theory and visual communications to undertake advanced study in the medium. The theory and technical aspects are taught as they relate to solving photographic problems.

Class 4, Studio 4, Lab 4, Credit 7

PPHT-210 Materials and Processes
Registration #0920-210 of Photography

An intensive 10-week summer course for students entering a transfer program in Biomedical Photographic Communications or Imaging and Photographic Technology. This course replaces PPHT-211, 212, 213. (Either this course or the PPHT-211, 212, 213 sequence is also a requirement in the Professional Photographic Illustration Program.)

Class 9, Credit 6 (SR)

**PPHT-211,212,213 Materials and Processes
Registration #0920-211,212,213 of Photography**

Basic study of the technology of photography, with the emphasis on applications to real photographic problems. Among the topics studied are image formation and evaluation, photosensitive materials, exposure, processing, tone reproduction, visual perception, color theory, variability, quality control, and photographic effects. An independent study project is required.

Class 3, Credit 3

**PPHT-220,221 Survey of Imaging and
Registration #0920-220,221 Photographic Technology**

This course is designed to provide students with information concerning career opportunities within the field of imaging and photographic technology and subdivisions of specialization, and includes presentations by experienced professionals representing a variety of positions.

Class 1, Credit 1

**PPHT-301 Photographic Sensitometry
Registration #0920-301**

Principles of sensitometric methods as applied to the selection and use of photographic emulsions. Problems in exposure processing, densitometry, and data interpretation will be addressed. The characteristics of commercially available sensitometers and densitometers will also be reviewed. The laboratory work will consist of practical comparisons of currently marketed photographic materials upon which the student is required to prepare written and oral reports. (PPHT-213)

Class 2, Lab 3, Credit 3

**PPHT-302 Technical Photographic
Registration #0920-302 Chemistry**

The basic chemistry of black-and-white and selected color processes is presented. Developer, short stop, fixation, bleaching and reversal are investigated. Student-designed investigations are carried out. Technical notebook and report preparation are required.

Class 2, Lab 3, Credit 3

**PPHT-303 Photographic Optics
Registration #0920-303**

The principles of geometrical optics as applied to image formation, lens types, lens aberrations, lens testing, and optical instruments, including the human eye, and radiometric applications to optical systems. (SMAM-204, SPSP-211, 212, 271,272)

Class 2, Lab 3, Credit 3

**PPHT-305 Portrait Retouching
Registration #0920-305**

The study and application of different techniques, materials and processes used in portrait retouching of negatives and prints. Projects making use of these techniques, materials and processes will be required.

Class 2, Lab 4, Credit 3

**PPHT-306 Commercial Retouching
Registration #0920-306**

The study and application of the techniques, materials and processes used in commercial retouching. Projects making use of these techniques, materials and processes will be required.

Class 1, Lab 4, Credit 3

**PPHT-307 Basic Airbrushing
Registration #0920-307**

Study of the different types of airbrushes and their uses. A series of lessons will develop skill in the handling of the airbrush and an understanding of when and how the airbrush is used to retouch photographs.

Class 1, Lab 4, Credit 3

**PPHT-311 Color Photography/Photographic Design
Registration #0920-311**

The exploration of images through the application of visual elements, principles and attributes, including the key and quality of light in the making of photographs, color contrast and rendition, and comparison of rendition from different materials.

Class 2, Lab 4, Credit 4

**PPHT-312 Color Printing/Theory
Registration #0920-312**

This course provides an introduction to color theory and the exploration of color processes utilizing practical laboratory procedures and photographic color reproduction processes. This will support lectures and readings on applied color theory relating to both color photography and its applications. Important topics, in addition to color materials and processes, include color vision, psychological aspects of color, color terminology, and color measurement and specification.

Class 2, Lab 4, Credit 4

**PPHT-313 Color Measurement
Registration #0920-313**

Equipment and methods used for the measurement of color will be discussed and demonstrated in the laboratory. Topics covered include light sources, radiometry, spectrophotometry, color order systems, and reproduction of color. Pascal programming will be presented and programming assignments will be required. (PPHT-321 or equivalent)

Class 2, Lab 4, Credit 4

**PPHT-321 Applied Computing for
Registration #0920-321 Technical Photography**

Current time-sharing computer facilities will be introduced with emphasis on specific hardware and software packages available on these facilities including word processing. Introductory material on Pascal programming will be presented. Programming assignments will be required. (Limited to Imaging and Photographic Technology students or by the permission of the instructor)

Class 2, Credit 3

**PPHT-340 Introduction to Scientific and Technical
Registration #0920-340 Applications of Photography**

Introduction to special or unusual methods particularly useful in technical, scientific or research photography. Emphasis on the student's development of innovative solutions to a set of photographic problems. Topics to include such subjects as high speed photography, strip photography, velocity and time measurement cameras, polarization, time lapse, astrophotography and others. First hand experience is encouraged by participation in simulated and simplified approaches to more complex specialties.

Class 2, Credit 4

**PPHT-341 Introduction to Photography
Registration #0920-341 for Publications**

An introduction to the use of photography in specialized publications in science, industry, business and education. Skill-building assignments to improve competence and an introduction to the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHL-313, PPHT-312 or the permission of the instructor)

Class 2, Lab 4, Credit 4

**PPHT-401,402,403 Photoinstrumentation
Registration #0920-401,402,403 Applications Seminar**

The student will be exposed to a variety of technical, industrial and/or applied photographic experiences in order to gain a fuller understanding of the scope of photography and its applications. Simplified approaches to photographic instrumentation applications are emphasized. Photographic topics are discussed that emphasize scientific and technical applications where photography functions as a tool of measurement and visualization of events that are beyond the range of normal photographic equipment.

Class 1 1/2, Lab 4, Credit 4

**PPHT-404,405,406 Seminar in Photography for
Registration #0920-404,405,406 Publications**

A survey of this type of publication with particular emphasis on the photographic problems involved. Skill-building assignments to improve competence and an introduction to the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHL-313, PPHT-312 or permission of the instructor)

Class 2, Lab 4, Credit 4

**PPHT-411 Preparation of Visuals
Registration #0920-411**

Study of the basic principles and techniques of effective visual communication and design; including charts, graphs, creative 35mm slide techniques, graphic design, and mechanical art requirements for printing. Assignments are compatible with situations in graphic design and AV studio facilities. (PPHT-203 or equivalent)

Class 2, Lab 2, Credit 3

**PPHT-412 Photomacrography/
Registration #0920-412 Photomicrography**

Basic principles of photomacrography and photomicrography with major emphasis on illumination techniques and image formation, with lectures, demonstrations, and projects. (PPHT-303)

Class 2, Lab 4, Credit 3

**PPHT-421 Holography I
Registration #0920-421**

This course is intended to be an introduction to holography theory and techniques. Lectures and demonstrations will cover the materials, processes, and applications of the fundamental types of holograms. Labs will give hands-on experience with the construction and playback of transmission, reflection, and focused image hologram types. (Algebra and physics)

Class 2, Lab 4, Credit 4

**PPHT-422 Applications of Holography
Registration #0920-422**

This course is designed to give the student a range of experiences in the production and evaluation of holograms as applied to scientific and engineering problems. Instruction is given in both the theoretical and practical aspects of holographic interferometry and nondestructive testing as well as holographic optical elements, computer-generated holography and coherent optical processing. The student is expected to have previous experience in basic display holography.

Credit 4

**PPHT-425,426,427 Nature Photography
Registration #0920-425,426,427**

Students will learn the fundamentals of professional nature photography as exhibited by such magazines as *Audubon* and *National Wildlife*. Topics include selection and care of equipment, use of strobes, adapting to adverse weather conditions, sales of photographs, copyright law, free lance, and more. Students will be required to spend a minimum of several hours per week shooting in natural environments. (PPHT-203 or permission of instructor)

Class 4, Field 4, Credit 4

**PPHT-431 Architectural Photography
Registration #0920-431**

An image-making course for advanced students with a specific interest in interior and exterior architectural photography. Assignments are designed to emphasize the development and exploration of professional attitudes and techniques while providing a comprehensive study of the subject. All required work will be on color transparency materials. (PPHL-313, PPHT-312 or permission of the instructor)

Class 3, Credit 9 (SR only)

**PPHT-441 Introduction to Dye Transfer
Registration #0920-441**

An introduction to the dye transfer process using pan matrix film with emphasis on the understanding of its theoretical principles, and on the mastery of basic transfer techniques. This includes the preparation of transfer prints from the student's color negatives. (PPHT-312 or equivalent)

Class 1, Lab 6, Credit 4

**PPHT-442 Advanced Dye Transfer I
Registration #0920-442**

A continuation of the dye transfer process with emphasis on the understanding and mastery of masking and color separation (analysis) of a color transparency. The synthesis is accomplished by the making of a dye transfer print. (PPHT-441, PPHT-312 or equivalent)

Class 1, Lab 6, Credit 4

**PPHT-443 Advanced Dye Transfer II
Registration #0920-443**

This quarter of the dye transfer program is devoted to the variations of standard techniques and further extension of improvement of procedures. Difficulty of procedure will determine number of assignments required. (PPHT-442 or equivalent)

Class 1, Lab 6, Credit 4

PPHT-444 **Reversal Color Printing**
Registration #0920-444

A one-quarter course on reversal color printing procedures, printing and processing. The student will gain proficiency in using reversal print material. (PPHT-312 or permission of the instructor)

Class 1, Lab 4, Credit 3

PPHT-446,447, 448 **Advanced Color**
Registration #0920-446,447,448 **Printing I, II, III**

This course provides advanced study in color techniques and theory in relation to quality and creative use of photographic materials. The student may choose a section for intensive study such as the dye transfer process, quality control methods in printing and processing and special masking. (PPHT-312 or equivalent and permission of the instructor)

Lecture 1, Lab 6, Credit 4

PPHT-450 **Photographic Scanning Systems**
Registration #0920-450

The student will receive instruction and make photographs related to the ever-increasing application of scanning imaging systems in industry, especially as these relate to industrial, scientific, and technical applications. Simplified and experimental equipment will be demonstrated and used. Primary emphasis will be on demonstrating a thorough understanding of the imaging processes and controls at work in systems such as peripheral, photofinish, strip enlarging, and panoramic recording methods. (For upper-division PPHT students; others with permission of the instructor)

Credit 4

PPHT-460 **Special Effects Photography**
Registration #0920-460

A course designed for practicing photographers and students in which photographic effects beyond those encountered in everyday situations in illustrative, commercial and advertising photography are discussed and practiced. Among the topics to be covered are stroboscopic, peripheral, scanning, high-speed flash, matte box, and combination flash/tungsten photographic techniques. (For upper-division SPAS students)

Credit 4

PPHT-470 **Introduction to Digital Image Processing**
Registration #0920-470

Exploration of the technology, theory and application of digital image processing equipment and procedures, particularly in relation to photographic processes. Principles of input, output and computer processing techniques will be covered. Applications such as contrast enhancement, edge sharpening and smoothing will be included. (PPHT-210 or 213)

Class 2, Lab 4, Credit 4

PPHT-499 **Co-op**
Registration #0920-499

This course is designed to provide students with on-the-job experience in the field of imaging and photographic technology. The student will seek and acquire a school-approved co-op position in business or industry. The working environment will provide the forum for learning more about the student's chosen career. A final interview with the co-op coordinator will assist the student in evaluating the experience.

Credit 0

PPHT-501 **High-Speed/Time-Lapse**
Registration #0920-501 **Photography**

This is a course in the theory and practice of photographic systems designed to permit analysis of events of very short or of extended duration. Included are operational characteristics of time-lapse cameras, sequencing and timing control devices, time magnification relationships. Also, characteristics of intermittent and rotating prism cameras, rotating mirror and drum cameras, synchronization system and timing controls and high speed flash and spark gap systems. Students gain experience not only in the use of the basic equipment but also in proper planning, set-up and data reduction techniques through a series of practical experiments. (For upper-division PPHT students; others with permission of the instructor)

Class 2, Lab 4, Credit 3

PPHT-502 **Introduction to Research**
Registration #0920-502

This course leads to a completed proposal in preparation for the Senior Project (PPHT-503). It guides the students in preparing formal proposals for their projects, including selection of topics, searching the literature, and proposal evaluation.

Class 1, Credit 1

PPHT-503 **Research Project**
Registration #0920-503

Investigation of a topic in the area of applied, technical, or scientific photography, involving camera and/or laboratory work, evaluation, oral presentation of the results, and a written report in a standard format. (PPHT-502)

Class 1, Lab 4, Credit 3

PPHT-504 **Survey of Nonconventional**
Registration #0920-504 **Imaging**

A survey of imaging methods and imaging systems not normally encountered in other technical photography courses, including UV, IR, 3D, holography, electrophotography, x-ray, and non-silver applications. (For upper-division PPHT students; others with permission of the instructor)

Class 1 1/2, Lab 3, Credit 3

PPHT-520 **Color Photography Workshop**
Registration #0920-520

A creative color workshop with the goal of producing visually effective color photographs. The student is free to choose from a large variety of assignment suggestions to structure a program individually as an independent study. Besides creativity, principles of design and photographic controls will be important. Most photographs will be produced on color transparency material. The last two weeks can be spent color printing for those wishing this experience.

Students are expected to furnish their own small or medium format cameras and supplies. Large format cameras and chemicals are furnished. Color film and paper expenses can be expected to run as high as \$75 to \$100. (Some previous photographic experience required. Registration limited; permission of the instructor)

Credit 9 (SR)

**PPHT-551,552,553 Special Topics in Imaging and
Registration #0920-551,552,553 Photographic Technology**

A seminar approach offered on demand when adequate numbers of students and a faculty member agree to study a subject not normally offered. Available to upper-level students.

Credit variable

**PPHT-599 Independent Study
Registration #0920-599**

A student-proposed advanced project sponsored by a faculty member. Approval of the proposal by the department chairman and the school director required. Available to upper-level students with a GPA of 3.0 or higher.

Credit variable

Center for Imaging Science

All courses in the Center for Imaging Science are offered at least once annually, except as noted.

Imaging Science

**PIMG-220 Introduction to Imaging Science
Registration #0925-220**

This course is offered during Summer Quarter to students who wish to transfer to the Imaging Science BS degree program at the sophomore level. Prerequisites for the course include one year each of physics, calculus and chemistry (with lab) at the college level. Topics include basic materials and methods of imaging science, an introduction to RIT's computer system and the C language. Laboratory experiments include image sampling and quantization, optical imaging, densitometry and sensitometry.

Credit 8

**PIMG-231 Survey of Imaging Science
Registration #0925-231**

Survey of Imaging Science is the first course in the curriculum. It describes the field of imaging science and introduces students to the component parts of many imaging systems.

Credit 3

**PIMG-232 Imaging Science Seminar
Registration #0925-232**

Survey of the features of several imaging systems, including optical systems, radar, sonar, x-ray, holography, etc. (PIMG-231, 241)

Credit 2

**PIMG-233 Introduction to Imaging Science
Registration #0925-233**

Introduction to Imaging Science continues the work begun in PIMG-231 and PIMG-232, introducing students to several non-conventional imaging systems. The student designs and performs an independent project.

Credit 2

**PIMG-241 Introduction to VAX/VMS C
Registration #0925-241**

An introductory-level course in computer programming techniques to solve problems in the field of imaging science. The student will be introduced to the VAX/VMS operating system and the VAX (ANSI) C programming language and shown how to use these facilities to solve computational problems.

Credit 3

**PIMG-345 Interaction Between Light
Registration #0925-345 and Matter**

This course emphasizes the interaction of electromagnetic energy with various states of matter. This includes the creation, propagation, and destruction of electromagnetic energy. Topics covered include: the electromagnetic spectrum; reflection, absorption, and transmission of energy; vibrations and simple excitations; molecular orbitals; band theory; and optical interactions. (SPSP-313, SCHG-206)

Credit 4

**PIMG-351,352 Math and Computation
Registration #0925-351,352 for Imaging Science**

This two-quarter course covers mathematical topics of special importance and relevance to imaging science. Topics include: vector analysis, matrix analysis, complex variables and analysis, linear algebra, differential equations, and Fourier analysis. (SMAM-305)

Credit 4

**PIMG-361 Geometrical Optics
Registration #0925-361**

An introduction to the characteristics of optical components and optical imaging systems; refracting and reflecting surfaces and components; stops, pupils, and the propagation of energy through optical systems. Discussion of lenses, cameras, collimators, telescopes, and other instruments. Limitations on system performance. (SPSP-312)

Credit 4

**PIMG-362 Physical Optics
Registration #0925-362**

An introduction to the principles of wave optics. Topics include one- and two-dimensional vibrations; wave motion; superposition of waves; polarization; interference and interferometry; single, double, and multiple slit diffraction; and coherence. (SMAM-251, 252, PIMG-231,232, 233, or permission of instructor)

Credit 4

**PIMG-365 Chemical Imaging Principles
Registration #0925-365**

This course is a rigorous mathematical and quantitative treatment of the chemical principles underlying selected imaging systems. Lectures will emphasize both physical chemistry and organic chemistry principles involved in emulsion chemistry, polymer chemistry, surface chemistry, and electrochemistry. Laboratory sessions will emphasize instrumental analysis and spectroscopy.

Credit 4

PIMG-543 **Optical Engineering****Registration #0925-543**

An introduction to the characteristics of optical components and their combination into instrument and imaging systems. Radiation sources. Refracting and reflecting optical components. Stops, pupils and the propagation of energy through optical systems with both image forming and image recording elements. Radiation measurement techniques and apparatus. Discussion of lenses, cameras, collimators, telescopes, alignment and measurement apparatus, and other instruments. Limitations of system performance. (PIMG-541)

Class 3, Lab 3, Credit 3

PIMG-551,552,553 **Special Topics in Imaging****Registration #0925-551,552,553**

Topics of special interest, varying from quarter to quarter, selected from the field of imaging science and not currently offered in the division's curriculum. Specific topics are announced in advance. (Not offered each quarter. Consult director of the Center for Imaging Science)

Class, Credit variable

PIMG-561,562,563 **Microelectronic****Registration #0925-561,562,563****Chemistry I, II, III**

Selected topics from organic, polymer, physical, and photographic chemistry important to the understanding of silver-halide, diazo and photo resist materials (EMCR-340, PIMG-221, PIMG-543)

Class 3, Lab 3, Credit 4

PIMG-566 **Imaging Systems Analysis****Registration #0925-566**

An analytical approach to evaluating imaging systems using linear systems theory. The concepts of convolution and Fourier methods and the use of frequency analysis and Fourier methods are emphasized. (PIMG-351, 352)

Credit 3

PIMG-567 **Advanced Imaging****Registration #0925-567****Systems Analysis**

This course is a continuation of PIMG-566 and extends the linear-systems formalism for analyzing and characterizing imaging systems; point, line, and edge spread functions; optical, modulation, and phase-transfer functions; coherent and incoherent optical systems. (PIMG-566)

Credit 3

PIMG-568 **Quantum Limitations of****Registration #0925-568****Imaging Processes**

The effects of random variations in collected radiant energy and/or detector response on image quality; characterizing stochastic processes and noise; film graininess and granularity; propagation of quantum effects through a linear system to the image. (PIMG-567)

Credit 3

PIMG-599 **Independent Study****Registration #0925-599**

A student-proposed advanced project sponsored by an instructor. Approval required by the department chairperson and the director of the school. Available to upper-level students with a GPA of 3.0 or greater.

Class, Credit variable

School of Printing Management and Sciences

All courses in the School of Printing Management and Sciences are offered at least once annually, except as noted.

Management Courses

PPRM-203 **Printing Computer Seminar****Registration #0910-203**

This seminar introduces Printing and Applied Computer Science students to the program. Students meet for one hour each week with the program coordinator for discussion of various topics of interest to entering students.

Class 1, Credit 1

PPRM-205,206,207 **Newspaper Seminar I, II, III****Registration #0910-205,206,207**

This three-quarter, sequential, one-credit-hour course is required for all Newspaper Operations Management majors. All other majors must have faculty approval to enroll. Course topics revolve around the newspaper industry in relation to the printing industry in general. The basic purpose is to provide an understanding of how the newspaper industry is similar, to, and different from, the printing industry in general.

Specific topics will include the technological and management considerations unique to newspaper production. This course will also serve as an introduction to the technology and procedures applied in the Newspaper Production Laboratory (NewsLab), that will play a major role in the other required newspaper courses.

Class 1, Credit 1 (each quarter)

PPRM-240 **Printing Financial Controls****Registration #0910-240**

Plant accounting systems covered as a tool for improving production management decisions. Topics include accounting's general philosophy and structure, inventory, equipment, job cost, standard cost and analysis of variance, budgeting and control techniques.

Class 4, Credit 4

PPRM-260 **Printing Planning Concepts****Registration #0910-260**

A required professional course designed to provide the student with the basic principles of price determination as it relates to marketing. Special emphasis on estimating will link those marketing concepts with practice to arrive at a selling price for printed materials. Class discussions, readings and problems will be directed toward a better understanding of the relationship of marketing and planning in a printing environment.

Class 4, Credit 4

PPRM-261 **Standard Software Packages****Registration #0910-261**

An introduction to software available at RIT on both the VAX/VMS system and on microcomputers housed in various locations on campus. Emphasis is on use of electronic mail, word processing, spreadsheets, statistical packages, database management and communications software to generate, analyze and present information relevant to the printing industry.

Class 2, Credit 2

PPRM-262 **Technical Writing I**
Registration #0910-262

A review of writing skills; an analysis of the purpose, problem, and audience of specific writing tasks. Consideration of the principles, techniques, organization, and appropriate format, style, tone, and word choice to achieve a desired writing purpose. Lectures presenting new material and reviewing assignments; and in-class writing, critiquing, and rewriting. (English Composition, GLLC-220)

Class 2, Credit 2

PPRM-263 **Technical Writing II**
Registration #0910-263

Discussion of fundamentals of modern technical and business writing: brief review of writing skills, audience analysis, and discussion, and selection of appropriate style, tone, and format. Discussion of research techniques, documentation, and presentation of a formal technical report. (PPRM-262)

Class 2, Credit 2

PPRM-280 **Printing Management**
Registration #0910-280 **Leadership Concepts**

This required course is designed to give students basic knowledge of the systems approach to management by studying the management of functions in production organizations. Emphasis is on people input and the system. Class sessions include lectures, films, discussions, etc., as appropriate. Homework includes reading and writing assignments.

Class 4, Credit 4

PPRM-305 **Magazine Writing and Design**
Registration #0910-305

A discerning look at what goes on in the competitive world of magazine publishing. An overview of the history, the business side, and the production side of the magazine industry. The first week will be devoted mainly to writing techniques, and the second week to the design techniques.

Credit 3 (SR)

PPRM-320 **Introduction to Magazine Publishing**
Registration #0910-320 **and Management**

A survey course designed to give the student insights into the editorial, production, management, fulfillment and distribution processes vital to the success of any magazine. Leaders from the magazine publishing industry are invited to present 3-hour guest lectures on a major aspect of their profession. Graduates of the printing program who have attained prominence within the industry are often guest speakers, encouraging interaction between current and former students.

Class 3, Credit 3

PPRM-330 **Introduction to Business**
Registration #0910-330 **Forms Manufacture**

A basic course -intended to acquaint the student with the design and manufacture of business forms as practiced in the industry.

Class 3, Credit 3

PPRM-340 **Non-impact Printing Technology**
Registration #0910-340

The course will cover printing methods using electrostatic technology as practiced on high speed copier machines. Along with the theory of operation, the course will include: how these devices fit in the in-plant, commercial, and quick-print-shop installations, cost factors, quality, and profitability in comparison to offset. The use and principles of lasers in electronic printing, as well as color copiers, will be included. In addition, several other non-impact printing methods, such as ink jet and thermal, will be presented. Each student will have a training session on a modern high-speed, high-quality copier.

Class 3, Credit 3

PPRM-350 **Economics of Production Management**
Registration #0910-350

Microeconomic study of factors in printing production systems. Supply and demand theories are applied to printing system inputs and outputs.

Class 4, Credit 4

PPRM-360 **Estimating Practice**
Registration #0910-360

A detailed study of the practice of estimating that will provide the student with the understanding that the final price of a printed job is the result of a series of planning decisions made during the estimating process. Development and the use of production standards and hourly rates will be analyzed to determine their importance in the pricing structure of printed materials. (PPRM-260)

Class 4, Credit 4

PPRM-361 **Electronic Printing Standards**
Registration #0910-361

A study of existing and emerging standards for the representation, creation, manipulation, storage, retrieval, translation, and output of documents and publications. Lab projects will be assigned regularly and will be presented in the form of problems to be solved by the students using software tools provided by the instructor. Students will be expected to have command of a programming language such as BASIC, Pascal, Modula-2, or C. (ICSA-208 or equivalent)

Class 3, Credit 3, Open Lab

PPRM-370 **Math Modeling for Printing**
Registration #0910-370 **Operations**

Explores certain analytical models that can be used practically in an ordinary printing company. Includes such topics as decision theory, probability concepts, mathematical modeling, break-even and economic-order analysis under conditions of risk, Markov chains, waiting-line analysis, game theory, simulation. These topics are considered without emphasis on mathematics beyond college algebra.

Class 4, Credit 4

PPRM-375 **Printing Operation Measurement**
Registration #0910-375 **and Improvement**

Explores practical techniques that printing companies can use in the areas of methods improvement, work measurement and control, production standards and operations indicators, equipment evaluation, proposals and financial analysis, systems analysis and standard practice instructions.

Class 4, Credit 4

PPRM-380 **Supervision in**
Registration #0910-380 **the Graphic Arts**

This course is designed to enable the student to meet the social, employee and management needs in the manning of a graphic arts operation. Subjects covered are: the nature of the employment relation; hiring; motivation and training; discipline; firing; layoffs and plant closures. (PPRM-280)

Class 4, Credit 4

PPRM-381 **Dynamics of Personal**
Registration #0910-381 **Leadership in Printing**

Required for third-year students in the PPRP program to prepare for more effective leadership and personal success in the printing industry. Provides guided opportunities for students to consider printing management principles in more practical, laboratory-type situations that can be provided in larger lecture-hall concepts courses. The purpose is to facilitate applications of management theory in career-related situations. This course helps students understand the nature of the printing industry and the personal skills, habits, etc. that will improve their effectiveness in an industry position.

Class 5, Credit 3

PPRM-415 **Advanced Ink and Color**
Registration #0910-415

Further study of ink and color with emphasis on relationship to printing processes and print qualities. Study of inks for special purposes as well as ink-jet and electrostatic printing. New types of inks such as acrylic ink, water based inks, etc. New ideas in inks such as IR drying. Study of materials used in ink manufacturing and the effects on printing processes and print qualities. Study of color with emphasis on color gamut system and problems in process color printing. Study of ink-paper relationship. Further study of ink rheology and other physical properties. The course will deal with inks for all the processes. (PPRT-332 or permission of instructor)

Class 4, Credit 4

PPRM-420 **Electronic Communications in**
Registration #0910-420 **the Printing and Publishing**
Industries I

Presentation of an overview of electronic communication theory and its application to the publishing industry. The course provides the student with the background necessary to relate publishing requirements to electronic system parameters. Several practical newspaper systems are discussed. (SMAM-225, 226)

Class 4, Credit 4

PPRM-430 **Advanced Business**
Registration #0910-430 **Forms Production**

This course extends PPRM-330, Introduction to Business Forms, by going more deeply into the study of some forms products introduced in that course, specifically through lab work, and by studying additional production management aspects of forms. Lecture hours are used to discuss management aspects of forms plants. Students are encouraged to discuss what they have observed in other classes, field trips, lab work, and co-op experience. Lab time is used to give students experience in forms production with emphasis on understanding the work required and the problems associated with managing production. As far as possible, the work is done within school labs, supplemented by field trips to cooperating plants.

Class 2, Credit 4, Lab 6

PPRM-450 **Expense and Capital Project**
Registration #0910-450 **Budgeting and Control**

Studies plant accounting systems as a tool for improving production management decisions. Topics include inventory, equipment, job cost, standard cost and analysis of variance, budgeting and control techniques, financial analysis of projects, proposal development.

Class 4, Credit 4

PPRM-460 **Dynamic Leadership and**
Registration #0910-460 **Committee Management**

Leadership and leadership skills are considered the foundation stones for good management. This course is designed to examine the principles and apply them. There is a concentration of the priority skills of communications, motivation, and conference management. The course is structured as a "Conference On Leadership" with the details of managing a seminar running in parallel. The "Case Method" of study is followed. A review of three books and a short term paper are required.

Class 4, Credit 4 (SR)

PPRM-462 **Computer Estimating Systems**
Registration #0910-462

A continuation of PPRM-360 in which more complex jobs are estimated, including some on the web offset press. An introduction to the use of the computer in estimating: comparative estimates are made and graphed to determine optimum printing quantities for press size, imposition and cost. An analysis of computer estimating systems provides a guide to selection and use of these systems. (PPRM-360)

Class 4, Credit 4

PPRM-505 **Management of Training in**
Registration #0910-505 **the Graphic Arts Industry**

Students examine the role and issues associated with training in the graphic arts industry. Topics include the growth and importance of training in the industry, roles and responsibilities of training personnel, the nature of training, resources available to training managers, and financial considerations of training. (PPRT-500)

Class 3, Credit 3

PPRM-506 **Business Law**
Registration #0910-506

Elements of the laws of contracts, agency, sales, partnerships, corporations, taxes, insurance, workers' rights, and other laws pertaining to business, printing and publishing.

Class 3, Credit 3

PPRM-508 **Legal and Ethical Conduct**
Registration #0910-508 **of Printing Businesses**

A study of the legal and ethical implications faced by printing companies when involved in making day-to-day and long-term business decisions. Students become acquainted with current printing business ethics, as well as the various laws regulating competition in the printing industry marketplace. Students are shown the impact their various business decisions will have upon their companies, co-workers and themselves.

Class 4, Credit 4

**PPRM-511 Labor Relations in Graphic Arts
Registration #0910-511**

A study of the organization of the United States labor force through the impact of national legislation and the construction of the same by United States Supreme Court and National Labor Relations Board decisions. Study includes rights of employees, their free choice of representation, duty of fair representation, right to strike, and future modification of the field.

Class 4, Credit 4

**PPRM-512 Collective Bargaining
Registration #0910-512
in the Graphic Arts**

An elective for students who have successfully completed PPRM-511. Study includes selection of representatives for the purposes of collective bargaining, negotiation of the agreement, and administration of the agreement. (PPRM-511)

Class 4, Credit 3

**PPRM-513 Sales in the Graphic Arts
Registration #0910-513**

Explores economic, psychological and sociological bases of selling, with emphasis on customer and salesmen interplay as well as techniques and practices of creative salesmanship in graphic arts companies. This course aims at benefiting both students considering a career in sales and those who will otherwise work with salesmen, either by supporting their company's salesmen in plant action or by buying from outside salesmen.

Class 4, Credit 4

**PPRM-514 Newspaper Management
Registration #0910-514**

Consideration of personnel, organization, finance, maintenance, advertising, circulation, and other sources of revenue as they pertain to the metropolitan press; problems and practices of plant supervision.

Class 4, Credit 4

**PPRM-515 Legal Problems in Publishing
Registration #0910-515**

A comprehensive review of United States Supreme Court decisions as they relate to the unique rights granted to the graphic arts industry. Cases cover Article I, Section 8 of the United States Constitution and the First and other amendments.

Class 4, Credit 4

**PPRM-516 Marketing in Graphic Arts
Registration #0910-516**

Key concepts and issues underlying the practice of marketing in graphic arts industries are discussed by the class. Discussion is encouraged to develop predisposition to *use* marketing rather than to merely acquire facts about marketing.

Class 4, Credit 4

**PPRM-518 Purchasing in the
Registration #0910-518
Graphic Arts**

Role of the purchasing agent in the printing plant. Methods of procurement, purchasing policies and sources of supply. Characteristics of graphic arts materials and supplies; quality assurance; inventory control; economic order quantity determination; make or buy decisions; blanket orders; capital investment decisions; the purchase order as a legal document.

Class 4, Credit 4

**PPRM-520 Systems Planning
Registration #0910-520**

An introduction to problem-solving techniques utilizing applied statistical tools in management situations.

Class 4, Credit 4

**PPRM-530 Establishing a Graphic Arts
Registration #0910-530
Operation**

This is an elective course for seniors only with permission of the instructor. The course is a study of the problems to be encountered in the establishment of a graphic arts operation. Students will organize their own printing-related operation as they study general planning, financing, physical requirements for operation, sales and merchandising, general management and operational problems. The purpose of the offering is to coordinate students' activities with a focus on the benefits and burdens of the responsibility of establishing a graphic arts business, (senior status with Instructor permission)

Class 3, Credit 3

**PPRM-540 Electronic Communications in the Printing
Registration #0910-540
and Publishing Industries II**

Development of the necessary mathematical and physical principles to understand the limitations of practical communication systems and the fundamentals of network operation. (PPRM-420)

Class 4, Credit 4

**PPRM-551 Special Topics-Printing
Registration #0910-551**

A management, or management-related, course used to present and investigate on a "one-time" basis special topics not normally covered in the curriculum. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Subject to be covered is announced in advance.

Credit variable

**PPRM-560 Computer Estimating
Registration #0910-560
Program Design**

The design and implementation of computer estimating systems. The class will work as a systems design team with each student required to research, design, code, debug and document an algorithm for a specific printing operation that will run within the framework of the overall system design. Classroom lectures will focus on good program design, data structures, disk file handling techniques, and error handling subroutines. The class will use Quick BASIC, a compiled language that runs on IBM-compatible personal computers under the MS-DOS operating system. (PPRM-462, some knowledge of BASIC, Turbo Pascal, C or another high-level programming language and willingness to undertake a major programming project)

Class 4, Open Labs, Credit 4

**PPRM-599 Independent Study
Registration #0910-599**

Student selects and develops, with approval from a faculty sponsor, an independent study project of his or her own design. Project and amount of credit assigned must have final approval from the director of the School of Printing Management and Sciences. (Generally seniors with qualifying GPA)

Credit 1-5

Technical Courses

PPRT-200 **Introduction to Printing** **Registration #0911-200**

An overview of the printing processes from design to the finished product. Laboratory experience for students to design and print a project consistent with their professional interests. Class lectures, demonstrations and hands-on lab experiences.

Class 1, Lab 3, Credit 3

PPRT-210 **Newspaper Presses** **Registration #0911-210**

An introduction to the printing processes and press designs used in the production of newspaper products. Letterpress, offset and flexographic presses are considered along with modified processes now being adopted and tested for newspaper applications. (PPRT-320)

Class 2, Lab 3, Credit 3

PPRT-213 **Principles of Copy** **Registration #0911-213** **Preparation**

A basic course involving fundamental methods and techniques of copy preparation. It stresses the assembly of copy for various printing specialty areas and compares their likenesses and differences. Lectures cover all aspects of copy as used in making the "mechanical" and how the "mechanical" relates to the entire production system.

Class 2, Lab 3, Credit 3

PPRT-230 **Printing Processes Concepts** **Registration #0911-230**

This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to both the printing process and press systems. Class sessions will consist of lectures, including films and videotape presentations. Outside assignments will consist of reading assigned portions of textbooks, vendor literature and journal articles relative to the lecture topics.

Class 4, Credit 4

PPRT-232 **Ink and Substrates** **Registration #0911-232**

Provides a basic understanding of the many different kinds of ink and substrates utilized by the various printing processes. Substrate composition, runability, printability, and end-use requirements are covered, as well as the different formulation of inks and their drying systems. Requirements of each printing process and the printed product as they relate to the ink and substrate properties are covered.

Class 3, Credit 3

PPRT-234 **Print-Finishing and Distribution** **Registration #0911-234**

Most printed products must be finished into a marketable form and distributed by various means. Print-finishing may be done in-line on web presses or in a conventional bindery. Planning for such post-press operations requires extensive knowledge from design to the finished product. This course is designed as an introduction to pre-press planning for print-finishing and distribution.

The emphasis is on cost-effective planning and management, familiarization with the mechanical limitations in print production and on modern tools and methods in distribution technologies.

Class 3, Credit 3

PPRT-239 **Gravure Process** **Registration #0911-239** **For Non-Printing Majors**

Building upon concepts of the gravure process learned in Introduction to Printing, PPRT-200, this course expands on the theories and practices of the gravure process. The course includes both cylinder imaging and presswork and involves information on related techniques, equipment, materials and supplies. Course conducted by means of lectures, class discussions, demonstrations, and supervised laboratory exercises. (PPRT-200)

Class 2, Lab 3, Credit 3

PPRT-240 **Lithographic Process** **Registration #0911-240** **For Non-Printing Majors**

The primary objective of this course is to instill in the non-printing major a basic understanding of the capabilities, limitations and applications of lithography in the printing market. In lecture the student is presented the underlying theories of the lithographic process. The lab session will be used to teach the basic concepts which printing students are assumed to know from Introduction to Printing (PPRT-200). The course also provides students with the knowledge necessary for more advanced and technical theory presented in Litho Press Problems, should the student desire more lithographic knowledge. (PPRT-200)

Class 2, Lab 3, Credit 3

PPRT-241 **Screen Printing** **Registration #0911-241** **For Non-Printing Majors**

This course is designed to acquaint non-printing majors with screen printing. Its primary focus is how screen printing can be used as a commercial printing process, stressing recent technological advances. Areas of emphasis include: frame construction; fabric selection; stretching of fabric; photomechanical stencil systems; screen printing inks; substrates; and an overview of modern screen printing presses. The economics of screen printing and its relationship to the total area of the graphic arts industry is stressed throughout the course. Laboratory session will be used to teach basic concepts that printing students cover in Introduction to Printing. (PPRT-200)

Class 2, Lab 3, Credit 3

PPRT-250 **Concepts of Design and Typography** **Registration #0911-250**

This is an introductory course designed to acquaint students with the principles of two areas: 1) printing design; 2) typography. Extensive use of slides, overhead materials, handouts and, where appropriate, movies and videotapes will be shown.

Class 4, Credit 4

PPRT-270 **Pre-press Imaging Concepts** **Registration #0911-270**

This required professional course is designed to give students a broad overview of the underlying concepts and scientific principles that are common to image generation, capture, processing, storage display and transfer technologies used in the graphic arts industry. Class sessions will consist of lectures interspersed with films and other audiovisual aids. Homework assignments will consist of reading assigned portions of textbooks, vendor literature, and journal articles related to the lecture topics. In addition, written assignments consisting of paraphrasing of relevant technical articles will be required.

Class 4, Credit 4

PPRT-313 Copy Preparation
Registration #0911-313
 Preparation of copy for camera, working from layouts, making analysis of requirements; pasteup techniques, methods of pre-separation mechanicals, "keyline" mechanicals, use of photographic and typographic copy. Relation to production is stressed by shooting copy on camera, stripping and proofing; proper instructional specification writing. Design and production of individual 4-color; process pre-separation. (PPRT-230, 250, 270)
 Class 2, Lab 6, Credit 4

PPRT-317 Calligraphic Forms
Registration #0911-317
 An introduction to the basics of calligraphy, exercises in use of broad edge pen to develop primary forms of Italic, Roman Capitals, and Uncial letter styles. Evolution of letter forms. Consideration of historical origins of letters, use of basic tools, understanding of methods and disciplines stressed.
 Class 3, Credit 3

PPRT-319 Newspaper Design
Registration #0911-319
 A study of the methods of designing 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 pages, go to camera, make plates, and go to press.
 Class 2, Lab 3, Credit 3

PPRT-322 Circulation and Mailroom
Registration #0911-322
 A study of the organization and functions of newspaper circulation departments. An overview of equipment and techniques used in modern newspaper mailrooms. A study of readership and how it relates to newspaper circulation.
 Class 3, Credit 3

PPRT-328 Flexography for Non-Printers
Registration #0911-328
 An introductory course in the principles of the Flexographic printing process for non-printing major students. Course is designed to add background experiences to students in a wide variety of RIT majors. Emphasis is placed upon the application of flexographic printing technology in packaging and other fields. The elements of artwork, platemaking, inks, substrates and printing are taught. Lab work centers around all flexographic elements with hands-on experience in the production of printed products.
 Class 2, Lab 3, Credit 3

PPRT-329 Introduction to Book Design
Registration #0911-329
 A course intended to give the student an understanding of how a book designer functions within a book publishing firm. Emphasis is placed upon the many factors involved in book design decisions, including the important relationship between book design and book production in producing a readable, functional book. (PPRT-301,303-offered once each year)
 Class 2, Lab 3, Credit 3

PPRT-330 Advanced Concepts of Newspaper Production Systems
Registration #0911-330
 The production of a newspaper by photocomposition methods and the offset process. A continuation of PPRT-320, in more depth, with special emphasis on pre-press operations, and the production of special editions. Also, emphasis on the use of color in newspaper production. (PPRT-320)
 Class 2, Lab 3, Credit 3

PPRT-331 Bookbinding
Registration #0911-331
 An introductory course to the skills of bookbinding and contemporary preservation procedures used to save our printed heritage. Content will cover methods and techniques used in hand bookbinding, including sewing, adhesive binding, gilding and boxmaking. Basic conservation skills are taught. Library binding and end-use requirements of bound products are studied and tested in order to obtain thorough knowledge of the physical requirements of bound books. Course is designed for those who value good craftsmanship and have an interest in binding books. No prerequisite is required. However, a good dexterity is desired. Students should bring several books of their own for rebinding.
 Class 3, Credit 3 (SR)

PPRT-332 Ink and Color
Registration #0911-332
 Theory of light and color; basic theory of process color and corrections; theory and applications of CIE color system; color matching systems; theory and applications of various ink systems; correlation of ink properties with applications, with emphasis on relationships of ink to paper and press; study of ink problems and their correction.
 Class 4, Credit 4

PPRT-333 Introduction to Book Production
Registration #0911-333
 A course designed to introduce the student to the many-faceted role of the production manager in a book publishing firm. Production's role throughout the publishing cycle from manuscript to bound books is examined, and detailed emphasis is placed upon determining production and purchasing requirements for producing a variety of books, including trade books, textbooks, juveniles and special editions.
 Class 3, Credit 3

PPRT-334 Print Finishing Management
Registration #0911-334
 Planning for successful print finishing requires in-depth knowledge of production phases from design through pre-press planning, press, bindery and distribution. This course emphasizes cost-effective planning and management, based in part on an awareness of the mechanical limitations involved in print production and in a contemporary print-finishing environment. (PPRT-234)
 Class 2, Lab 3, Credit 3

**PPRT-376 Electronic Composition Workshop
Registration #0911-376**

An advanced course in the area of composition. The emphasis is upon developing an in-depth understanding of the various aspects of a composition system. An individualized term project is selected by the student, with instructor permission, and an oral and written presentation is made upon completion. The course is conducted by lecture, discussion, and supervised laboratory assignments with individualized projects. (PPRT-375 and instructor's permission)

Class 2, Lab 6, Credit 4

**PPRT-382 Tone Reproduction and
Registration #0911-382 Half-tone Analysis**

A comprehensive treatment of monotone graphic arts photography to an advanced level. Human visual perception, half-tone sensitometry, and process control are emphasized as important factors for the aesthetic and consistency of printed pictorial reproduction. Topics include densitometry, contact screens, flare, reciprocity law, two-point and three-point half-tone sensitometry, electronic screening, film contacting and automatic film processing and its control, plate/press characteristics, dot gain, criteria for subjective tone reproduction, and the Jones diagram for objective tone reproduction analysis. (PPRT-372)

Class 2, Lab 3, Credit 3

**PPRT-390 Application of Electronics
Registration #0911-390 to Graphic Arts**

A basic course in the fundamentals of electricity and electronics covering direct current, alternating current, semiconductors and transistors. Theory will be applied in lab experiments as well as with graphic arts machines and devices. Students will perform laboratory experiments using basic electronic components and instruments. (SMAM-220, SMAM-225)

Class 2, Lab 3, Credit 3

**PPRT-415 Techniques in Hand
Registration #0911-415 Papermaking**

This course offers a practical introduction to the many techniques used in hand papermaking. The class will begin by collecting natural raw materials that can be used in papermaking, and then proceed through the preparation of the pulp. The student will make a deckle box, design a watermark, and then make handmade paper. Fiber identification, pulp dyeing, paper layering, embedding objects into paper, adding pulp selectively to paper surfaces, molding and casting paper will provide the students with a very broad exposure to hand papermaking techniques. Includes experimentation with beating pulp, blending pulps, sizing paper, and coating paper.

Credit 3 (SR)

**PPRT-417 Advanced Calligraphy
Registration #0911-417**

A special 5-day workshop designed to sharpen the skills of serious calligraphers and graphic designers. Emphasis will be on fine tuning traditional lettering styles for personal and commercial use. There will be exercises and discussions about traditional and contemporary techniques and how modern technologies are affecting alphabet design. Students will also see slide presentations, receive individual attention and have exposure to many School of Printing Management and Sciences resources including the Melbert B. Cary Jr. Graphic Arts Collection. (By selection only)

Class 3, Credit 3

**PPRT-438 Advanced Flexography
Registration #0911-438**

An advanced course in the principles and practices of the flexographic printing process. Expanded lab time allows students to get into greater depth in all phases of flexographic technology. Students perform all operations necessary to print a large variety of substrates on all lab presses. (PPRT-338)

Class 2, Lab 6, Credit 4

**PPRT-439 Advanced Gravure
Registration #0911-439**

Building upon PPRT-339, this is an advanced laboratory and technical course embracing the theories and practices of the gravure printing process. Classes include such new course content as electronic image processing, color proofing systems, quality assurance testing for packaging printing, press-side color testing, press design concepts, and the economics of the gravure process. Course includes lectures, laboratory exercises, guest speakers and plant tours. (PPRT-339)

Class 2, Lab 3, Credit 3

**PPRT-441 Screen Printing II
Registration #0911-441**

Further study of the theory and practice of screen printing that will include such topics as experiments with fabric in screen making, stretching screen fabrics on one or more of the tensioning devices, stencil films and the effect they have on a finished product, study of the inks and substrates common to the screen printer. Areas of concentration with this course may be one of the following: flat-bed cycling presses; automatic cylinder screen printing press; container press capable of printing cylinders, conicals, ovals and flat objects; GSP Graphix 2 for making positives from masking materials or cut stencils; and ultra violet curing inks common to the screen printing industry. (PPRT-341)

Class 2, Lab 3, Credit 3

**PPRT-442 Lithographic Press Problems
Registration #0911-442**

An advanced course in the theory, practice, and problems of offset presswork. Further development of technical knowledge of materials and equipment. Practice in running process color work. (PPRT-340)

Class 2, Lab 6, Credit 4

**PPRT-444 Web Offset
Registration #0911-444**

An analytical study of the technological development in web offset. Emphasis on the interrelationship of procedures, materials and equipment. Practical laboratory projects on a commercial four-unit perfecting web offset press. (PPRT-340)

Class 2, Lab 2, Credit 3

**PPRT-452 Layout and Print Design II
Registration #0911-452**

An advanced course involving discussion of traditional design, use of grids, historical evolution of design and contemporary design solutions. Typical commercial printing design problems are explored in laboratory projects, from rough to comprehensive layout. The laboratory problems incorporate traditional rendering techniques with desktop electronic publishing output to produce presentation pieces. (PPRT-352)

Class 2, Lab 6, Credit 4

GCJC-501**Juvenile Justice****Registration #0501-501**

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. This course may also be taken as a Liberal Arts elective.

Class 3, Credit 4 (offered annually)

GCJC-514**Planning and Change in the Criminal Justice System**

It is the objective of this offering to expose the student to issues of planning within the criminal justice system. Police, courts and corrections will be discussed in view of current and proposed changes. The planning of change will be emphasized with regard to organizational issues. In addition, attention will be given to surveying various strategies for accomplishing change. This course is designed to give the advanced student the opportunity to intensely scrutinize the prospective shape of the criminal justice system. (GCJC-204) (Senior status)

Class 3, Credit 4 (offered annually)

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) (Junior status)

Class 3, Credit 4 (offered annually)

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-541**Research Methods in Criminal Justice****Registration #0501-541**

Through lecture, discussion, and activities associated with a research project, the techniques and methods of data collection and analysis are presented. Students will acquire the skills necessary to conduct criminal justice research and the ability to prepare a formal research/evaluation report. The required research projects typically include data gathering and coding procedures, entry of the data to a file on the VAX/VMS, the use of application software (e.g., SPSS, MINITAB, DATAPLOT), and preparation of a final report. (GCJC-401)

Class variable, Credit 4 (offered annually)

Professional Electives**GCJC-206****Administrative Concepts in****Registration #0501-206****Law Enforcement**

The course is intended to provide the student with an overview of the fundamental concepts of organization and administration, and to provide also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively. (GCJC-203, 303) (GCJC Sophomore status or higher)

Class 3, Credit 4 (offered occasionally)

GCJC-302**Organized Crime****Registration #0501-302**

This course provides a critical assessment of the structures of organized crime, its historical development, and the areas in which organized crime operates. Special emphasis will be placed upon how the character of organized crime has changed during the last 30 years, including the movement of organized crime into a variety of legitimate business enterprises. In addition current enforcement strategies will be studied and evaluated. (GCJC-201, 203) (GCJC Sophomore status or higher)

Class 3, Credit 4 (offered occasionally)

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) (GCJC Junior or Senior status)

Class 3, Credit 4 (offered periodically)

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 periodically)

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. (GCJC Junior or Senior status)

Class 3, Credit 4 (offered periodically)

GCJC-406**Computer Application in****Registration #0501-406****Criminal Justice**

This course is designed to introduce students to the use of computer-related terminology, historical, current and potential uses of computers, the classification and the use of various types of computer application programs on both super mini- and micro-computers. Standard application software packages and computer hardware systems will be discussed as they can be utilized in criminal justice settings. In addition, students will have practical experience that will include the use of text processing, data base and spreadsheet software commonly used in criminal justice agencies and academic settings.

Class 3, Credit 4 (offered annually)

GCJC-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 clients. Issues to be discussed will revolve around counseling and supervision strategies and conflicts among agencies, between administrators and staff, and clients. This course will present both the practical and theoretical aspects of these issues as well as devote attention to surveying prospective counseling strategies for accomplishing desired behavioral change. (GCJC-201) (GCJC third year or higher)

Class 3, Credit 4 (offered periodically)

GCJC-511 **Alternatives to Incarceration**
Registration #0501-511

The course analyzes possible sentencing options available to the criminal courts as well as pre-adjudicatory alternatives for both adults and juvenile offenders. The variety of dispositions evaluated include: probation, parole, halfway houses, work-release, study-release, prison furloughs, pre-trial release, pre-probation alternatives (fines, suspended sentences, conditional discharge, and a variety of diversion programs). Special emphasis is placed on a critical evaluation of the alternatives as they compare to the more traditional methods of handling offenders. Field trips and guest lecturers from non-traditional programs are typically included in the course. (GCJC-207, 411) (GCJC third year or higher)

Class 3, Credit 4 (offered occasionally)

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. (GCJC fourth year)

Class 3, Credit 4 (offered occasionally)

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) (GCJC third year or higher)

Class 3, Credit 4 (offered periodically)

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) (GCJC third year or higher)

Class 3, Credit 4 (offered occasionally)

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) (GCJC Senior status)

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) (GCJC Junior or Senior status)

Class 3, Credit 4 (offered occasionally)

GCJC-523 **Crime and Violence**
Registration #0510-523

This course focuses on the outbreak and increase of violent crime and criminal trends in the United States as one of the more serious realities in this century. In addition to an historical review, contemporary problems are explored, covering such topics as violence in the streets, terrorism, riots, vigilantism, and the role of various criminal justice agencies in attempting to control these problems. (GCJC-201) (GCJC Junior or Senior status)

Class 3, Credit 4 (offered occasionally)

GCJC-527 **Seminar in Law**
Registration #0501-527

This course will focus on the nature, function and limits of the rule of law. Attention will be paid to areas of substantive and procedural criminal law to illustrate the nature and limits of the idea of law. Readings will draw from both the classical and modern view of law. (GCJC-301, 304) (GCJC Senior status)

Class 3, Credit 4 (offered occasionally)

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) (GCJC Senior status)

Class 3, Credit 4 (offered annually)

GCJC-529 **Physical Security and Safety**
Registration #0501-529

The course examines, through survey techniques, the complex problems confronting business and industry in the protection of assets. The use of electronic and non-electronic anti-intrusion systems and other hardware is examined and evaluated. Safety and accident prevention, health hazard prevention methods, and fire prevention and control also are examined. (GCJC-201) (GCJC Junior or Senior status)

Class 3, Credit 4 (offered occasionally)

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. (GCJC Junior or Senior status)

Class 3, Credit 4 (offered periodically)

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. (GCJC Junior or Senior status)

Class 3, Credit 4 (offered occasionally)

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. (GCJC Junior or Senior status)

Class 3, Credit 4 (offered occasionally)

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. (GCJC Junior or Senior status)

Class 3, Credit 4 (offered occasionally)

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. (GCJC Junior or Senior status)

Class 3, Credit 4 (offered occasionally)

GCJC-599 **Independent Study**
Registration #0501-599

A combined student/faculty member effort on a chosen topic beyond the normal sequence of course selections. It provides the qualified self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.

Class variable, Credit variable (offered annually)

Economics

The following courses are required for the BS degree. See listings under Service Course area for full course descriptions, unless otherwise indicated.

GSSE-301 **Principles of Economics I**
Registration #0511-301

GSSE-302 **Principles of Economics II**
Registration #0511-302

GECN-310 **Managerial Economics**
Registration #0530-310

A further elaboration of the elementary principles of economic analysis in Principles I and II. Particular emphasis will be placed on the application of these principles to the decision-making process of the firm. (GSSE-302)

Class 3, Credit 4 (offered annually)

GECN-410 **Applied Econometrics I**
Registration #0530-410

This course is designed to provide students in the economics program with an opportunity to develop their skills in applied regression analysis. This course will cover the various regression models, estimation techniques, data preparation and transformation, and the interpretation of regression results. Particular emphasis on the dangers of misuse of regression techniques. (GECN-302, BBUQ-330, SMAM-226)

Class 3, Credit 4 (offered annually)

GECN-411 **Applied Econometrics II**
Registration #0530-411

This course introduces students to one of the major functions contemporary economists perform—economic forecasting. Students will be exposed to alternative theories and the manner in which economists in both the private and public sector use these frameworks of analysis, data and quantitative methods to generate economic forecasts. (GECN-410)

Class 3, Credit 4 (offered occasionally)

GECN-460 **Math Methods: Economics**
Registration #0530-460

This course develops the mathematical skills used by the applied economist in computer-based research. Exercises and research projects for the course will be chosen to illustrate the kind of problems actually dealt with by the contemporary applied economist. (GSSE-302, SMAM-226)

Class 3, Credit 4 (offered occasionally)

GECN-501 **Monetary Analysis and Policy**
Registration #0530-501

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. This course may also be taken as a Liberal Arts elective. (GSSE-302 or equivalent)

Class 3, Credit 4 (offered annually)

GECN-505 Intermediate Microeconomic Theory
Registration #0530-505

This course helps develop the tools of analysis utilized in contemporary economics to study the process of price formulation 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. This course may also be taken as a Liberal Arts elective. (GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GECN-506 Intermediate Macroeconomic Theory
Registration #0530-506

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. This course may also be taken as a Liberal Arts elective. (GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GECN-510 International Trade and Finance
Registration #0530-510

This course introduces the students to the theory and the practical issues of the export/import markets, the international flow of capital, and international investment decisions. In addition, the students study the foreign-exchange and the Eurodollar markets and the investment opportunities in them. The role of multinational corporations in international trade and finance is also discussed. (GSSE-301 and GSSE-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GECN-520 Industrial Organization
Registration #0530-520

This course is the study of the structure, conduct, and performance of contemporary American 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)

GECN-550 Seminar in Applied Economics
Registration #0530-550

A senior-level course emphasizing applications of economic analysis and quantitative methods to economic decision-making. Cases will be drawn from both the private and public sectors of the economy. (Limited to BS in economics and economics degree seniors)

Class 3, Credit 4 (offered occasionally)

Professional and Technical Communication

The following courses are required for the BS degree. See listings under Language and Literature for full course descriptions, unless otherwise indicated.

GPTC-200 Foundations of Communication
Registration #0535-200

This course is first an introduction to the theoretical and conceptual underpinnings of oral, visual and written communication. The course introduces basic communication models, the role of language in communication, symbols and symbolmaking, issues of audience analysis, and the development of different modes of discourse. Foundations also explores the history of communication. Finally, the course introduces students to basic research in communications studies.

Class 3, Credit 4

GPTC-210 Interpersonal Communication
Registration #0535-210

Analysis and application of the major theories of interpersonal communication in various situations. The course focuses on perception of self and others, language use, nonverbal communication, and symbolic interaction in the communication of shared meanings in face-to-face interpersonal relationships. Required course.

Class 3, Credit 4 (offered occasionally)

GPTC-220 Effective Speaking
Registration #0535-220

The development of the techniques of formal public speaking as an aid to self-confidence in modern social and business situations. Weekly practice talks with emphasis on organization, clarity, vocal expressions, poise.

Class 3, Credit 4 (offered quarterly)

GPTC-230 Written Argument
Registration #0535-230

This course develops reasoning and advanced language skills needed to carry out applied logic and applied problem-solving writing processes. Required course. (GLLC-220)

Class 3, Credit 4 (offered annually)

GPTC-300 Group Communication and Problem Solving
Registration #0535-300

Basic theories of problem-solving techniques in small group meetings. Focus on leadership, participation, types and functions of problem solving, and informational groups. Student participation, in leading, participating in, and evaluating various conference groups. This course is required and restricted to GPTC majors. (GPTC-200)

Class 3, Credit 4

GPTC-310 Conference Techniques
Registration #0535-310

Basic theories of conference techniques including leadership, participation, types, and functions of public and private conferences and their evaluations. Student participation in training, problem solving, and informational-developmental conferences. Required course. (GPTC-200)

Class 3, Credit 4 (offered quarterly)

GPTC-520 Intel-cultural Communication
Registration #0535-520

This course is an examination of the role of culture in face-to-face interaction. Students may find a basic background in communication, anthropology or psychology useful. Professional elective. (GPTC-200)

Class 3, Credit 4 (offered occasionally)

GPTC-525 Special Topics in Communication
Registration #0535-525

A focused, in-depth study and analysis of a selected advanced topic in communication and associated issues. Specific topic will vary according to faculty assigned and will be published when the course is offered. Topics include: semiotics, public relations, communication technologies, gender differences in communication, legal communication, and censorship and propaganda. Professional elective. (For junior and senior PTC students; non-PTC students must receive permission of the instructor) (GPTC-200)

Class 3, Credit 4 (offered occasionally)

GPTC-532 Professional Writing
Registration #0535-532

This course develops in the student those professional writing skills necessary to the composition of in-house journals or newsletters; press releases; trade journals/books; speeches; general-interest writing; and ghost writing. Students enrolling in the course should have command of clear and logical standard written English prose. Required course. (GPTC-200, 230)

Class 3, Credit 4 (offered annually)

GPTC-550 Film and Society
Registration #0535-550

An inquiry concerning the relationship between motion pictures and society that will use historical, humanistic, and social science research to achieve an understanding of movies as a social force, industry and art form. Professional elective. (GPTC-350)

Class 3, Credit 4 (offered occasionally)

GPTC-595 Senior Thesis in Communication
Registration #0535-595

Senior Thesis is a guided research seminar culminating in a major project that brings communication studies and substantive work in the technical studies area together. The course focuses on designing, conducting and completing an independent research project. The progress of each project will be shared with the class for discussion and critiques. Required course. (GPTC-445)

Class 3, Credit 4 (offered annually)

Social Work

Core Courses

GSWS-210 The Professional 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-212 Self-Awareness in the Helping Role
Registration #0516-212

This course helps to develop students' helping skills in essentially three broad areas: 1) Skills in noticing or observing; 2) Observing one's professional use of self in the helping relationship and evaluating the appropriateness of such behavior; and 3) Observing the client and evaluating the effect one's response has on her/him.

Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills. (GSWS-210)

Class 3, Credit 4 (F,W)

GSWS-216 Introduction to Social Welfare
Registration #0516-216

This course is designed to introduce students to and expand their interest in the field of social welfare through exploration of practice settings in which social workers are employed. The primary method for students to learn about these settings is by developing basic informational interviewing skills and then practicing them in actual interviews with social workers in agencies. Through the collective efforts of students in the course, a overview of basic social welfare services and advocacy groups will be attained.

Class 3, Credit 4 (W)

GSWS-217 Community Services
Registration #0516-217

This beginning level social work course is designed to introduce students to service delivery systems and client systems. As volunteers, students will have the opportunity to observe professional practice, be exposed to a social work setting, and interact with agency clientele. (GSWS-216)

Class 3, Credit 4 (S)

GSWS-302 History of Social Welfare
Registration #0516-302

This course is designed to acquaint the student with the historical roots of our present system of social welfare, emphasizing its development in the United States, and the concurrent development of social work as a profession. It will examine the value bases and the economic, social and political factors of each era as reflected in the social welfare programs of that time and their effects on people. (GSWS-217)

Class 3, Credit 4 (F)

GSWS-305 Structure and Function of Social Welfare
Registration #0516-305

Examines the provision of current social services in five major fields of social welfare: public welfare, traditional voluntary agencies, voluntary social movements, mental health and the legal system. Course also will explore organization theory as it applies to the structure of these services, as well as major patterns and sources of funding. (GSWS-302 or concurrent)

Class 3, Credit 4 (W)

**GSWS-322 Alcoholism: Employee Assistance
Registration #0516-322 Programs and Community Resources**

The course analyzes symptoms and diagnosis of the alcohol abuser and current methods of rehabilitation. Explores structure, function and use of community resources including the increasing role played by Employee Assistance Programs (EAPs). (GSWS-302, GSHH-493, GSSP-210, 440, GSSS-210, 526, 527, SBIG-211, 212)

Class 3, Credit 2 or 4 (offered occasionally)

**GSWS-330 Rural Social Services
Registration #0516-330**

The course will identify the historical development, cultural makeup, family lifestyles and work habits of the nation's migrant population and the rural poor. The course will examine and critically analyze the differences between migrants and the rural poor and compare them to the characteristics of the urban poor found in contemporary American cities. The course considers governmental rural policies and service-delivery systems directed to the rural areas which reflect the economic, political and social conditions during the time they were developed. The skills of generalist social work as applied in the rural setting are compared to application in urban settings.

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-340 Deafness: Fundamental Aspects
Registration #0516-340**

This course is designed to provide the student with a basic understanding of deafness. The overview includes how we hear, techniques for diagnosis, the etiology of deafness, as well as a historical perspective on how education for the deaf has developed with its various philosophies. Language acquisition and modes of communication are explored, as well as the social, psychological and vocational development of deaf persons.

This is the first course in a sequence that will provide a knowledge base for the development of generalist social work practice skills. (GSWS-302,455, GSSP-210,440,442)

Class 3, Credit 4 (W)

**GSWS-341 Psychosocial Implications
Registration #0516-341 of Deafness**

The purpose of this course is to provide the student with an in-depth examination of the psychosocial implications of deafness for the individual. The various systems with which the deaf individual interacts will be examined for relevance to the development and functioning of the individual. The course also examines how the individual and these systems impact and influence each other. These systems will include family, school, service-delivery systems and society. (GSWS-340)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-342 Deafness: Intervention Strategies
Registration #0516-342**

The purpose of this course is to build skills in applying the knowledge base developed in the prerequisite course to case situations. Students demonstrate collection and recognition of pertinent information, and development and implementation of appropriate intervention plans. Legal and political issues, as well as methods of assessing local resource networks, are considered. Professional roles and intervention goals are discussed as they relate to interfacing systems, including individual, family, school, medical, mental health, rehabilitation and employment. (GSWS-340)

Class 3, Credit 4 (every other year)

**GSWS-357 Mental Health and Mental Illness
Registration #0516-357 from a Social Work Perspective**

This course is designed to give social work students a basic understanding of mental health, mental illness and mental retardation from a social work perspective. The role of the social worker in working with individuals and their families will be included. Students will be given a general understanding of our current mental health systems. The medical model and alternative systems of diagnosis are considered. (GSWS-302, 455, GSSP-210, 440,442)

Class 3, Credit 4 (every other year)

**GSWS-360 Social Work with the Disabled
Registration #0516-360**

This course provides an examination of the psychosocial aspects of disabilities, the course emphasizes the effects of disability on the individual's development and functioning and the accompanying stress on the family and society in attempts to respond to her/his needs. Interventive strategies and critical times for intervention by the social worker are examined. (GSWS-302,455, GSSP-210, 440, 442)

Class 3, Credit 4 (S, every other year)

**GSWS-370 Child Protective Services
Registration #0516-370**

This course examines the concepts and knowledge base of child abuse and neglect. Topics will include: definition of abuse and neglect; a historical perspective; possible causes and effects of abuse; intervention strategies; statutes and legislation; preventive approaches; child abuse services in New York State; provision of service; role of the social workers; and future concerns in this problem area. (GSWS-302,455, GSSP-210,440,442)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-380 Social Work and the Law
Registration #0516-380**

This course provides the student with the opportunity to develop a workable vocabulary and understanding of some of the basic legislative processes and laws that affect the practice of social work. Focus centers around significant issues and points of law that have affected the delivery of services. (GSWS-302, 455, GSSP-210, 440, 442)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-455 Contemporary Issues in Social Work
Registration #0516-455**

This course is designed to offer students an opportunity to examine and discuss contemporary issues in the field of social work. Course content will vary from quarter to quarter depending on current issues and student interest. Areas related to expressed student interest, family expertise and developments in the field will be examined. (GSWS-302, GSSP-210,440,442)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-509 Services for Children
Registration #0516-509 and Their Families**

This course is designed to give social work students a beginning knowledge of social work services to children and their families. Specific services included are preventive services, homemakers, day care, protective services, foster care, adoption, unmarried parents, institutional care and mental health services. The development of each type of service will be discussed, as well as the reasons why each service is needed and for what type of situation. The social worker's role in each area will also be considered. (GSWS-302,455, GSSP-210,440,442)

Class 3, Credit 4 (every other year)

**GSWS-512 Advanced Intervention
Registration #0516-512 with Individuals**

This course builds upon the knowledge base of generalist social work practice and develops students' understanding of the specific way in which these concepts and theories are applied in social intervention with individuals. Use will be made of case studies and role playing to further develop the students' skills in this area. (GSWS-550, 551, 560)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-513 Advanced Intervention
Registration #0516-513 with Families**

This course is for students who have completed the practice sequence and field instruction, and have learned the theories and concepts of generalist social work intervention. This course builds on that knowledge base and develops the students' understanding of the specific ways in which these concepts and theories are applied in intervention with families. (GSWS-550, 551,560)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-522 Advanced Intervention
Registration #0516-522 in Communities**

This course examines community intervention as a social work method. The roles and functions of the community intervention practitioner and alternate methods of practice are analyzed, such as locality development, social planning and social action. The course will investigate specific applications of community intervention theory to political influence processes, coalition, neighborhood associations and regionalization. (GSWS-550, 551, 560)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-523 Advanced Intervention
Registration #0516-523 with Groups**

This course examines social treatment as one form of group work practice. There are different service procedures and approaches which may be applied to client groups, and each may have utility in pursuing distinct service objectives. The course will investigate the scope, techniques and functions of generalist social work practice in such diverse settings as social service agencies, business, correctional institutions and communities. (GSWS-550, 551,560)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-525 Grant Writing
Registration #0516-525**

This course is designed to provide the student with a series of readings and experiential exercises necessary for writing a grant proposal. Focus will be on funding sources which provide money for social welfare programs and for research into social work. (GSWS-302,455, GSSP-210,440,442)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-536 Aging and Society
Registration #0516-536**

This course considers concepts, issues and research techniques in the behavioral and biological aspects of aging. It examines the interaction of group processes in the family and community which influence society's attitudes toward the aging process. It further examines the culture, environmental and institutional changes as they relate to an increasing population of older people. (GSWS-302, 455, GSSP-210, 440, 442) (May also be taken for liberal arts elective credit.)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-537 Social Policy and the Aging
Registration #0516-537**

This course will be organized around culture and values as the context for policy formulation. Special attention will be given to the process of policy analysis and implementation. Several specific policy areas will be examined: social security and income maintenance; health and long-term care; work and retirement; social services and the aging network; housing and living arrangements for the elderly; and the role of the family and the elderly. (GSWS-302, 455, GSSP-210, 440, 442) (May also be taken for liberal arts elective credit. See GSSS-515)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-538 Family Violence
Registration #0516-538**

This course is designed to acquaint social work students and practitioners with the problem of family violence. The causes and dynamics of various forms of violence in the family will be addressed. These include: child abuse, incest, spouse abuse, sibling violence, marital rape, abuse of parents by adolescents, and the abuse of the elderly by their adult children. Factors affecting intervention in families where these occur and techniques for intervention will be included. (GSWS-302, GSHH-493, GSSP-210,440, GSSS-210,526,527, SBIG-211,212)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-539 Services for the Aging
Registration #0516-539**

This course deals with the variety of existing community-based services available for the elderly. The course also examines the tactics, assessment, coordination and evaluation of various direct and indirect services for the elderly. Particular attention will be given to such service groups as nursing homes, home health care, mental health and other formal and informal support systems. (GSWS-302,455, GSSP-210,440,442)

Class 3, Credit 4 (offered on sufficient demand)

**GSWS-599 Independent Study
Registration #0516-599**

A combined student/faculty effort on a chosen topic beyond the normal course selections. It provides the self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement. Independent Study may include independent work in an agency setting or other field work away from the Rochester area.

Credit variable (F, W, S, SR)

Liberal Arts Courses

Language

GLLC-220 **English Composition** **Registration #0502-220**

This course develops the language skills needed to write effectively. It should be taken in the freshman year.

Class 3, Credit 4 (offered quarterly)

GLLC-443 **Writing and Thinking** **Registration #0502-443**

This course develops the reasoning and advanced language skills needed to carry out applied logic and applied problem-solving writing processes. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-444 **Technical Writing** **Registration #0502-444**

This course develops in students those skills necessary for completing technical writings tasks, such as instructional memos; letters of inquiry; reports (trip, progress/status, accident, research, feasibility); problem analyses; specifications; flow charts; technical manuals. Students enrolling in Technical Writing should have command of clear and logical standard written English prose. This course is part of the Language Concentration and may also be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-445 **History of the English Language** **Registration #0502-445**

What makes the English language so difficult? Where do our words come from? Why is it a challenge for native speakers to master English grammar? This course surveys the development of the English language from its beginning to the present to answer such questions as these about the nature and flexibility of the English language. This course is designed for anyone who is curious about the English language. This course is part of the Language Concentration and also may be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-446 **Advanced Technical Writing** **Registration #0502-446**

This course develops in students those skills necessary for designing, writing and editing long technical documents, such as final reports and manuals. Special emphasis is given to computer-designed graphics and page layout. Students enrolling should have command of concise English prose. (This course will be taught with a Macintosh microcomputer.) This course is part of the language concentration and may also be taken as an elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-516 **Creative Writing/Poetry** **Registration #0502-516**

An exploration of the techniques of writing poetry in both open and closed forms. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-517 **News Writing** **Registration #0502-517**

Practicum in basic techniques of news writing and gathering for the daily press. Emphases will be primarily on writing for the print media and on frequent writing against a deadline.

Class 3, Credit 4 (offered occasionally)

GLLC-518 **Creative Writing/Prose Fiction** **Registration #0502-518**

An exploration of some of the most important contemporary techniques of prose fiction in the short story form. This is a writing elective for the Professional and Technical Communication Program and also may be taken as a liberal arts elective. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered annually)

GLLC-519 **Advanced Creative Writing** **Registration #0502-519**

Students who have completed Creative Writing or who have satisfied the instructor, normally by presentation of a writing sample, of their readiness to undertake the course will be given an opportunity to explore in depth a literary genre, subject or theme chosen by the individual student in conference with the instructor. The acceptability of the student's project will be determined on the basis of its intrinsic literary merit and its potential value to the student's development as a writer. (GLLC-220 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLC-524 **Communication and Documentary Film** **Registration #0502-524**

An examination of the documentary film and video as case studies in communication media. The course focuses on film techniques used as argument, persuasion, propaganda and reconstruction of reality. Such elements as director, subject, shooting style, and editing techniques will be analyzed in terms of message, purpose and audience.

Class 3, Credit 4 (offered annually)

GLLC-553 **Creative Interpretation in Sign** **Registration #0502-553**

Creative approaches to the interpretation of selected literary classics (prose, poetry, fiction, drama) through the visual medium of sign (sign language and sign-mime). (Sign language)

Class 3, Credit 4 (offered occasionally)

GLLC-400,440-41 **American Sign Language I, II, III** **Registration #0503-400,440-41**

This course presents a study of the origins, nature, and development of American Sign Language (ASL), and its variants, as used by the deaf population of North America. Integral to the course is the linguistic structure of ASL and the nature of signing as a linguistic modality. These courses are not part of any concentration.

Class 3, Credit 4 (offered annually)

GLLF-405,445-49 **Beginning Arabic I, II, III**
Registration #0503-405,445-49 **IV, V, VI**

This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is certified by NASILP and uses course material and examiners accredited by NASILP.

These courses will introduce students with no prior exposure to the language to modern standard Arabic. Arabic I will introduce the phonology and script. Throughout, the emphasis will be on acquiring oral skills. These courses are not part of any concentration. (Permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLF-408,451-55 **Beginning Chinese I, II, III**
Registration #0503-408,451-551 **IV, V, VI**

This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is certified by NASILP and uses course material and examiners accredited by NASILP.

These courses will introduce students with no prior exposure to the language to elementary spoken Mandarin. The Chinese writing system will be introduced in Chinese III. Courses II and III are part of the Foreign Language/Culture Concentration and may also be taken as electives. (Permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLF-412,472,473 **Beginning German I, II, III**
Registration #0503-412,472,473

This sequence of courses is designed to give students with no prior exposure to the language a sound basic knowledge of German as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the German-speaking countries. Courses II and III are part of the Foreign Language/Culture Concentration and may also be taken as electives.

Class 4, Credit 4 (offered annually)

GLLF-474,475,476 **Intermediate German I, II, III**
Registration #0503-474,475,476

This sequence of courses at the intermediate level is designed to give students advanced practice in the skills of speaking, reading, comprehension, and writing German. The courses also include segments of the use of German for business. Besides language, students will study contemporary life and culture through a variety of carefully selected readings. Although these courses are part of a six-course sequence, they may be taken separately. This intermediate sequence is part of the language requirement for International Business majors.

Class 4, Credit 4

GLLF-420,480-84 **Beginning Japanese I, II, III**
Registration #0503-420,480-84 **IV, V, VI**

This sequence of courses is offered in a modified, self-instructional format developed by the National Association of Self-Instructional Language Programs (NASILP). The College of Liberal Arts is certified by NASILP and uses course material and examiners accredited by NASILP.

These courses will introduce students with no prior exposure to the language to elementary spoken Japanese. The Japanese writing system will be introduced in Japanese III. Courses II and III are part of the Foreign Language/Culture Concentration and may also be taken as electives. (Permission of the foreign language coordinator)

Class 2, Credit 4 (offered annually)

GLLF-430,490,491 **Beginning Spanish I, II, III**
Registration #0503-430,490,491

This sequence of courses is designed to give students with no prior exposure to the language a sound basic knowledge of Spanish as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the Spanish-speaking countries. Courses II and III are part of the Foreign Language/Culture Concentration and may also be taken as electives.

Class 4, Credit 4 (offered annually)

GLLF-492,493,494 **Intermediate Spanish I, II, III**
Registration #0503-492,493,494

This sequence of courses at the intermediate level is designed to give students more advanced practice in the skills of speaking, reading, comprehension, and writing Spanish. The courses also include segments of the use of Spanish for business. Besides language, students will study contemporary life and culture through a variety of carefully selected readings. Although these courses are part of a six-course sequence, they may be taken separately. This intermediate sequence is part of the language requirement for International Business majors.

Class 4, Credit 4

GLLF-464,465 **Beginning French II, III**
Registration #0503-464,465

This sequence of courses is designed to give students with one or two years of high school French a sound basic knowledge of French as it is spoken and written today. A strong emphasis is placed on speaking and reading skills. Besides language, students will also study contemporary life and culture in the French-speaking countries. These courses are not part of any concentration.

Class 4, Credit 4 (offered annually)

GLLF-466,467,468 **Intermediate French I, II, III**
Registration #0503-466,467,468

This sequence of courses at the intermediate level is designed to give students more advanced practice in the skills of speaking, reading, comprehension, and writing French. The courses also include segments of the use of French for business. Besides language, students will study contemporary life and culture through a variety of carefully selected readings. Although these courses are part of a six-course sequence, they may be taken separately. This intermediate sequence is part of the language requirement for International Business majors.

Class 4, Credit 4

Literature

GLLL-332

Registration #0504-332

The students study some of the great literary works of our culture to enrich their lives and reinforce their analytical abilities. The students read representative poems, dramas, and narratives drawn from the Ancient, Medieval-Renaissance, and Modern Periods.

Class 3, Credit 4 (offered quarterly)

Literature

GLLL-440

Registration #0504-440

Drama/Theatre studies drama as a genre and theatre as a performing art. Intensive study of at least one major playwright or period complements a general survey of drama/theatre from ancient Greece to modern Broadway. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

Drama/Theatre

GLLL-441

Registration #0504-441

This course emphasizes the enjoyment and study of poetry with primary attention to major poetry in English. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

GLLL-442

Registration #0504-442

The course is a study of a collection of short stories with critical commentary in order to provide source materials on the nature and development of this genre. The course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

The Art of Poetry

Short Story

GLLL-443

Registration #0504-443

The Novel provides a close reading and analysis of several novels selected to show the range of narrative techniques, methods of characterization and plot construction, and styles representative of the genre. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

The Novel

GLLL-444

Registration #0504-444

This course examines the nature of narrative in both film and literature, the various aspects of adaptation of literature into film, and the relationship between social reality and storytelling in documentary film. This course is a non-technical, non-chronological study of film with a balance of roughly 50% literature and 50% film. This course is part of the Literature Concentration and may also be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

Film as Literature

GLLL-445

Registration #0504-445

This course provides extended study of the works of specific great authors (listed in the course titles that follow). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also can be taken for the Literature Concentration or elective credit. Detailed descriptions, objectives and content/methods appear under each subtitle (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

Great Authors

GLLL-445

Registration #0504-445

The course will consist of readings from the bitter-comic writings of the last part of Twain's career, focusing on his philosophy of total determinism, his disenchantment with the "damned human race" and its institutions of government, his trust in and later disillusionment with industrialism, and his romantic nostalgic desire to return to an idyllic pre-Civil War existence. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

Great Authors: Mark Twain and the American Dream

GLLL-445

Registration #0504-445

Reading and/or viewing ten plays of Henrik Ibsen, the father of modern drama, enables attentive examination of values and structures of modern society that form and formulate the lives of women and men. Ibsen argues that the possibility of individual freedom and creativity can only be won by seeing beyond and acting in spite of formidable forces. The texts and films are analyzed for visual, as well as verbal, information. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

Great Authors: Ibsen Drama and Film

GLLL-445

Registration #0502-445

A close reading of the major poetry of Geoffrey Chaucer and *The Pearl* poet in modern English translation, and a brief introduction to the history of the English language. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

Great Authors: Chaucer and His Times

GLLL-445

Registration #0504-445

Vicious satirical writings of Jonathan Swift and other early 18th century authors will be read and analyzed focusing on the intrigue and scandals marking the political and religious environment of the age. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

Great Authors: Jonathan Swift and the Age of Satire

GLLL-445

Registration #0504-445

This course will survey the writings of Henry James and examine his use of the "international theme"; his treatment of the relations between men and women; his fictional patterns of initiation, manipulation, and corruption; and his interest in the "psychological novel." We will also examine James's contributions to literary theory and his experiments with literary form. (GLLL-332 or equivalent)

Class 3, Credit 4

Great Authors: Henry James

GLLL-445 Great Authors: James Joyce**Registration #0504-445**

Careful study of three of James Joyce's major works: *Dubliners*, *A Portrait of the Artist as a Young Man*, and *Ulysses*. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GLLL-445 Great Authors: Shakespeare—
Tragedy and Romance****Registration #0504-445**

A generous sample of Shakespeare's tragic and romantic plays is investigated to reveal literary excellence and theatrical power. Reference is made to his poems; to the sources of his plays; to the world of Shakespeare's time, its intellectual preconceptions, political stresses, and religious rivalries; and to the theatre and its traditions. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GLLL-445 Great Authors: Shakespeare—
Comedy and History****Registration #0504-445**

Several of Shakespeare's comedy and history plays are read and analyzed to reveal their literary excellence and theatrical power. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

**GLLL-445 Great Authors:
Tolstoy and Dostoevsky****Registration #0504-445**

A study in the contrasting styles, themes and purposes of two of the world's greatest novelists. Either *War and Peace* or *The Brothers Karamazov* will be read—along with several of the shorter works by each author. The writers will be studied in the context of nineteenth century Russia and for the implications their works and lives continue to have for twentieth century Western culture. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-446 Modern Literature**Registration #0504-446**

The course provides extended study of works written in the 20th century (the particular genres or topics are listed in the titles that follow). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also may be taken for concentration or elective credit. Detailed descriptions, objectives, and content/methods appear under each subtitle. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered annually)

**GLLL-446 Modern Literature:
Modern World Drama****Registration #0504-446**

Reading modern plays from Europe, America, and the Third World reveals both style and content that function to depict, from a variety of perspectives, the condition of the individual in the modern world. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GLLL-446 Modern Literature:
Fiction****Registration #0504-446**

Reading 20th century short stories and novels from the East, West and Third World reveals, in addition to stylistic innovation and excellence, a variety of perspectives, values, and problems that contribute to the delineation of contemporary global civilization. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GLLL-446 Modern Literature:
Modern Poetry****Registration #0504-446**

A close examination of the poems of important English and American poets of the 19th and 20th centuries, including several living poets. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GLLL-446 Modern Literature:
Latin American Literature****Registration #0504-446**

Reading short stories, novels, and poetry of modern Mexico, Central and South America reveals a literature and culture wherein the mythic functions as an integral part of the modern world view and the poetic functions as a political power. The impressive vitality of modern Latin American literature can be attributed to its indigenous roots and to its branches that, stemming from a common language and a shared continent, overarch national boundaries and political regimes to form an international literary community. This course is part of the Literature Concentration and the Foreign Language/Culture Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GLLL-446 Modern Literature
World Literature in English****Registration #0504-446**

The course will cover short stories and novels written in English by Australian, African, Asian, and West Indian authors. The selections will be discussed against the background of the social, political, and cultural milieu in which the authors worked. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 Literature Topic**Registration #0504-447**

The course provides extended study of special topics in literature (the particular topics will be listed in the subtitles). Students can take any section of this course as part of the Literature Concentration or as an elective. Additional sections also can be taken for concentration or elective credit. Detailed descriptions, objectives, and content/methods appear under each subtitle. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GLLL-447 Literature Topic: Technology
in American Literature****Registration #0504-447**

A study of 19th and 20th century American literature (short stories, essays, poems, and novels) commenting on the impact of technology on society. The works selected reflect mostly the skeptical response of American writers to the technological Utopia. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic: The Nightmare
Registration #0504-447** **of Technology—Studies in
19th Century British Writings**

A study of 19th century British prose and poetry. Attention will be devoted to the effects of industrialism on a changing English society. The course will study, in general, the various social problems confronting 19th century England and how various writers responded to these problems in their works. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:
Registration #0504-447** **The Romantic Vision**

A study of 19th century European prose and poetry (primarily British) with particular attention paid to the collapse of the Romantic vision, and its gradual absorption into the Aesthetic and Decadent literary traditions of late 19th century European literature. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topics:
Registration #0504-447** **Literature of the Bible**

A close and rapid reading of selected Old and New Testament books to show the range and variety of literary genres and styles in the *Bible*. This course is part of the Literature Concentration and Perspectives on Religion Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:
Registration #0504-447** **Myth, Legend, Folklore**

Scholarly investigation into the rationale, origins and sources of myths, legends, and folklore of the western world and the effect these primary forms have had on our literature. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic: The Epic
Registration #0504-447**

Advanced study of great representative works in the epic mode. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:
Registration #0504-447** **Viking Myth and Saga**

Reading the myths, sagas, and folktales of the Viking world reveals the values of a people that created the world's oldest extant democratic society. Both women and men fiercely defend their honor and freedom, willing to risk death rather than to bow in submission. The sagas are analyzed as compelling narrative structures and as documents of a culture that continues significantly to shape Western civilization. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic:
Registration #0504-447** **Black Literature**

This course traces the literary contributions of selected black writers in the various genres from their roots in the African heritage through slavery to the present day. This course is part of the Literature Concentration and the Minority Relations Concentration. It also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic: The American
Registration #0504-447** **Spirit in Literature**

This is a survey of the development of American philosophy through the study of selected works from the colonial period through the mid-19th century. Particular attention is given to the ideas of the writers under consideration and their effect on modern American thought. This course is part of the Literature Concentration and also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-447 **Literature Topic: Multi-Cultural
Registration #0504-447** **North American Literature**

"A teeming nation of nations" is Walt Whitman's description of America. Such diversity has not always been represented in American literature. This course recognizes ethnic, racial, class, and gender differences in the shaping of American literary tradition. In reading, for example, Asian, African, Jewish, Hispanic, and Native-American literature, the emphasis is on the complexity and contradictions of a multi-cultural tradition as well as on a democratic spirit of inclusion rather than exclusion. This course is part of the Literature Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GLLL-480 **Women in Literature
Registration #0504-480**

This course concentrates on literature by women about women primarily from the early 19th century to the present. The course considers the aspirations, frustrations, and achievements of women as documented by themselves, as well as the perceptions and representations of women in literature by male writers. Works are examined for their literary value as well as their documentation of broader feminist issues. This course is part of the Women's Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GLLL-481 **Literature of War and Peace
Registration #0504-481**

This course gives students an awareness of the different views on war and peace in world literature and cinematic works. This course is part of the Peace Studies Concentration, but also may be taken as an elective. (GLLL-332 or equivalent)

Class 3, Credit 4 (offered occasionally)

GLLL-484 **Literature and Religion
Registration #0504-484**

A literature course which explores the complexity of religious experience, both personal and culture, as it is portrayed by writers from biblical times to our own day. The literature will be supplemented by readings from such disciplines as psychology, philosophy, history and theology. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GLLL-501 Speculative Fiction**Registration #0504-501**

Speculative fiction is a survey course in contemporary literature presenting conjectural views of man, his world, his society and his belief. Attention is given to the historical development of the genre as well as those works which have become classics of science fiction and fantasy.

Class 3, Credit 4 (offered occasionally)

GLLL-516 Literature and Society**Registration #0504-516**

Selected works by writers such as Sophocles, Dante, Dickens, Camus and Vonnegut as important works of art that reflect the human condition and implicitly prophesy against particular evils in attitudes or institutions of their times.

Class 3, Credit 4 (offered occasionally)

GLLL-524 Contemporary Film**Registration #0504-524**

A study of contemporary world films, to be drawn from those presently showing in the Rochester area (theaters, television, film festivals). Emphasis will be on both technical and aesthetic aspects of the films.

Class 3, Credit 4 (offered annually)

GLLL-545 The Deaf in Fiction**Registration #0504-545**

A study of literature of deafness, with special emphasis on literary works which identify and illuminate "the deaf experience."

Class 3, Credit 4 (offered occasionally)

Science and Humanities

Fine Arts

GSHF-213 Fine Arts: Visual Arts**Registration #0505-213**

The course will develop ability in perceiving worth in objects of art through consideration of fundamental concepts in painting, sculpture and architecture, involving analysis, interpretation and principles of aesthetics.

Class 3, Credit 4 (offered quarterly)

GSHF-214 Fine Arts: Musical Arts**Registration #0505-214**

An introduction to music as a fine art. The course is designed to develop skills in listening, evaluation, and analysis through an examination of music's forms, constituent elements, and stylistic and historical development.

Class 3, Credit 4 (offered quarterly)

GSHF-215 Fine Arts: Film Arts**Registration #0505-215**

This course will develop ability to view analytically and evaluate the film arts, both still and moving (motion) pictures, through consideration of their technologies, histories, aesthetics, and critical writings.

Class 3, Credit 4 (offered annually)

GSHF-441 American Architecture**Registration #0505-441**

A survey of American architecture from the seventeenth century to the present. Stress will be placed on a visual as well as historical and social analysis. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-442 Music in the United States**Registration #0505-442**

A survey of music in the United States from the time of European colonization to the present. Particular emphasis will be placed upon the question of what makes music distinctively "American." This course is part of the American Artistic Experience Concentration and the Music Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-443 Images of American Life**Registration #0505-443**

This course examines images of American life in the 19th and 20th century in the visual arts, particularly photography, to analyze and evaluate the influences of American political, social and cultural events on imagery and perception. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-444 American Painting**Registration #0505-444**

A survey of the style and meaning in American paintings from the colonial limners to contemporary artists. It will center on what distinguishes painting of the colonies and of the United States from its European counterpart. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-445 Issues in American Art**Registration #0505-445**

The purpose of this course is to offer the student a comprehensive overview of American attitudes and philosophies as they have shaped and been embodied in our artistic heritage. Emphasis will be placed on American art from 1850 to the present. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-446 American Film**Registration #0505-446**

This course will develop an understanding of theories, styles and trends in American film through a historical and sociological study of the medium. This course is part of the American Artistic Experience Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-447 **The American Musical Theatre**
Registration #0505-447

This course will survey the development of American opera and the American musical theatre, highlighting representative works, composers, librettists and performers of both the "cultivated and vernacular traditions." This course is part of the American Artistic Experience Concentration and the Music Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-448 **20th Century American Music**
Registration #0505-448

This course will survey both the cultivated and vernacular traditions of American music in the 20th century, taking into account its political, social and historical frameworks. The course is part of the American Artistic Experience Concentration and the Music Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-449 **Music Theory I**
Registration #0505-449

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. This course is part of the Music Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-450 **Music and the Stage**
Registration #0505-450

This course will survey the development of opera and the American musical theatre, highlighting representative works, composers, librettists, and performers. This course is part of the Music Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-451 **Music Performance**
Registration #0505-451

This course involves the historical and theoretical study of musical forms and styles in the context of active participation in the RIT Singers or the RIT Philharmonia. As an experiential outcome of such study, the group will prepare significant musical compositions for public performance. Credit: one hour per quarter. A total of four such credits may count as a Liberal Arts elective. This course is part of the Music Concentration and also may be taken as an elective.

Class 1, Credit 1 (offered quarterly)

GSHF-480 **Women and the Visual Arts**
Registration #0505-480

This course examines the image of women in the visual arts and the role of women as image makers. Major topics to be covered include: the variety of images of women, the evolution and change of these images over time, media images (as differentiated from fine art images) of women, images of women by women and by men, women's images and the issues of their relationship to the images made by men, the nude and pornography, history of women artists, selected women artists and their work, relation of their work to the art of the period, current issues and status of women artists. This course is part of the Women's Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHF-481 **Oriental Art**
Registration #0505-481

A survey outlining the development of art in India, China, Japan and examining the philosophical circumstances that distinguish Eastern artistic traditions. There will be opportunity for each student to pursue special interests in depth. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-482 **Beethoven**
Registration #0505-482

This course introduces the music of Beethoven in the psychological, political and philosophical contexts that gave it shape and force. Using the classical style of Haydn and Mozart as background, it focuses on the development of the "Dionysian" personality in Beethoven's compositions and the creation of the sublime in music. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-483 **Bach and the Baroque**
Registration #0505-483

This course is devoted to a study of Johann Sebastian Bach, his life and times, and his music in the context of Baroque styles and aesthetics. Compositions from each of the major periods of his creative life will be examined and discussed, particularly as they serve the social and religious purposes for which they were written, and as they reveal the psychology of so-called "Rhineland mysticism." This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-484 **Romanticism in Music**
Registration #0505-484

This course surveys the rise of German Romanticism from Beethoven to Strauss in the context of the development of 19th century musical styles in general. The course is part of the German Language Culture Concentration and the Music Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHF-501 **Craftsmanship in Gothic Art**
Registration #0505-501

A survey of religious and secular art in Europe from about 1100 to 1500 A.D. and its antecedents. Media to be studied include manuscript illumination, sumptuous objects, and church architecture (including associated sculpture, mosaics, paintings and stained glass).

Class 3, Credit 4 (offered occasionally)

GSHF-509 **Impressionism to Analytical Cubism**
Registration #0505-509

This course deals with the historical and stylistic aspects of the avant-garde painters of the second half of the 19th century and the first decade of the 20th century. It traces the struggles of these artists to break away from the traditional forms of expression and to attain a new vision of reality.

Class 3, Credit 4 (offered occasionally)

GSHF-S12 **Master Drawings Since the Renaissance**
Registration #0505-512

A study of drawings from the 15th to the 20th centuries, including the work by Leonardo da Vinci, Michelangelo, Durer, Rembrandt and Picasso.

Class 3, Credit 4 (offered occasionally)

GSHF-514 **Cubism to the Present**
Registration #0505-514

An investigation into modern man's struggle to preserve his identity in our fast developing technological world as reflected in the vitality and diversity of today's visual arts. Differences and similarities with art forms of earlier eras and other cultures also will be discussed.

Class 3, Credit 4 (offered occasionally)

GSHF-519 **Rembrandt Van Rijn: His Art and Times**
Registration #0505-519

A study of the life, art and times of the Baroque master. Emphasis will be placed on his stylistic evolution, his relation to his society and to the Baroque style, and on his humanistic world view.

Class 3, Credit 4 (offered occasionally)

GSHF-520 **Picasso**
Registration #0505-520

The life and work of one of the most influential artists of our century.

Class 3, Credit 4 (offered occasionally)

GSHF-530 **Art and Human Values**
Registration #0505-530

This course investigates the nature and value of the arts and their relation to other areas of human activity such as religion, economics, science and technology and personal freedom.

Class 3, Credit 4 (offered occasionally)

GSHF-532 **African Tribal Art**
Registration #0505-532

After an investigation of the world of "primitive" man and the function of art in a tribal environment, this course will focus on preliterate societies of sub-Saharan Africa.

Class 3, Credit 4 (offered occasionally)

GSHF-534 **Renaissance and Baroque Art**
Registration #0505-534

This course examines the stylistic development of painting in Europe from 1420 to 1650. The Renaissance style will be analyzed and studied through the works of painters, with emphasis placed on stylistic evolution through the 15th century and the classical synthesis created in the high Renaissance. Mannerist and Early Baroque paintings will be discussed from the point of view of the Renaissance style to investigate concepts of stylistic continuity, evolution, and change. Paintings also will be discussed within their culture and political contexts.

Class 3, Credit 4 (offered occasionally)

History

GSHH-301 **History: Modern America**
Registration #0507-301

This course examines the political, social, cultural, and economic development of the American people in the modern period. Studies the United States in its foreign relations.

Class 3, Credit 4 (offered quarterly)

GSHH-302 **History: Modern European**
Registration #0507-302

An examination of social, economic, political and intellectual movements of Europe from the Modern Period to the Twentieth Century, which played major roles in shaping our contemporary world.

Class 3, Credit 4 (offered quarterly)

GSHH-440 **United States Social and Intellectual History**
Registration #0507-440

This course will examine the American people, their society and their culture, in relation to the nation's institutions: government, courts, business, labor and political and private associations. The interplay between the American people and the institutions which structure their lives sheds light on the dynamic forces which shape American history and help to explain the present. Instead of detailing day-to-day chronology, this study will highlight the sweep of major trends and movements over longer periods of the American experience. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-441 **20th Century American Diplomatic History**
Registration #0507-441

An examination of the major events and forces which shaped American diplomacy from the opening years of the 20th century to the immediate post World War II era. This course is part of the History concentration and also the Global Studies Concentration, and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-442 **The Contemporary Middle East**
Registration #0507-442

This course analyzes the making of the contemporary Middle East from the rise of Islam to the present with special emphasis on the patterns of political development in the 20th century. This course is part of the History Concentration and also the International Relations Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent for the History Concentration; GSSM-211 or GSSM-215 or equivalent for the International Relations Concentration)

Class 3, Credit 4 (offered annually)

GSHH-443 **European Social Intellectual History Since 1600**
Registration #0507-443

An analysis of social events and intellectual movements in Europe since 1600. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-444 **Strategy and Diplomacy:**
Registration #0507-444 **Europe, 1871-1945**

This course investigates the origins and outcomes of the two World Wars with special emphasis on the conflicting strategies and secretive diplomacy adopted by the European Great Powers between 1871 and 1945. This course is part of the History Concentration and the International Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-445 **Modern Latin America**
Registration #0507-445

This course surveys the historical development of the Hispanic and Portuguese areas of the Americas from independence to the mid-twentieth century. The movement towards independence, the problems that emerged during the nineteenth century of forming unified nations, and the problems of modernization in the twentieth century are all covered. The histories of selected countries are used to illustrate these issues. This course is part of the History Concentration and also the Foreign Language/Culture Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-446 **Europe Since 1945**
Registration #0507-446

An analysis of the political, economic, social and cultural events that have shaped the new system of Europe since 1945. This course is part of the History Concentration and the Global Studies Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered annually)

GSHH-447 **The United States Since 1945**
Registration #0507-447

An analysis of the major themes characterizing post-World War II United States history. The course aims to investigate the specific characteristics of America as a modern state. Selected themes will have an intellectual, cultural and political history focus. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-448 **The History of Russia**
Registration #0507-448

A study of the historical context and development of Russian society and the factors leading to the emergence of the Soviet regime. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-449 **The History of the Soviet Union**
Registration #0507-449

A study in depth of the Bolshevik revolution, the rise of Stalin, industrialization and collectivization, the terror and the purges, the process of de-Stalinization under Krushchev and his successors, and current developments in the Soviet Union. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-450 **Europe of the Dictators:**
Registration #0507-450 **Stalin, Mussolini, Hitler**

A study of the European states and peoples in the inter-war period, the diplomatic and military history of World War II, the reconstruction of Europe, the Cold War, detente, and contemporary Europe. This course is part of the History Concentration and also may be taken as an elective. (GSHH-301 or GSHH-302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-480 **History of American Women**
Registration #0507-480

A history of women in North America from the colonial period to the present. Concentrates on the social, political, cultural, diplomatic and economic history of women in the United States and Canada. This course is part of the Women's Studies concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-483 **Christianity in the West**
Registration #0507-483

This course traces the development of Christian thought in the broad historical context of Western Civilization. It concentrates on major movements and outstanding personalities. This history of Christian thought is examined against the background of economic, political, social and intellectual currents. The study sheds light on both the conflicts within and the criticisms from outside and Christian tradition. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-485 **Foundations of Asian Civilizations**
Registration #0507-485

This course is primarily a study of the Confucian/Buddhist world in East Asia with the focus on China and Japan, their origins and cultural characteristics. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHH-486 **China and Japan**
Registration #0507-486 **in the 20th Century**

An examination of social, political, economic and intellectual developments of China and Japan in the 20th century with an analysis of how these two Asian powers have reached their respective significant status in the contemporary world. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-487 **History of Chinese**
Registration #0507-487 **Communism**

An analysis of the main characteristics of Chinese Communism, its native roots, Marxist/Leninist elements, and Maoist innovations. The course also will examine the causes for the rise of Communism in modern China, the context and process of its development, as well as contributions and problems Communism brought to the Chinese people. In addition, China and the world will be examined. This course is part of the Foreign Language/Culture Concentration and the History Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHH-488 **Modern Germany**
Registration #0507-488

A study of Germany in the 19th and 20th centuries. This course will begin with the unification of Germany in 1871 and trace the political evolution of the nation to the present. Special emphasis will be placed on the rise of Nazism. Pertinent social and cultural factors will be considered as well. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-489 **Japan in the Modern World**
Registration #0507-489

An examination of social, economic, political and intellectual developments of Japan in the nineteenth and twentieth centuries with an analysis of how Japan has reached such a significant status in the contemporary world. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHH-490 **History of Mexico**
Registration #0507-490

The historical development of Mexico, including the colonial period, independence movement, the liberal-conservative class, and the revolution of 1910. This course is part of the Foreign Language/Culture Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered alternate years)

GSHH-491 **Black Experience in America**
Registration #0507-491

Examines the history of blacks in America, treating the subject primarily from a social and cultural perspective. Studies the impact of whites on black Americans and describes the contribution of blacks to the development of the United States. This course is part of the Minority Relations Concentration and also may be used as an elective.

Class 3, Credit 4 (offered annually)

GSHH-492 **Selected Problems in Black History**
Registration #0507-492

A seminar approach to the thought of key black leaders (Washington, Garvey, King) and the study of civil rights and black power movements. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHH-493 **History of Social Discrimination**
Registration #0507-493

A study of the discriminatory practices, present and historical, found in the United States. To include the cultural values and problems of acculturation for the American Indian, Black, Puerto Rican, Chicano, Asian, women, and religious groups, with emphasis on its implication to social work. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-494 **The Immigrant in American History**
Registration #0507-494

This course explores the personal and collective experience of immigrants arriving in North America from colonial times to the present. Categories of special interest include immigrant expectations and adaptation; the tension between ethnic exclusiveness and assimilation; the role of the immigrant in the urban communities of the United States and Canada; native-born reactions to immigrants; the ethnic revival of the 1960s and 1970s; and the condition of ethnicity and the new immigration in contemporary America. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-495 **Black Civil Rights**
Registration #0507-495 **in the 20th Century**

This course examines the social and legal history of civil rights in the U.S. with particular attention to the demonstrations of the 1950s and 1960s and the philosophy of the Rev. Dr. Martin Luther King, Jr. Finally, it will compare his views with those of the recent Black Power Movement. This course is part of the Minority Studies Concentration and may also be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHH-501 **United States Community History**
Registration #0507-501

Students will study the lives of Americans in various communities (such as families, working, ethnic and political communities) from 1850 to the present. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-507 **World at War 1914-45**
Registration #0507-507

This course aims to give continuity (interpretation of cause and effect relationships) to the major developments of the period 1914-45. The course notes the impact of classical liberal economic theories in a period of rapid mechanization and industrialization. Rising social expectations in the period of exploding democratic and later social liberalism are observed in their relationship to revolution and reaction. This course considers the causes of World War I and examines the military operations in some detail.

Class 3, Credit 4 (offered occasionally)

GSHH-514 **Race and Society**
Registration #0507-514

A social, historical, political, religious and anthropological appraisal of the factors which have produced the differences between social appearances and social attainments of the world's population. Primary emphasis will be placed upon the fact that such differences are not sufficient reason for believing that there are underlying disparities or innate capacities among races.

Class 3, Credit 4 (offered occasionally)

GSHH-519 **United States-Latin America**
Registration #0507-519 **Diplomatic Relations**

The emphasis in this course will be on analyzing the United States' relations with Latin America from independence to the present.

Class 3, Credit 4 (offered occasionally)

GSHH-520 **Crime, Violence, and Urban Crisis**
Registration #0507-520

This course will analyze the causes of the outbreak and rapid increase of violent and criminal trends in the world as the most serious realities of the 20th century. The course will be a comparative study on America's and the world's problems of violence, crime, and urban crisis.

Class 3, Credit 4 (offered occasionally)

GSHH-524 **The Italian American**
Registration #0507-524 **Experience**

Examines the history and culture of the Italian Americans from the colonial period to the present. Stresses their role in the arts, business, politics, the Church, and the labor movement. Italian history is studied as it relates to the Italians in America.

Class 3, Credit 4 (offered occasionally)

GSHH-526 **The United States and**
Registration #0507-526 **The Third World Revolutions**
in the 20th Century

One of the dominant features of the 20th century has been the revolution of rising expectations in the countries of the Third World. This course will study the underlying causes of these revolutions and the reaction of the United States government to this revolutionary ferment in Latin America, Asia and Africa.

Class 3, Credit 4 (offered occasionally)

GSHH-528 **The History of Popular**
Registration #0507-528 **Culture in America**

American myths, icons, heroes, and institutions as represented in American popular culture from the late nineteenth century to the present. Examine the history of popular entertainment and the mass media in the United States.

Class 3, Credit 4 (offered occasionally)

GSHH-530 **19th Century American**
Registration #0507-530 **Diplomatic History**

An examination of American diplomacy from the early years of American independence to the emergence of the United States as a world power. The War of 1812, Monroe Doctrine, and Manifest Destiny are among the topics considered.

Class 3, Credit 4 (offered annually)

GSHH-532 **Civil Liberties in American History**
Registration #0507-532

The course will teach the history of civil liberties in America. Emphasis will be placed on the current state of civil liberties. Students will make philosophical as well as historical analyses of cases. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-538 **Social Justice and the**
Registration #0507-538 **Constitution in American History**

This course will analyze how well the Constitution has met the social and political expectations of citizens. Emphasis will be on analyzing Supreme Court cases that explain the current state of social justice. This is a companion course to GSHH-532, Civil Liberties in American History. (GSHH-301 or 302 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSHH-545 **Revolutionary Leaders in**
Registration #0507-545 **Latin America**

In this course three movements will be studied: the rise of Juan Peron in Argentina in the 1940s, Fidel Castro's revolution in Cuba; and Salvador Allende's electoral victory in Chile in 1970. By studying these three "revolutionary" movements, it is hoped that the student will come to an understanding of the historical perspective and nature of social discontent in Latin America.

Class 3, Credit 4 (offered annually)

GSHH-550 **The Ascent of Man**
Registration #0507-550

The course is a multi-disciplinary study in societal, historical, intellectual, technological and scientific perspectives of man's development from prehistoric times to the present. The course is partially based on the television series, "The Ascent of Man," created and narrated by J. Bronowski.

Class 3, Credit 4 (offered occasionally)

GSHH-552 **War and Crises, 1945-Present**
Registration #0507-552

World backdrop for American foreign policy and relations from 1945 to the present, dealing with the Greek Civil War, the Chinese Civil War, the Korean War, the American assumption of Western leadership in the Cold War, economic warfare, the Cuban crisis, war in Southeast Asia, the roles of Presidents Truman to Reagan, detente, multinational business, the press, and crises in the Middle East. Background is developed for decisions of the 1980s.

Class 3, Credit 4 (offered occasionally)

GSHH-556 **The Renaissance World**
Registration #0507-556

The thematic study of the Renaissance in Europe from 1300 to 1600. The course explores the art, literature, philosophy, society and institutions of the Renaissance that have contributed to the revival of the western culture and heritage.

Class 3, Credit 4 (offered occasionally)

GSHH-557 **Communism, Fascism and**
Registration #0507-557 **Democracy in Their**
Theoretical Foundations

A political and historical appraisal of these philosophies. Emphasis is placed upon the claims they make with regard to the individual and the state and the changes they demand for the future.

Class 3, Credit 4 (offered occasionally)

Science, Technology, and Society

GSHN-211 **Science, Technology and Values**
Registration #0508-211

This course explores the concepts and effects of science and technology in society, analyzes the relationship between science and technology, examines how each has come to play a major role today, and looks at how science and technology have been affected by our values. Science and technology are often assumed to be value free, yet people, guided by individual and societal values, develop the science and technology. In turn, the choices people make among the opportunities provided by science and technology are guided by their individual values.

Class 3, Credit 4 (offered quarterly)

GSHN-440 **History of Science**
Registration #0508-440

This course presents a study of the origins, nature, and development of Western science, and its social, economic, and cultural context. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-441 **Science and Technology Policy**
Registration #0508-441

This course will examine how local, state, Federal, and international policies are developed to influence innovation, the transfer of technology, and industrial productivity in the United States and other selected nations. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-442 **History of American Technology**
Registration #0508-442

This course presents an examination of the cultural context of American technology and its influence on American social, economic, political, and cultural institutions. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-443 **Face of the Land**
Registration #0508-443

This course is a case study in the relationship of technology and society, focusing on the interaction of land, people and technology. By considering the natural landforms of the United States and other countries as appropriate, students will see how the nature of land determines its value. As technological innovations are made and introduced, old relationships with the land are altered, sometimes irreversibly. Through this study students have a concrete example of the positive and negative effects of technology on the social structure. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-444 **Social Consequences of Technology**
Registration #0508-444

Modern society is increasingly based on technology. With each advance due to technology, unanticipated problems are also introduced. Society must define and solve these problems or the advances may be diluted or lost. In this course we will study several interactions between technology and the world in which we live. We will investigate how various technologies developed and compare the expected effects of the new technologies with the actual results. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-445 **Biomedical Issues in Science and Society**
Registration #0508-445

A study of the impact of science and technology on life, our view of life, and of the value issues that arise from this impact. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-446 **Makers of Modern Science**
Registration #0508-446

This course is designed to help the student understand the life of modern science through the lives of modern scientists. Modern science is understood to be science from the Scientific Revolution of the 16th and 17th centuries to the present. Much recent scholarship has been devoted to analyzing science in context; i.e., the way it actually develops in particular social and political environments as well as through the lives of individuals. This course is part of the Social Impacts of Science and Technology Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-481 **Introduction to Environmental Studies**
Registration #0508-481

This course seeks to make students aware of the environmental consequences of modern technology by investigating to what degree various technological systems conflict with the basic ecological principles. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-482 **Energy and the Environment**
Registration #0508-482

In this course we will look at the current situation, its environmental implications, and try to determine how we got here, why we got here, and where we may be able to go in the next 20 to 50 years. We will look at the nature, uses, and relative importance of our sources of energy; high technology and low or appropriate technology; hard energy paths and soft energy paths. We will look especially at the role of government policy in the energy area. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-483 **Environmental Values**
Registration #0508-483

We seek to identify, interpret, and trace the values associated with concern for the environment, and the factors that induced change in these values. Concern with the environment is not a new concept; its history reaches to ancient times, but the values related to this concern have drastically changed. Understanding environmental values helps one become a better prepared participant in the environmental decision making. This course is part of the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHN-484 **Environmental Policy**
Registration #0508-484

Public compliance with environmental regulations has become increasingly complicated as a result of many laws and regulations instituted since the mid 1960s. The purpose of this course is to study the consequences of major environmental legislation and regulations and to examine the actions of both citizens and the corporate sector as they comply with these laws. The course also will focus on the economic and social implications and value of environmental regulation and enforcement and will identify current developments in the area. This is a concentration course in the Environmental Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-440 Philosophy of Religion**Registration #0509-440**

A critical examination of a number of important issues connected with religion. These include the nature of religion itself, the existence of God, the problem of evil, and questions about the language we use when we talk and write about religion. This course is part of the Philosophy Concentration and the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-441 Logic**Registration #0509-441**

An introduction to the basic principles of logic. The main emphasis will be on symbolic, or formal logic, but some attention may be paid to informal logic as well. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-442 Aesthetics**Registration #0509-442**

This course will introduce students to thinking philosophically about the nature of art and its relation to other human experiences. Among the topics considered will be: the aesthetic experience, the relation between morality and art, ugliness in art, and truth in art. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-443 Philosophy of Science**Registration #0509-443**

An examination of the nature of the scientific enterprises; possible discussion topics include the presuppositions of science, its logic, its claims to reliability, and its relationships to society and to problems of human values. This course is part of the Philosophy Concentration and also may be taken as an elective. (At least one prior course in either philosophy or one of the natural sciences—physics, chemistry, biology)

Class 3, Credit 4 (offered annually)

GSHP-444 The Great Thinkers**Registration #0509-444**

This course will introduce the student to the thought of some of those philosophers who have been most influential in the history of ideas. An attempt will be made to cover in some depth the works of one or more of those "great thinkers." It is hoped that the student will begin to recognize the enduring nature of some of our most pressing problems, as well as the intellectual foundation of proposed solutions. The course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-445 Social and Political Philosophy**Registration #0509-445**

An examination of some of the main problems of social and political philosophy through an analysis, comparison and critical examination of various views concerning the natures of individuality and society, the relations between them and the dependence of one on the other. This course is part of the Philosophy Concentration and also may be taken as an elective. (At least one prior course in philosophy, political science, or sociology)

Class 3, Credit 4 (offered annually)

GSHP-446 Philosophy of Law**Registration #0509-446**

This course is an introduction to philosophical analysis centering on the nature, extent and justification of law, the nature of legal thought, and the problems and theories of justice. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-447 Contemporary Moral Problems**Registration #0509-447**

This course will present moral issues which arise in the professions and other areas of technical expertise. These problems in applied ethics will be studied through contemporary literature by moral philosophers (Donegan, Frankena, Gadamer, Habermas, Jonas, Singer, and Wellmer), as well as key classical texts (Plato, Locke, Reid, Kant, and Dewey).

Each section of the course will apply moral theory to one of a number of professional areas, such as business, communications, medicine and bioethics, public policy, and technology. This course is part of the Philosophy Concentration and also may be taken as an elective. (GSHP-211)

Class 3, Credit 4 (offered annually)

GSHP-448 Philosophy and Peace**Registration #0509-448**

An introduction to some of the philosophical dimensions of the search for world peace including the elements that would constitute a just and lasting peace, nations as moral entities, justice and national self-interest, force and violence, the morality of the use of force, peace-making and peace-keeping groups. This course is part of the Peace Studies Concentration and Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSHP-449 Special Topics in Philosophy**Registration #0509-449**

This course will be a critical examination of issues in some area of philosophy not covered in any other concentration course. Examples of likely topics are metaphysics, epistemology, the philosophy of mind, and the philosophy of language. This course is part of the Philosophy Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

GSHP-450 Undergraduate Seminar in Philosophy**Registration #0509-450**

This course will examine some area of philosophy at an advanced undergraduate level. The area examined will probably vary from quarter to quarter. The seminar is designed especially for those whose interest in philosophy goes beyond the requirements of the Liberal Arts curriculum. This course is part of the Philosophy Concentration and also may be taken as an elective. (Two courses in philosophy, or permission of the instructor)

Class 3, Credit 4 (offered occasionally)

Behavioral Science

Anthropology

**GSSA-210 Cultural Anthropology
Registration #0510-210**

This course is a study of the nature, method, and scope of human culture—the patterns of thought and behavior with which mankind makes decisions, criticisms, choices and judgments in order to satisfy the needs of life and experience.

Class 3, Credit 4 (offered quarterly)

**GSSA-440 Culture in Crisis
Registration #0510-440**

The Chinese proverb "may you be cursed to live in interesting times" sets the tone for this course. Change in all subsystems of human culture is the hallmark of the 20th century. The stress and strain that accompany change challenge every traditional way of life in the world today. From peasant revolutions and millenarian movements, to the feminist activism of the past generation, causes and consequences are explored in historical and cross-cultural perspective. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSA-210 or GSSS-210)

Class 3, Credit 4 (offered annually)

**GSSA-441 American Culture:
Registration #0510-441 The Anthropology of Us**

Call them Nacirema, American backward. This course takes an anthropologist's eye view of the "Nacirema" way of life now, what they say and think about themselves, and how they actually act, their myth, ritual, music, humor, religion, class structure, regional subcultures, and ethnic groups. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSA-210 or permission of instructor)

Class 3, Credit 4 (offered occasionally)

**GSSA-483 The Anthropology of Religion
Registration #0510-483**

This course is designed to provide students with a basic understanding of how religion operates as an integral part of any society. In order to demonstrate this, the institution of religion will be studied from a cross-cultural, anthropological perspective. Emphasis will be on primitive and peasant societies. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered occasionally)

**GSSA-501 Anthropological Research Methods:
Registration #0510-501 Explorations in Subcultural Diversity**

This course is designed to expose students from a variety of backgrounds to an alternative means of understanding human behavior through the methods of the cultural anthropologist and to demonstrate that variations in cultural patterning exist in our presumably homogeneous society. The primary emphasis in the course will be involvement of students in the actual observation of human behavior and collection of data in a subculture of their own selection in the Rochester area.

Class 3, Credit 4 (offered occasionally)

**GSSA-502 American Culture:
Registration #0510-502 The Archaeology of Us**

American history and contemporary American society are examined through the only unexpurgated record of our behavior, the material remains. This course illustrates how the techniques of archaeology can throw new light on the lives of our Pilgrim forebearers, the founding fathers, on slaves and free blacks, on the American industrial revolution, and even on the contemporary middle-class of a city like Tucson, Arizona.

Class 3, Credit 4 (offered occasionally)

Psychology

**GSSP-210 Introduction to Psychology
Registration #0514-210**

This course is designed to introduce the student to the scope and methodology of psychology. Topics will include: aims and methods, sensation and perception, learning and memory, emotion and motivation, normal and abnormal personality, and social psychology.

Class 3, Credit 4 (offered quarterly)

**GSSP-440 Childhood and Adolescence
Registration #0514-440**

This course explores human development from conception through adolescence. The developmental approach provides the opportunity to integrate many areas of psychological research such as cognition, personality, perception, social interaction and moral development as they apply to human development. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSP-441 Growth Psychology
Registration #0514-441**

This course examines the major assumptions, theories and implications of "growth" or humanistic psychology. In the course, students will study human beings as dynamic, complex creatures who shape themselves and their world through the choices they make each day and whose best hope for realizing their individual and collective potential is an accurate understanding of what human persons need to grow psychologically and what societal conditions seem to foster such growth. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSP-442 Adulthood and Aging
Registration #0514-442**

This course encompasses the psychology of the span of life from young adulthood through the middle years. The developmental approach, presented in an interdisciplinary framework, provides a systematic orientation to the study of the individual during early adulthood. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-443 Learning and Memory**Registration #0514-443**

This course focuses on the environmental forces that are responsible for the outcome of human development. It studies how learning shapes and changes individuals almost from the moment they are born and how it continues to be all pervasive throughout their lives. It examines the complexity of memory process, which is an essential element of learning and learning theories and their applications in real-life situations. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-444 Social Psychology**Registration #0514-444**

This course will attempt to give a general overview of those areas of social psychology currently under the most intensive investigation, and likely to be of most interest to the student, including nonverbal communication, attraction, aggression and group effects. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-445 Psychology of Perception**Registration #0514-445**

This course covers topics of all sense modalities with emphasis on visual perception. It traces what happens to the physical stimulus as our sensory systems analyze it to produce complicated perceptions of the world around us. Many complex perceptual phenomena draw upon explanations at the physiological, psychological and cognitive levels. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-446 Psychology of Personality**Registration #0514-446**

This course examines the strengths and weaknesses of the major psychological theories of personality. Methods of assessing personality, research, and applications of theory to real-life situations are included in the evaluation of each theory. This course is part of the Psychology Concentration and also may be used as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-447 Abnormal Personality**Registration #0514-447**

This course examines the major categories of mental disorder not only from the descriptive point of view, but also in terms of the major theoretical explanations of the causes of disorder. The major treatment modalities also are covered. This course is part of the Psychology Concentration and also may be used as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-448 Industrial Psychology**Registration #0514-448**

Consideration of principles and application of, and current research in, industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership, and communication. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

GSSP-449 Behavior Modification**Registration #0514-449**

This course will teach you the skills of changing your behavior by controlling your environment and the consequences of your behavior. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

GSSP-450 Psychology of Altered States of Consciousness**Registration #0514-450**

This course will cover such topics as the specialized consciousness in the two halves of the brain, dreaming, hypothesis, meditation, systematic relaxation, and parapsychology. The course format will combine discussion and demonstration. This course is part of the Psychology Concentration and also may be taken as an elective. (GSSP-210 or equivalent)

Class 3, Credit 4

GSSP-480 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 socio-cultural factors, women's place in society, women and their bodies, and women and mental health. This course is part of the Women's Studies Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSP-483 Social Psychology of Religion**Registration #0514-483**

This course examines religions as cultures which, like other "ways of life," face the task of attracting or creating new members, maintaining their loyalty, providing them with a coherent world view and satisfying their basic needs. It will examine the way religions use education, ritual, rewards, punishment, symbols and other mechanisms of social control and cohesion formation to build and nurture their flocks. In addition it will examine the ways in which religious organizations and their individual members reconcile conflicts between religious and secular norms, world views, loyalties and problem solving strategies. Finally it will suggest how psychological processes such as identity information, attribution, self actualization, brainwashing, conflict, denial, projection, and repression may be applied and misapplied in efforts to understand religious belief and behavior. This course is part of the Perspectives on Religion Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSP-504 Attitude Formation and Persuasion Techniques**Registration #0514-504**

The course will focus on current theories of attitude formation, and seek to apply them to contemporary events to achieve an understanding of how those who wish to shape or change attitudes do so. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GSSP-513 Psychology of Motivation
Registration #0514-513**

The course surveys basic motivational concepts and provides a fair representation of many different areas of motivational research, relating these to each other where possible. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GSSP-515 Psychology of Human Adjustment
Registration #0514-515**

This course will teach you the skills of coping with a variety of everyday experiences. Particular attention will be given to the areas of self validation, interpersonal tactics, and interpersonal relations. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GSSP-517 Death and Dying
Registration #0514-517**

This course will view death from a social-psychological perspective. After dealing with topics such as the leading causes of death, attitudes toward death, suicide, and American funeral practices, it will focus on such questions as how people can better cope with their own mortality and that of loved ones, and how people can help others face death, and help themselves and others during periods of bereavement. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSP-520 Psychology of Creativity
Registration #0514-520**

A psychological investigation of the creative process and creative individuals with a focus on techniques which stimulate creativity. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

**GSSP-521 Psychology and Politics
Registration #0514-521**

This course examines how political attitudes are acquired and altered, how politicians and ordinary citizens satisfy psychological needs through participation in politics and how principles of learning can illuminate processes of political leadership, persuasion and control. (GSSP-210 or equivalent)

Class 3, Credit 4 (offered occasionally)

Sociology

**GSSS-210 Foundations of Sociology
Registration #0515-210**

This course introduces students to the way sociologists interpret social reality, the major elements of the field and the most important research findings. Included are such topics as cultural differences and ethnocentrism, socialization, social statuses and roles, group dynamics, social institutions, stratification, collective behavior.

Class 3, Credit 4 (offered quarterly)

**GSSS-441 The Changing American Family
Registration #0515-441**

This sociology course examines contemporary patterns in the courtship, marital and family systems of the United States with special reference to gender role definitions, participation the workplace and variations in social class. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210)

Class 3, Credit 4 (offered annually)

**GSSS-443 Sociology of Work
Registration #0515-443**

This sociology course analyzes the essential properties of work, its structure, the group processes involved in it, and its social meaning. The course treats work as emerging, like other social realities, out of social relationships between individuals and groups. It looks at ways in which people can develop a positive self-regard or a sense of alienation in their occupations and professions and various types of work organizations. It also considers leisure as a complement to work. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210 or instructor's permission)

Class 3, Credit 4 (offered annually)

**GSSS-444 Social Change
Registration #0515-444**

Few people need to be more prepared to deal with social change than professionals in technical fields. In this culture, technology is often at the center of change and technical people are expected not only to cope with change but to help guide it. The purpose of this course is to help RIT students understand and deal with change rather than to simply react to it. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSS-446 Sociology of Health
Registration #0515-446**

This course is a survey of the sociological aspects of health and illness. Some areas of study will be the definition, causes (etiology) and cure of disease in various societies and social groups. Also included will be a discussion of the epidemiology of disease, access to, and delivery of health care in contemporary U.S. society, problems of patient care and the study of mental illness and death and/or dying. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSS-447 Women in Contemporary
Registration #0515-447 U.S. Society**

This sociology course will examine three major social institutions which shape the lives of women in contemporary U.S. society: the family, the workplace, and political structure. This course is part of the Social Change in a Technological Society Concentration and the Women's Studies Concentration, and also may be taken as an elective. (GSSS-210 or GSSA-210)

Class 3, Credit 4 (offered annually)

GSSS-448 **Minority Group Relations**
Registration #0515-448

This course will deal with the principal concepts and research findings of those who have studied racial and ethnic minorities and their relations. Taking into account the growing body of theory and data on the dynamics of ethnic prejudice and discrimination, the course is concerned with the subcultures of minorities, the nature of prejudice and discrimination, the etiology, patterns and consequences of intergroup conflict, and the reactions of minorities to differential and discriminatory treatment. Concepts such as assimilation, amalgamation, and de-segregation will be analyzed as forms of conflict resolution. This course is part of the Social Change in a Technological Society Concentration and the Minority Group Relations Concentration, and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSS-449 **Population and Society**
Registration #0515-449

Study of demographic variables of mortality, fertility, and migration as they affect the rise and quality of population. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210)

Class 3, Credit 4 (offered annually)

GSSS-442 **The Urban Experience**
Registration #0515-442

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. This course is part of the Social Change in a Technological Society Concentration and also may be taken as an elective. (GSSS-210 or GSSA-210)

Class 3, Credit 4 (offered annually)

GSSS-482 **African-American Culture**
Registration #0515-482

This course is designed to analyze past, present and future social policies, programs and practices from their actual and predictable effects on black people. These analyses and solutions will include particular emphasis on how the black community has been forced to develop mechanisms for coping with the debilitating effects of poverty, environmental deprivation, and institutional racism. The course is designed to present a systematic means of facilitating change in people's attitudes and behaviors. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSS-483 **Hispanic American Culture**
Registration #0515-483

This course offers the study of the social experiences and conditions of Hispanic Americans and the degree to which they have been assimilated into the mainstream dominant culture. Various Hispanic groups will be studied with the goal of defining and outlining their differences and similarities. The Puerto Ricans in the Northeast and the Mexican-Americans in the Southwest will be specifically selected for analysis. The course will help students to better understand the problems faced by Hispanic Americans by looking at specific socio-economic indicators such as: their access to health care, job opportunities, educational institutions, and the degree to which Hispanics have "progressed" in the U.S. This course is part of the Minority Relations Concentration and also may be taken as an elective.

Class 3, Credit 4 (offered annually)

GSSS-506 **Social Inequality**
Registration #0515-506

This is a survey course that will examine different dimensions of stratification in the U.S. and elsewhere. Explanations for the existence of inequality will be addressed at individual, group and institutional levels.

Class 3, Credit 4 (offered occasionally)

GSSS-507 **Complex Organizations**
Registration #0515-507

This course analyzes the structure and dynamics of a wide variety of social organizations (government bureaucracies, corporations, and voluntary groups). Topics discussed will include theories of organization, organizational processes, technological impact and organizational change and development. An examination of the internal operation of large organizations will include sources of power and authority, modes of communication, division of labor as well as tension, stress and strain.

Class 3, Credit 4 (offered occasionally)

GSSS-508 **Aging and Society**
Registration #0515-508

This course considers concepts, issues, and research techniques in the behavioral and biological aspects of aging. It examines the interaction of group processes in the family and community which influence society's attitudes toward the aging process. It further examines the cultural, environmental and institutional changes as they relate to an increasing population of older people.

Class 3, Credit 4 (offered annually)

GSSS-509 **Social Policy**
Registration #0515-509

An examination of social policy formulation in a variety of contexts from local government to national government. Special attention will be given to the strategies, choices and priorities in the formulation of social policy. The course will deal with historical development of social policies including the issues of health, aging, poverty, family and children. The course also will examine the question of how social values and economy influence policy development.

Class 3, Credit 4 (offered occasionally)

GSSS-510 **Juvenile Justice**
Registration #0515-510

The philosophical, historical and operational aspects of the juvenile justice system; evaluation of the social and personal factors related to juvenile delinquency; the role of police, the courts, corrections and community programs in delinquency prevention, control and treatment.

Class 3, Credit 4 (offered annually)

GSSS-513 **Criminology**
Registration #0515-513

A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime.

Class 3, Credit 4 (offered annually)

GSSS-515 **Social Policy and the Aging**
Registration #0515-515

This course will be organized around culture and values as context for policy formulation. Special attention will be given to the process of policy analysis and implementation. Several specific policy areas will be examined: social security and income maintenance; health and long-term care; work and retirement; social services and the aging network; housing and living arrangements for the elderly; and the role of the family and the elderly.

Class 3, Credit 4 (offered annually)

GSSS-524 **Applied Sociology**
Registration #0515-524

This course is an effort to provide the student with useful sociological knowledge applicable to solutions of practical problems. The inventory of problems is not fixed beforehand, and the specific course content reflects the problems either already encountered by students or very likely to represent a significant portion of their anticipated professional concern upon graduation. (Permission of instructor)

Class 3, Credit 4 (offered annually)

GSSS-569 **Human Sexuality**
Registration #0515-569

This course is designed to be sex positive in its approach to the study of human sexual behavior. It will focus upon basic physiology, sexual awareness, sexual development throughout the life cycle, sex roles, sexual myths, legal and social issues, pre-marital and marital sexual behavior, and alternative sexual choices. Frequently these issues raise questions of sexual attitude and value and these will be examined and clarified.

Class 3 + 2 hr. weekly seminar, Credit 4 (offered biannually)

Social Science

Economics

GSSE-440 **Urban Economics and Public Policy**
Registration #0511-440

Urban economics is the application of economic analysis to spatial relationships in densely populated (urban) areas. The first part of the course develops economic models which explain the location behavior of consumers and businesses in cities. The second part of the course is issue-oriented, applying the insights gained in the first part to a number of urban problems. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-441 **Economics of Human Resources**
Registration #0511-441

The microeconomic study of human resources encompasses aspects of human involvement in the production and distribution of goods and services. Potential topics are labor force participation, economics of employment discrimination, primary and secondary education, higher education, distribution of income and wealth, poverty and income maintenance, manpower planning, and microeconomic analysis of the work/leisure decision. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-442 **Contemporary International**
Registration #0511-442 **Economic Problems**

This course aims to prepare the student to deal with foreign exchange market, international trade decisions, the macroeconomic effects of trade on domestic economics, and the effects of domestic business fluctuations on international trade and finance of each country. Though the course is basically a theory course in economics, the applied aspects of international trade and finance are emphasized. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-443 **Current American**
Registration #0511-443 **Macroeconomic Problems**

This course is an in-depth analysis of selected macroeconomic problems such as economic growth, inflation, and business cycles. The primary focus is consideration of current macroeconomic theory and policy application in the context of the U.S. economic problems, e.g., tax-based incomes policies, wage-price controls. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-444 **Public Finance**
Registration #0511-444

This course is a study of the economics of the public sector. Topics include but are not limited to: taxation and public expenditures and their effect on the allocation of resources, distribution of income, and employment; market failure; public goods; the economics of public choice; and the application of public finance principles and normative questions to public economic issues. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-445 Survey of Economic Thought**Registration #0511-445**

This course is a survey of the various schools of thought which have developed in economics from the late eighteenth century up to the present. Representative economists from each of the major schools (Classical, Marxian, Neo-Classical, Keynesian, Monetarist, etc.) are studied. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-446 Economics, Public Policy and Competition**Registration #0511-446**

This course is a study of society's responses to imperfections in an otherwise competitive marketplace. Economic analysis, along with some legal analysis, is used to examine not only the problems but also some solutions to such problems as monopolies, externalities, and other forms of market failure. Responses examined include: regulation, antitrust, public enterprise, and other forms of government action. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-448 Economics of Less Developed Countries**Registration #0511-448**

This course introduces students to the economic problems of less developed countries (LDC). Students study the historical causes of underdevelopment gap between developed and underdeveloped countries, and the theories and the policies aimed at accelerating the rate of growth in LDC. In addition, the role of international organizations in the economic development of LDC is discussed. This course is part of the Global Studies Concentration and the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-449 Comparative Economic Systems**Registration #0511-449**

This course provides a comparative analysis of different economic systems. The three major economic systems to be studied are the Capitalist Mode of Production, the Planned Economy, and the Mixed Economy. The student will study the economic decision-making process in each system including the economic structure, operation, and relative efficiency in achieving its macroeconomic goals. Upon completion of this course, the student will be able to critically evaluate each economic system, recognize the advantages and disadvantages of each, and propose general policy recommendations to improve each system's relative efficiency. This course is part of the Global Studies Concentration and the Economic Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-450 Benefit-Cost Analysis**Registration #0511-450**

This course explores the use and abuse of benefit-cost and related analytical techniques commonly encountered in economic policy making. Many expenditure and regulatory programs of governmental agencies now are routinely evaluated in a benefit-cost or cost-effectiveness framework, and debate about policy decisions increasingly draws upon benefit-cost findings. Yet application of benefit-cost analysis often attracts much controversy, in part because of disagreements about how to conduct such analysis and about the role that economic efficiency should play in societal decisions. The mechanics, power, and limitations of this form of analysis form the primary elements of the course. It is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-451 Forensic Economics**Registration #0511-451**

Forensic economics is the application of economics to the law. A major subset of this discipline involves the determination of economic damages resulting from personal injury and wrongful death. More recently, forensic economists have been involved in measuring damages arising from malpractice claims, division of marital property in divorce cases and the determination of damages resulting from loss of employment. In addition, a major obstacle faced by the forensic economists involves the methodological issues in determining damages. Analysis of these and other issues will be the foundation of this course. This course is part of the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

GSSE-480 The Economic Role of Women**Registration #0511-480**

This course is intended to analyze the economic role of women in today's society. This analysis includes the economic role of women in the labor force, as owners of other factors of production, and in business decision-making process. The impact of the changing role of women on GNP, labor market, and other economic variables is elaborated. Through the analysis of some economic models and their application to real world situations, it is shown that the social, political, and individual equality of women depends, to a great extent, on their economic role in family and society.

Class 3, Credit 4 (offered on sufficient demand)

GSSE-481 Environmental Economics**Registration #0511-481**

The course will examine the relationship and apparent conflict between economic growth and environmental quality, the economics of environmental issues and policy, the environment as a resource and a public good, and the ability and lack of ability of free markets and the government to deal adequately with pollution and other environmental problems. This course is part of the Environmental Studies Concentration and the Economics Concentration and also may be taken as an elective. (GSSE-301)

Class 3, Credit 4 (offered annually)

Political Science**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
Registration #0513-215 Political Process**

This course examines major ideological concepts and how these are operationalized through the political processes of various governmental structures.

Class 3, Credit 4 (offered quarterly)

**GSSM-440 International Relations
Registration #0513-440**

This course critically analyzes the structure and principles of the international system with emphasis on the tensions between the imperatives of power politics and the requirements of law and justice. This course is part of the International Relations Concentration, the Global Studies Concentration, the Peace Studies Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-441 Politics in China
Registration #0513-441**

This course is designed to provide the students with the political dynamics of the People's Republic of China. Major emphasis will be given to the historical background, major aspects of the political systems, and the foreign relations of China. This course is part of the International Relations Concentration and the Foreign Language/Culture Study Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215)

Class 3, Credit 4 (offered annually)

**GSSM-442 Government and Politics
Registration #0513-442 of the USSR**

This course examines various aspects of the Soviet political system with particular emphasis on the communist party apparatus, governmental institutions, political leadership and contemporary issues in the USSR. This course is part of the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-443 Foreign Policy of the
Registration #0513-443 Soviet Union**

This course critically examines fundamental elements of Soviet foreign policy since its inception. Special emphasis will be given to geopolitical and ideological aspects of Soviet national interests as well as analyses of the mechanics of foreign policy formulation and its implementation with respect to the United States, Western and Eastern Europe, China, the Third World and the Middle East. This course is part of the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-444 The Cold War
Registration #0513-444**

This course is an examination of the origins and evolution of the Cold War with the major emphasis upon the Soviet-American rivalry in the post World War II era. This course is part of the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-445 Comparative Politics
Registration #0513-445**

This course provides a mode of analysis for the study of political systems. Basic concepts of political science are utilized to present a descriptive and analytical examination of various political systems that can be classified as western democracies, communist, or third world. Particular attention is paid to the governmental structure, current leadership, and major issues of public policy of those selected political systems under review. This course is part of the International Relations Concentration and the Global Studies Concentration, and also may be used as an elective.

Class 3, Credit 4 (offered annually)

**GSSM-450 State and Local Politics
Registration #0513-450**

This course is a study of politics and government on the state and local levels, and the relationships between these levels and the federal government. It will illustrate differences in state governments by comparing other states to New York, and will use the Rochester area for comparisons with local governments found elsewhere. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-451 The Legislative Process
Registration #0513-451**

This course examines the role of the legislature in the U.S. political process. The primary emphasis will be the study of the U.S. Congress, but some attention also will be directed to state legislatures. Topics to be studied include elections, party organization, committees, interest group activities, and executive-legislative relations. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-452 The American Presidency
Registration #0513-452**

This course is a study of the role of the presidency in the American political system. Among the topics to be considered are: the nomination and election process, evolution, expansion and limitation of presidential powers, factors in decision making, and the various leadership functions performed by the American Presidency. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-453 American Foreign Policy
Registration #0513-453**

A study of the formulation and execution of American foreign policy, including the examination of the instruments, procedures and philosophies shaping the development and implementation of foreign policy. This course is part of the American Politics Concentration and the International Relations Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-454 Political Parties and Voting
Registration #0513-454**

Political parties are a crucial part of the democratic process. Parties serve as a critical link between citizens and their government, as parties promote policies favored by their voters. This course studies parties; their history, their future and their role in the democratic process. Its overall emphasis is on the degree to which parties perform or fail to perform as links between citizens and government. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-455 Politics and Public Policy
Registration #0513-455**

This is a course in the politics of the policy process. The basic questions of the course are: How do public problems get to the agenda of government? How does government formulate policy alternatives? How does government legitimate public policy? How does government implement public policy? How does government evaluate public policy? This course is part of the American Politics Concentration and also may be taken as an elective (GSSM-211 or GSSM-215 or equivalent)

Class 3, Credit 4 (offered annually)

**GSSM-456 The Judicial Process
Registration #0513-456**

This course examines the structure and function of the state and federal courts in the American political system. This course is part of the American Politics Concentration and also may be taken as an elective. (GSSM-211 or GSSM-215)

Class 3, Credit 4 (offered annually)

**GSSM-457 Constitutional Law
Registration #0513-457**

This course has been designed to provide the student with a basic understanding of the constitutional principles frequently encountered in the criminal justice profession. Landmark court decisions relating to due process, equal protection, unlawful arrest, unreasonable search and seizure, compulsory self-incrimination, the assignment of counsel, and fair trial guarantees are discussed and critically evaluated. This course is part of the American Politics Concentration and also may be taken as an elective.

Class 3, Credit 4

**GSSM-502 Politics of Developing Countries
Registration #0513-502**

Since World War II more than 100 new countries have joined the global political system and they are searching for appropriate political means to serve their societies' ends. In addition, many older and established countries have been struggling to adjust their political arrangements to cope more effectively with modern problems. Several elements are involved in this complex process: social mobilization, economic development, and political modernization. This course will focus on the political problems of the developing countries which occupy roughly the southern half of the earth's land mass. Class 3, Credit 4 (offered occasionally)

**GSSM-504 20th Century America
Registration #0513-504**

An examination of the major political, social and economic developments affecting the United States in the 20th century. Emphasis will be placed upon the reactions of the various presidential administrations to conditions in both the domestic and foreign fields.

Class 3, Credit 4 (offered occasionally)

**GSSM-514 Theories of Political Systems
Registration #0513-514**

An examination of the basic questions in political theory, a survey of the major political philosophers, and an inquiry into the major political ideologies.

Class 3, Credit 4 (offered occasionally)

**GLAI-501 Senior Seminar
Registration #0520-501**

This course enables students to sharpen and demonstrate their ability to define a research task or problem, gather and evaluate scholarly evidence and present their findings in a paper or project. While the content and focus of the seminar will change from year to year, it will always direct student attention toward a broad issue or aspect of contemporary culture and equip them to understand that subject more fully, investigate one facet of it in depth, and provide an advanced experience of problem solving and value clarification.

Class 1, Credit 2 (offered quarterly)

Independent Study

A student may register for an independent study project subject to the approval of the faculty sponsor, student's department, the academic committee of the College of Liberal Arts and the dean of the College of Liberal Arts and providing that she or he has a minimum GPA of 2.7 at time of application. An independent study project is not a substitute for a course. It enables the interested student and his or her faculty sponsor to coordinate their efforts on subjects and topics that range beyond the normal sequence of course selection.

Credit variable (offered annually)

Service Courses

Service courses are required courses offered by the College of Liberal Arts for specific professional departments. These courses may not be taken for Liberal Arts credit.

GLAA-201,202,203 **History of Airpower** **Registration #0519-201,202,203**

This course is a study of the development of airpower from its origins to the present. This course deals with the impact of airpower upon 20th century warfare. It also traces the evolution of airpower as a factor in military and nonmilitary operations in support of U.S. foreign and domestic policy.

Class 1 (201, Credit 1); (202, Credit 2); (203, Credit 1) (offered annually)

GSSM-401 **National Security Forces in** **Registration #0513-401** **Contemporary American Society I**

This course will examine the sociology aspects of officership, the military criminal justice system, and introduce National Security Policy. Topics of interest focus on the military as a profession, officership, Air Force doctrine, civilian control of the military, and a comparison of the military/civilian justice systems. (Approval of the Aerospace Studies Department)

Class 4, Credit 5 (offered annually)

GSSM-402 **National Security Forces in** **Registration #0513-402** **Contemporary American Society II**

This course will examine the American National Security Policy by analysis of the evolution of the American defense strategy and policy. Topics include methods for managing conflict, international terrorism, alliances and regional security, an analysis of arms control and the threat of war, and the formulation of American defense policy and strategy. (Approval of the Aerospace Studies Department)

Class 3, Credit 4 (offered annually)

GLAI-201 **Seminar: Academic Fields of** **Registration #0520-201** **Study (Tech. and Lib. Studies)**

This seminar is designed to introduce students to the full array of degree programs offered by RIT. Although it is part of a student's exploration of career possibilities, the focus will be on fields of study necessary for particular careers rather than on the ultimate career activity itself. The presupposition is that interest in a field of study is necessary to career success, but also that any one field of study can lead to a variety of career choices.

Class 1, Credit 1 (offered annually)

GLLC-301,302 **College Writing I, II** **Registration #0502-301,302**

This course sequence develops minimal college-level writing competencies. The credits earned, however, may not comprise part of the student's normal Liberal Arts curriculum. Furthermore, this sequence may not be substituted for English Composition.

Class 1, Credit 1 (offered quarterly)

GLLC-402 **Conference Techniques** **Registration #0502-402**

Basic theories of conference techniques including leadership, participation, types, and functions of public and private conferences and their evaluation. Student participation in training, problem solving, and informational-developmental conferences.

Class 4, Credit 4 (offered annually)

GPTC-403 **Effective Technical** **Registration #0535-403** **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)

GLLZ-200 **Basic Communications** **Registration #0518-200**

Students will gain an understanding of deafness, plus basic skills which will permit communication with a segment of the deaf population.

Class 3, Credit 4 (offered on sufficient demand)

GLLZ-201,202,203 **Manual Communication I, II, III** **Registration #0518-201,202,203**

A course designed to provide the student with the basic vocabulary of frequently used signs and the American manual alphabet.

Class 3, Credit 4 (offered on sufficient demand)

College of Science

Biology

SBIB-201

General Biology

Registration #1001-201

Characteristics and origin of life; basic principles of modern cellular biology including cell organelle structure; chemical basis and functions of life including enzyme systems, cellular respiration and photosynthesis; nutrient procurement in plants and animals.

Class 3, Credit 3 (F)

SBIB-202

General Biology

Registration #1001-202

A study of the physiological processes of gas exchange, internal transport, osmoregulation, excretion, and hormonal control in plants and animals; nervous system and behavior in animals.

Class 3, Credit 3 (W)

SBIB-203

General Biology

Registration #1001-203

A study of cellular and organismal reproduction, the principles of genetics and developmental biology, introduction to evolution and ecology.

Class 3, Credit 3 (S)

SBIB-205,206,207

General Biology Laboratory

Registration #1001-205,206,207

Laboratory work to complement the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve ability to make, record and interpret observations. (Corequisite SBIB-201,202, 203)

Lab 3, Credit 1 (205-F; 206-W; 207-S)

SBIB-230

Introduction to Co-op Seminar

Registration #1001-230

Exploration of cooperative education opportunities in the biological sciences. Practice in writing letters of application, resume writing, and interviewing procedures.

Class 1, Credit 1 (W, S)

SBIB-250

Introduction to Biotechnology

Registration #1001-250

An introduction to the nature and scope of the science of biotechnology, the employment environment and opportunities, and the literature of the field. (One quarter of general biology)

Class 1, Credit 1 (W)

SBIB-301

Invertebrate Zoology

Registration #1001-301

Biology of invertebrate animals with emphasis on phylogeny and functional morphology. (One year of general biology or permission of instructor)

Class 3, Lab 3, Credit 4 (S)

SBIB-302

Vertebrate Zoology

Registration #1001-302

Morphology, physiology, behavior, classification, and ecology of chordates. (One year of general biology)

Class 3, Lab 3, Credit 4

SBIB-303

Comparative Vertebrate Anatomy

Registration #1001-303

A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)

Class 3, Lab 6, Credit 5 (F)

SBIB-304

Botany

Registration #1001-304

Distribution of the major groups of plants and their adaptations to their particular environment. (One year of general biology or permission of instructor)

Class 3, Lab 3, Credit 4 (F)

SBIB-305

Physiology and Anatomy

Registration #1001-305

An integrated approach to the structure and function of the nervous, endocrine, integumentary, muscular and skeletal systems. Laboratory exercises include histological examination, anatomical dissections and physiology experiments with human subjects. (One year of general biology or permission of instructor for non-science majors)

Class 4, Lab 3, Credit 5 (W)

SBIB-306

Physiology and Anatomy

Registration #1001-306

An integrated approach to the structure and function of the gastrointestinal, cardiovascular, immunological, respiratory, excretory and reproductive systems with an emphasis on the maintenance of homeostasis. Laboratory exercises include histological examinations, anatomical dissections and physiological experiments using human subjects. (SBIB-305 or permission of instructor)

Class 4, Lab 3, Credit 5 (S)

SBIB-310

Plant Physiology

Registration #1001-310

Physiological phenomena in the growth and development of higher plants. Water relationships, photosynthesis, translocation, mineral nutrition, growth, hormonal control and reproduction. (One year of general biology and one year of organic chemistry)

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

SBIB-320

Histology

Registration #1001-320

Detailed microscopic studies on the structure and function of normal human tissues. (One year of general biology; SBIB-305, 306, recommended)

Class 3, Lab 3, Credit 4 (F)

SBIB-330

Small Animal Laboratory Techniques

Registration #1001-330

A course designed to prepare the student for small animal handling, biological administrations and preparations, minor surgery and autopsies. (3rd-, 4th-, 5th-year status and permission of instructor)

Class 1, Lab 3, Credit 3 (S)

SBIB-340

General Ecology

Registration #1001-340

Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments. A study to include such ecological concepts as energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography and representative ecosystems. (One year of general biology)

Class 3, Lab 3, Credit 4 (F)

SBIB-350 Molecular Biology**Registration #1001-350**

The study of structure, function, and organization of proteins, nucleic acids and other biological macromolecules. (One year of general biology; second- or third-year status)

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

SBIB-360 Horticulture**Registration #1001-360**

A basic introduction to horticulture with a study of the interconnections of plants, gardens and their environment and discussion relating to applications of principles to indoor and outdoor gardening.

Class 3, Lab 3, Credit 4 (S)

SBIB-370 Biological Writing**Registration #1001-370**

Written technical communication in the biological sciences with emphasis on components of report writing: analysis, definition, description, instruction, data presentation, literature research, abstracting and editing. (Third-, fourth-, fifth-year status)

Class 1, Rec. 1, Credit 2 (F, W)

SBIB-380 Human Gross Anatomy**Registration #1001-380**

This course is designed to expose students to details of human anatomy through cadaver dissection. Lecture material stresses functional and clinical correlates corresponding to laboratory exercises. (SBIB-305, 306 and permission of instructor)

Class 2, Lab 6, Credit 4 (W)

SBIB-390 Vertebrate Evolution**Registration #1001-390-01**

Study of the major changes in vertebrate functional morphology through time, beginning with fish and ending with humans; fossil evidence depicting major transitions between the vertebrate classes; modern taxonomy, including cladistic analysis, geologic time, and stratigraphy; and plate tectonics. (One year of General Biology or equivalent)

Class 3, Lab 0, Credit 3 (not offered in 1992-93)

SBIB-402 Immunology**Registration #1001-402**

Investigation of the basic concepts of immunology (antigens, antibodies, immunologic specificity, antibody synthesis, and cell-mediated immunity) and the applications of immunology to infectious diseases, allergic reactions, transplantations, tumors, autoimmune diseases, immunosuppression and tolerance. (One year of general biology)

Class 3, Credit 3 (F)

SBIB-403 Cell Physiology**Registration #1001-403**

Functional eucaryotic cytology, nuclear and cytoplasmic regulation of macromolecular synthesis, exchange of materials across cell membranes, regulation of cellular metabolism and control of cell growth. (SBIB-350)

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

SBIB-404 Introductory Microbiology**Registration #1001-404**

Introduction to microorganisms and their importance. Principles of structure, metabolic diversity, taxonomy, environmental microbiology, and infectious diseases of procaryotes will be discussed. Basic laboratory techniques, microscopy, staining, bacterial identification, and food testing. (SBIB-350, one year of general biology and one year of organic chemistry)

Class 3, Lab 4, Credit 5 (F, W)

SBIB-405 Microbial Pathogenesis**Registration #1001-405-01**

Mechanisms of bacterial, fungal, viral, and parasitic diseases to include host response to invasion of pathogens, subversion of host defenses, virulence factors, and various prominent infectious diseases. (SBIB-404)

Class 3, Lab 0, Credit 3 (W)

SBIB-407 Microbial and Viral Genetics**Registration #1001-407**

The study of the molecular genetics of bacteria, bacteriophages, fungi, and eucaryotic viruses. (SBIB-350,421; SCHO-334)

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

SBIB-417 Industrial Microbiology**Registration #1001-417**

Practical applications of yeasts, fungi and bacteria in industrial fermentations. Industrial aspects of fermentor design, pilot plant operations, strain development, and recovery of fermentation end products. Microbiology, biochemistry and engineering of large-scale processes. (SBIB-404 and one biochemistry course)

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

SBIB-420 Plant Ecology**Registration #1001-420**

A consideration of the nature and variation of plant communities with a discussion of factors which limit, maintain, and modify communities both locally and regionally. Laboratories will involve field studies of various plant communities and the gathering and analysis of data. (SBIB-340)

Class 3, Lab 3, Credit 4 (S)

SBIB-421 Genetics**Registration #1001-421**

Introduction to the principles of inheritance; the study of genes and chromosomes at molecular, cellular, organismal, and population levels. (SBIB-350)

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

SBIB-422 Developmental Biology**Registration #1001-422-01**

Study of the processes of growth, differentiation, and development that lead to the mature form of an organism. (One year of General Biology or equivalent)

Class 3, Lab 3, Credit 4 (W)

SBIB-424 Descriptive Embryology**Registration #1001-424**

Study of the developmental processes leading to the mature vertebrate form, with emphasis on early human development and its clinical variations. Course requires extensive use of independent study materials. (One year of introductory biology or permission of instructor)

Class 2, Credit 4

SBIB-430 **Radiation Biology****Registration #1001-430**

Effects of radiation upon living tissue, both harmful and beneficial. Morphological changes, genetic effects, and pathological changes in both plant and animal tissues. Use of radioisotopes in plant and animal research. (Minimum of 20 credits in biological science)

Class 3, Lab 3, Credit 4 (W)

SBIB-431 **Histological Techniques****Registration #1001-431**

Preparation of plant and animal tissues on slide mounts. Techniques in paraffin and frozen sectioning. Sectioning on the rotary and sliding microtomes and multiple staining techniques. (One year of general biology)

Class 1, Lab 4, Credit 3

SBIB-442 **Hybridoma Techniques****Registration #1001-442**

Designed to acquaint each student with the basic methods employed in the production of hybridoma cell lines and monoclonal antibodies. To include preparation of viable cell suspensions, cell culture fusion techniques, cloning, and monoclonal antibody production and characterization.

(SBIB-445)

Lab 3, Credit 2 (W, S)

SBIB-445 **Tissue Culture****Registration #1001-445**

Study of the techniques and applications of culturing cells, tissues, and organs in vitro. Emphasis on mammalian systems. (One year of general biology)

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

SBIB-446 **Plant Tissue and Cell Culture****Registration #1001-446**

Study of the techniques and applications of plant organ, tissues, and cell culture in vitro, with emphasis on plant regeneration and protoplast manipulation. (One year of general biology)

Class 2, Lab 3, Credit 4 (W)

SBIB-450 **Genetic Engineering****Registration #1001-450**

Introduction to the theoretical basis, laboratory techniques, and applications of gene manipulation. (SBIB-350,404)

Class 3, Lab 6, Credit 5 (W, S)

SBIB-471 **Freshwater Ecology****Registration #1001-471**

A study of the physics, chemistry and biology of inland waters. The course will emphasize the physical and chemical properties of water and how these properties affect the associated biological communities. Planktonic, benthic and littoral communities will be considered. Field trips to streams and lakes will be conducted to gather physical, chemical and biological data. (SBIB-340 or permission of instructor)

Class 3, Lab 3, Credit 4

SBIB-472 **Introduction to Oceanography****Registration #1001-472**

An introduction to the study of the world ocean, with emphasis on fundamental principles, concepts and processes of biological, geological, chemical, and physical oceanography. (SBIB-340 or permission of instructor)

Class 4, Lab 0, Credit 4 (W)

SBIB-473 **Marine Biology****Registration #1001-473**

The biology of marine life, with emphasis on the roles that marine plants and animals assume in their environmental situations, and the structural and physiological adaptations necessary to fulfill those roles. (Minimum of 20 credits in biological science)

Class 3, Lab 3, Credit 4 (F)

SBIB-490 **Transmission Electron Microscopy****Registration #1001-490**

A lecture/laboratory course covering operation, maintenance and calibration of transmission electron microscopes; preparation of biological, chemical and physical specimens for the transmission electron microscope; black-and-white photographic darkroom techniques. (Fourth- or fifth-year status and permission of instructor)

Class 1, Lab 6, Credit 4

SBIB-491 **Scanning Electron Microscopy****Registration #1001-491**

A lecture/laboratory course covering operation, maintenance and calibration of scanning electron microscopes; preparation of biological, chemical and physical specimens for the scanning electron microscope; black-and-white photographic darkroom techniques. (Third-, fourth- or fifth-year status)

Class 1, Lab 6, Credit 4

SBIB-541,542,543 **Biology Research****Registration #1001-541,542,543**

Faculty directed projects of research usually involving original field or laboratory work encompassing a period of at least two quarters. Final results are presented in written and oral formats. (Third-year status with a GPA of 2.5 in science and mathematics courses, and consent of faculty)

Class variable, Credit variable (F, W, S, SR)

SBIB-550 **Biology Seminar****Registration #1001-550**

Written and oral reports and their discussion by class members covering topics of current interest in the biological sciences. (40 quarter credits in biology and successful completion of the departmental writing requirement)

Class 2, Credit 2 (W, S)

SBIB-559 **Special Topics: Biology****Registration #1001-559**

Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures.

Class variable, Credit variable (offered upon sufficient request)

SBIB-579 Topics in Biotechnology**Registration #1001-579**

An in-depth study of one or more aspects of the field of biotechnology, with emphasis on current areas of research. (Fourth- or fifth-year biotechnology major status)

Class 3, Credit 3 (F, W)

SBIB-599 Independent Study: Biology**Registration #1001-599**

Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (One year of general biology)

Class variable, Credit variable (F, W, S, SR)

SBIB-720 Introduction to Pharmacology**Registration #1001-720**

A survey of the pharmacodynamic properties and physiological effects of drugs used clinically to treat disease. Emphasis will be placed on anti-cancer drugs, antibiotics, and drugs which will affect the central and peripheral nervous systems. (SBIB-305, 306 or equivalent; SBIB-403; SCHO-233)

Class 3, Credit 3

SBIB-721 Introduction to Pharmacology**Registration #1001-721****Laboratory**

Laboratory work to accompany the lectures in Introduction to Pharmacology. (Corequisite SBIB-720)

Lab 3, Credit 1

NOTE: The following courses may not be taken for biology credit by biology or biotechnology majors.

SBIG-210 Microbiology in Health and Disease**Registration #1004-210**

An introduction to microorganisms; their relationship to the environment and human health; the causes, prevention and treatment of infectious diseases; and the role of microorganisms in the preparation and spoilage of foods. (One year of high school biology or equivalent)

Class 4, Credit 4 (F)

SBIG-211 Human Biology I**Registration #1004-211**

A general study of human anatomy and physiology. This course includes discussions of cellular biology, skeletal, muscular, nervous, and endocrine systems.

Class 3, Lab 3, Credit 3 (W)

SBIG-212 Human Biology II**Registration #1004-212**

A general study of human anatomy and physiology with emphasis on mechanisms by which the nervous and endocrine systems coordinate and integrate body functions. This second course includes discussion of nutrition, metabolism and respiratory, circulatory, lymphatic, urinary and reproductive systems.

Class 3, Lab 3, Credit 3 (S)

SBIG-231 Human Biology I Laboratory**Registration #1004-231**

Laboratory to complement the lecture material of SBIG-211. Experiments are designed to illustrate the dynamic characteristics of cells, tissues, and organ systems.

Lab 3, Credit 1

SBIG-232 Human Biology II Laboratory**Registration #1004-232**

Laboratory for dietetic and medical illustration students complements the lecture material of SBIG-212. Experiments are designed to illustrate the dynamic anatomy and physiology of major organ systems.

Lab 3, Credit 1

SBIG-289 Contemporary Science: Biology**Registration #1004-289**

A study in various biological topics relevant to contemporary problems of society. Topics may include population biology, pollution, disease control, human heredity, contagious diseases, marine biology, bioethics.

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

SBIG-315 Medical Genetics**Registration #1004-315**

A survey of selected human variations and diseases of medical importance, with emphasis on the underlying genetic principles. (SBIB-203 or equivalent)

Class 2, Credit 2 (S)

Chemistry

NOTE: SCHG courses, except SCHG-309, may not be taken by chemistry or polymer chemistry majors.

SCHA-261 Quantitative Analysis I**Registration #1008-261**

An introduction to quantitative analysis: experimental error and statistics, solubility and gravimetric analysis, volumetric analysis, acid-base equilibria and pH, acid-base and complexometric titrations. (Corequisites SCHC-252 and SCHA-265)

Class 4, Credit 4 (offered every year) (W)

SCHA-262 Quantitative Analysis II**Registration #1008-262**

Continuation of SCHA-261: fundamentals of electrochemistry, electrodes and potentiometry, redox titrations, electrogravimetric and coulometric analysis, polarography, spectrophotometry, nuclear chemistry, and coordination compounds. (Corequisites SCHA-266, SCHA-261)

Class 4, Credit 4 (offered every year) (S)

SCHA-265 Quantitative Analysis I Lab**Registration #1008-265**

Experimental techniques include using the analytic balance, calibration of glassware, gravimetric determinations, titrations of weak acids and bases, multi-endpoint titrations, iodometric and EDTA titrations, and Gran plots. Emphasis on record keeping and report writing. (Corequisites SCHA-261 and SCHC-252)

Lab 6, Credit 2 (offered every year) (W)

SCHA-266 Quantitative Analysis II Lab**Registration #1008-266**

Experimental techniques include potentiometric and photometric determinations and titrations, electrogravimetric analysis, determination of equilibrium constant (weak acids). Emphasis on record keeping and report writing. (Corequisites SCHA-261 and SCHA-262)

Lab 6, Credit 2 (offered every year) (S)

SCHA-311 **Analytical Chemistry:**
Registration #1008-311 **Instrumental Analysis**

Elementary treatment of instrumental theory and techniques; properties of light and its interaction with matter; ultraviolet, visible, and infrared absorption spectroscopies; atomic absorption and molecular fluorescence spectroscopy; nuclear magnetic resonance spectroscopy. (Corequisite SCHA-318) (SCHC-253)

Class 3, Credit 3 (offered every year) (F-X*, W)

SCHA-312 **Analytical Chemistry:**
Registration #1008-312 **Separations**

Inorganic and organic separations; Raoult's and Henry's Laws; phase rules; distillation; extraction; adsorption and surface effects; chromatography including gas, liquid, column, paper, thin layer, and ion exchange. (Corequisite SCHA-319) (SCHC-253)

Class 3, Credit 3 (offered every year) (S, SR)

SCHA-317 **Instrumental Analysis for**
Registration #1008-317 **Imaging Science**

Instrumental methods of chemical analysis, including infrared and atomic absorption spectroscopy, high performance liquid chromatography, gas chromatography, and potentiometry. Written laboratory reports will be emphasized. (Corequisite SCHG-310) (SCHG-207 or equivalent)

Lab 3, Credit 1 (offered every year) (S)

SCHA-318 **Instrumental Analysis Lab**
Registration #1008-318

Lab accompanying SCHA-311. Quantitative and qualitative experiments in ultraviolet, visible, infrared, fluorescence, and atomic absorption spectroscopies. Laboratory report writing is emphasized. (Corequisite SCHA-311) (SCHC-253 or equivalent)

Lab 4, Credit 1 (offered every year) (F-X*, W)

SCHA-319 **Separations Lab**
Registration #1008-319

Lab accompanying SCHA-312. Experiments with chemical separation techniques including distillations, extractions and a variety of chromatographic methods (HPLC, thin layer, paper, ion exchange, gas, gel filtration). Laboratory report writing is emphasized. (Corequisite SCHA-312) (SCHC-253)

Lab 4, Credit 1 (offered every year) (S, SR)

SCHA-620 **Building Scientific Apparatus**
Registration #1008-620

Basic skills associated with the construction of scientific laboratory apparatus, some of which is not commercially available, will be covered: machine shop skills, working with glass, vacuum technology, optics, and electronics. Special emphasis will be placed on function-structure relationship between an instrument and its intended use. Several references on construction techniques will be provided and information about current manufacturers and suppliers of necessary components will be given. (Corequisite SSEG-621) (SCHP-441, SPSP-212, 213 or 312, 313)

Class 3, Credit 3 (offered upon sufficient request)

*X, extended day (after 5 p.m.)

SCHB-334 **Biochemistry**
Registration #1009-334

Introduction to biological chemistry. An in-depth survey of the molecular organization, physiological functions and bio-energetic 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 of all chemicals including flammable materials, compressed gases, cryogenics, radioactive materials and other special chemicals.

Class 1, Credit 1 (offered every year) (F)

SCHC-230 **Introduction to Co-op/**
Registration #1010-230 **Chemistry Career Seminar**

Exploration of cooperative education opportunities with practice in writing letters of application and resumes and in interviewing techniques. Careers related to chemistry and polymer chemistry will be discussed, and career information resources at RIT will be utilized.

Class 1, Credit 1 (offered every year) (F)

SCHC-251 **General Chemistry I**
Registration #1010-251

A detailed study of fundamental tools of chemistry: properties and measurement, atomic theory; stoichiometry (elements, compounds, reactions), reactions in aqueous solutions, thermochemistry (First Law), and gaseous equilibrium. (Corequisite SCHC-255)

Class 3, Credit 3 (offered every year) (W)

SCHC-252 **General Chemistry II**
Registration #1010-252

Gas laws, periodic table and periodic trends, quantum theory of electrons, chemical bonding (ionic, covalent, valence bond theory, and hybridization), chemical kinetics, and introduction to organic chemistry. (Corequisites SCHA-261 and SCHA-265) (SCHC-251)

Class 3, Credit 3 (offered every year) (W)

SCHC-255 **General Chemistry I Lab**
Registration #1010-255

A variety of experimental techniques, including determination of Avogadro's number, qualitative analysis, Job's plot, acid rain, antacid buffers, heats of reaction, syntheses of aspirin and polymers. (Corequisite SCHC-251)

Lab 3, Credit 1 (offered every year) (F)

SCHC-301 **Elements of Chemical Research**
Registration #1010-301

The nature of chemical research will be presented in terms of the concepts, approaches, and procedures. Special attention will be given to methods of keeping research records and notebooks. Opportunities and projects available for undergraduate and graduate research will be described by Department of Chemistry faculty. (Corequisite SCHP-340) (SCHO-431)

Class 1, Credit 1 (offered every year) (F, W)

SCHC-401 **Chemical Literature****Registration #1010-401**

Instruction will be given on the use of chemical literature resources such as *Chemical Abstracts*, *Science Citation Index*, *Beilstein*, *Current Contents*, and computerized information retrieval. Students will prepare a library-based research paper on a chemical topic of their choice as a culmination of instruction on planning a research paper, outlining, using correct scientific English and formats for documentation (footnotes, endnotes, bibliographies), and preparing visuals, abstracts, and letters of transmittal.

Class 2, Credit 2 (offered every year) (F-X*, W)

SCHC-541,542,543 **Chemistry Research****Registration #1010-541,542,543**

Faculty directed student projects or research usually involving laboratory work and/or calculations that would be considered original. (SCHC-401 and permission of research advisor)

Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHC-559 **Special Topics:****Registration #1010-559****Undergraduate Chemistry**

Courses in which topics of special interest to a sufficiently large group of students, and not covered in other courses, may be offered upon request.

Class variable, Credit variable (offered upon sufficient request)

SCHC-599 **Independent Study:****Registration #1010-599****Chemistry**

Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature. (Permission of independent study advisor)

Class variable, Credit variable (offered every year) (F, W, S, SR)

NOTE: SCHG courses, except SCHG-309, may not be taken by chemistry or polymer chemistry majors.

SCHG-201 **Survey of General Chemistry****Registration #1011-201**

One quarter survey of general chemistry for non-science majors with no previous background in chemistry. Fundamentals of matter and energy, the atomic theory, chemical structure and bonding, ionic species and solutions, and acid-base chemistry are covered. (Corequisite SCHG-221)

Class 3, Credit 3 (offered every year) (F)

SCHG-202 **Survey of Organic Chemistry****Registration #1011-202**

One quarter survey of the fundamentals of organic chemistry that are essential for an understanding of biological molecules, biochemistry, and the basics of polymer chemistry. Topics covered include alkanes, alkenes, alkynes, aromatics, alcohols, ethers, aldehydes, ketones, carboxylic acids and derivatives, amines, and addition and condensation polymers. (Corequisite SCHG-222) (SCHG-201 or equivalent)

Class 3, Credit 3 (offered every year) (W)

SCHG-203 **Biochemistry I****Registration #1011-203**

Structure and reactions of the major classes of biomolecules are studied. Topics include amino acids and proteins, lipids, carbohydrates and nucleic acids. (SCHG-202 or equivalent)

Class 4, Credit 4 (offered every year) (S)

SCHG-204 **Biochemistry II****Registration #1011-204**

The fundamentals of the metabolism of major classes of biomolecules are covered. Topics include biochemical energetics; the metabolism of carbohydrates, lipids and proteins; and the functions of nucleic acids. (SCHG-203 or equivalent)

Class 4, Credit 4 (offered every year) (F)

SCHG-205 **Chemical Principles I****Registration #1011-205****Laboratory**

A laboratory course for photoscience, microelectronics, and science majors and others who are taking SCHG-211. Laboratory experiments are designed to complement the lecture material and may cover the following topics: analytical balance, volumetric measurements, titrations, syntheses, and analyses. (Corequisite SCHG-211)

Lab 3, Credit 1 (offered every year) (F, W)

SCHG-206 **Chemical Principles II****Registration #1011-206****Laboratory**

A laboratory course for photoscience, microelectronics, and science majors and others who are taking SCHG-212. Laboratory experiments are designed to complement lecture topics and may include the following: titrations, thermochemistry, kinetics, spectrophotometry (visible), and redox reactions. (Corequisite SCHG-212) (SCHG-205)

Lab 3, Credit 1 (offered every year) (W, S)

SCHG-207 **Introduction to Organic****Registration #1011-207****Chemistry Laboratory**

An introduction to organic laboratory techniques. Methods of separating, purifying, and characterizing organic compounds are covered. (Corequisite SCHG-213) (SCHG-206)

Lab 3, Credit 1 (offered every year) (S)

SCHG-208 **College Chemistry I****Registration #1011-208**

Primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stoichiometry, First Law of Thermodynamics, thermochemistry, electronic theory of composition and structure, chemical bonding.

Class 4, Credit 4 (offered every year) (F, W)

SCHG-209 **College Chemistry II****Registration #1011-209**

A continuation of SCHG-208. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry and the chemistry of metals. (SCHG-208)

Class 4, Credit 4 (offered every year) (S)

SCHG-211 **Chemical Principles I****Registration #1011-211**

For science, microelectronics, and photoscience majors and others who desire an in-depth study of general chemistry. Atomic structure and chemical bonding, chemical equations and chemical analysis; gases; acids and bases. (Corequisite SCHG-205)

Class 3, Credit 3 (offered every year) (F, W)

SCHG-212 **Chemical Principles II**
Registration #1011-212

Problem solving applications of chemical principles. Topics include thermodynamics and equilibrium, oxidation-reduction, and chemical kinetics. (Corequisite SCHG-206) (SCHG-211)

Class 3, Credit 3 (offered every year) (W, S)

SCHG-213 **Introduction to Organic Chemistry**
Registration #1011-213

Introduction to the structure and reactivities of organic molecules for physical science majors. An overview of the structure, nomenclature, bonding, and reactivities of major functional groups. Special topics will include spectroscopy, organometallics, polymers, and biomolecules. (Corequisite SCHG-207) (SCHG-212)

Class 3, Credit 3 (offered every year) (S)

SCHG-215 **General & Analytical Chemistry I**
Registration #1011-215

General chemistry for students in biology, medical technology, and the life sciences. Introduction to chemical symbols, formulas, equations, stoichiometry, atomic structure, chemical periodicity and bonding. Emphasis on an early introduction to solutions, concentrations, acid-base and precipitation reactions; analytical chemistry problem-solving applications are stressed. (Corequisite SCHG-225)

Class 3, Recitation 1, Credit 4 (offered every year) (F)

SCHG-216 **General & Analytical Chemistry II**
Registration #1011-216

Introduction to quantitative gravimetric analysis, oxidation-reduction, nomenclature, chemical equilibrium and equilibria in aqueous solutions. Particular emphasis on solution equilibria - including weak acids, bases, buffers, hydrolysis, pH titrations and heterogeneous equilibria. (Corequisite SCHG-226) (SCHG-215)

Class 3, Credit 3 (offered every year) (W)

SCHG-217 **General & Analytical Chemistry III**
Registration #1011-217

The concepts of polyprotic equilibria, spectrophotometry instrumentation and analyses, electrochemistry, nuclear chemistry and chemical kinetics are presented with an emphasis on the analytical applications of these principles to the life sciences. (Corequisite SCHG-227) (SCHG-216)

Class 3, Credit 3 (offered every year) (S)

SCHG-221 **Survey of General Chemistry**
Registration #1011-221 **Laboratory**

Laboratory course to accompany SCHG-201. Emphasis on introduction to methods of chemical analysis, qualitative and quantitative techniques. (Corequisite SCHG-201)

Lab 3, Credit 1 (offered every year) (F)

SCHG-222 **Survey of Organic Chemistry**
Registration #1011-222 **Laboratory**

Laboratory course to accompany SCHG-202. Emphasis is on representative examples of typical organic techniques and synthesis. (Corequisite SCHG-202) (SCHG-221 or equivalent)

Lab 3, Credit 1 (offered every year) (W)

SCHG-225 **General & Analytical Chemistry**
Registration #1011-225 **Laboratory**

Introduction to analytical chemistry laboratory techniques and methods of qualitative and quantitative analysis. Topics include volumetric calibration, density and chemical formula analysis, and an introduction to volumetric titration and spectrophotometric analysis. Emphasis is placed on laboratory methods, notebook documentation, report writing, and quantitative evaluation of laboratory data. Experiments are designed to complement lecture material in SCHG-215. (Corequisite SCHG-215)

Lab 3, Credit 1 (offered every year) (F)

SCHG-226 **General & Analytical Chemistry**
Registration #1011-226 **Laboratory**

Continuation of SCHG-225 laboratory. Topics include gravimetric analysis; atomic absorption analysis; redox titration; visible spectrophotometric titrations; and thin layer, gas and gel filtration chromatographies. Emphasis is placed on analytical methods of analysis, report writing and quantitative unknown reports. Experiments are designed to complement lecture material in SCHG-216. (Corequisite SCHG-216) (SCHG-225)

Lab 3, Credit 1 (offered every year) (W)

SCHG-227 **General & Analytical Chemistry**
Registration #1011-227 **Laboratory**

Continuation of SCHG-226 laboratory. Topics include pH measurement, buffers and pH indicators, polyprotic acid multi-endpoint titrations, spectrophotometric analysis of equilibrium constants, a redox titration contest, enzyme catalysis, and an independent laboratory practical on the quantitative analysis of an unknown solution by various analytical methods. Experiments are designed to complement lecture material in SCHG-217. Emphasis is on independent laboratory analysis, experimental design, and data analysis. (Corequisite SCHG-217) (SCHG-226)

Lab 6, Credit 2 (offered every year) (S)

SCHG-271 **Basic Chemistry I**
Registration #1011-271

Basic training in general chemistry assuming no prior experience, concentrating on atomic structure, chemical formulas and reactions, stoichiometry, solutions, acids and bases, and oxidation-reduction. (SCHG-275 should be taken concurrently)

Class 3, Credit 3 (offered every year) (F, W)

SCHG-272 **Chemistry of Water and Waste Water**
Registration #1011-272

Chemistry of water analyses, including solids, pH, alkalinity, acidity, chloride, phosphate, BOD, COD, nitrogen, metals, radioactivity, residual chlorine and chlorine demand. Polymers will also be covered. (Corequisite SCHG-276) (SCHG-271 or equivalent)

Class 3, Credit 3 (offered every year) (F)

SCHG-273 **Basic Chemistry II**
Registration #1011-273

A basic survey of organic chemistry and functional groups with an emphasis on addition and condensation polymers, inorganic polymers (silicates, glasses, ceramics), structure and properties of metals, and oxidation-reduction applications, including corrosion (SCHG-271; SCHG-277 is a corequisite)

Class 3, Credit 3 (offered every year) (W, S, SR)

SCHG-275 **Basic Chemistry I Lab**
Registration #1011-275

Laboratory to be taken concurrently with SCHG-271. General chemistry and volumetric techniques will be covered.

Lab 3, Credit 1 (offered every year) (F, W)

SCHG-276 **Chemistry of Water and Waste Water Lab**
Registration #1011-276

Laboratory to be taken concurrently with SCHG-272. Techniques used in water and waste water analysis will be covered. (SCHG-271 or equivalent)

Lab 3, Credit 1 (offered every year) (F)

SCHG-277 **Basic Chemistry II Lab**
Registration #1011-277

Experiments with organic chemistry, polymers, metals, and oxidation-reduction. (SCHG-275; SCHG-273 is a corequisite)

Lab 3, Credit 1 (offered every year) (W, S, SR)

SCHG-281 **Chemical Foundations I**
Registration #1011-281

Basic concepts of general chemistry including measurement, atomic theory, chemical bonding, stoichiometry, the liquid and solid states, properties of water. (SMAM-204)

Class 3, Recitation 1, Credit 4 (offered every year) (W)

SCHG-282 **Chemical Foundations II**
Registration #1011-282

Basic concepts of general chemistry including solutions, colligative properties, acid-base theory, pH, titrations, oxidation-reduction, organic functional groups, addition and condensation polymers. (SCHG-281)

Class 3, Recitation 1, Credit 4 (offered every year) (S)

SCHG-289 **Contemporary Science: Chemistry**
Registration #1011-289

This course examines a broad range of contemporary scientific topics with a chemical basis. These may include nuclear power, sources of energy, air and water pollution, medicines and drugs in addition to the chemical laws and structure of the atom.

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

SCHG-309 **Glassblowing Techniques**
Registration #1011-309

This course is designed to introduce and train each student in small-scale scientific glassblowing techniques. Proficiency will be developed in rod manipulation, ring seals, construction of apparatus, annealing, use of a simple lathe and hand-torch work. (May be taken by chemistry, polymer chemistry, and other majors.)

Class 4, Credit 2 (offered upon sufficient request)

SCHG-310 **Chemical Principles for Imaging Science**
Registration #1011-310

Fundamentals of atomic and molecular structure of stable ground-state and excited-state atoms and molecules and of reactive intermediates in chemical reactions. The principles of chemical thermodynamics and kinetics will be developed in the context of understanding chemical transformations which occur in imaging systems. Elements of polymer science and photo/radiation chemistry are also included. (Corequisite SCHA-317) (SCHG-213 or equivalent)

Class 3, Credit 3 (offered every year) (S)

SCHO-231,232 **Organic Chemistry**
Registration #1013-231,232

Survey of the structure, nomenclature, reactions, and synthesis of the major functional groups. Mechanisms of main classes of reactions are discussed. (Corequisites SCHO-235, 236) (SCHG-216 or 212, or 209)

Class 3, Credit 3 (offered every year) (231-F; 232-W)

SCHO-233 **Organic Chemistry**
Registration #1013-233

Structure, nomenclature, reactions, and properties of the important classes of bio-organic molecules (carbohydrates, lipids, amino acids, proteins, and nucleic acids) are covered in depth. Emphasis is on structure and reactivity in relation to biochemical processes. (Corequisite SCHO-237) (SCHO-232)

Class 3, Credit 3 (offered every year) (S)

SCHO-235,236,237 **Organic Chemistry Lab**
Registration #1013-235, 236,237

Laboratory work emphasizes techniques, preparations, and analyses. SCHO-237 emphasizes reactions and properties of biomonomers and polymers. (Corequisites SCHO-231,232,233)

Lab 3, Credit 1 (offered every year) (235-F; 236-W; 237-S)

SCHO-431 **Organic Chemistry I**
Registration #1013-431

A rigorous survey of the reactions of major organic functional groups, emphasizing alkanes, alkenes, alkyl halides, and alkynes. Stereochemistry is also included. (Corequisite SCHO-435) (SCHC-253)

Class 3, Credit 3 (offered every year) (S, SR)

SCHO-432 **Organic Chemistry II**
Registration #1013-432

A continued survey of reactions of major organic functional groups, including aromatic compounds, alcohols, ethers, aldehydes, and ketones. Organometallics and spectral analysis (IR, UV, NMR) are also included. (Corequisite SCHO-436) (SCHO-431)

Class 3, Credit 3 (offered every year) (F, W)

SCHO-433 **Organic Chemistry III**
Registration #1013-433

A continued survey of reactions of major organic functional groups, including carboxylic acids, carboxylic acid derivatives, amines, and enolate anions. Structure, nomenclature, reactions, and properties of important classes of bio-organic molecules are also included. (Corequisite SCHO-437) (SCHO-432)

Class 3, Credit 3 (offered every year) (S, SR)

SCHO-435,436 **Preparative Organic Chemistry**
Registration #1013-435,436

Synthesis of organic compounds utilizing a variety of laboratory techniques. Purification techniques and spectral characterization will be routinely used. (SCHO-431 should be taken concurrently with SCHO-435, SCHO-432 with SCHO-436.) (SCHC-253 or equivalent)

Lab 6, Credit 2 (offered every year) (435-S, SR; 436-F, W)

SCHO-437 **Systematic Identification of Organic Compounds**
Registration #1013-437

A laboratory course utilizing synthesis, and chemical and spectral (IR, NMR, and GC/MS) techniques to identify and characterize organic compounds. (Should be taken concurrently with SCHO-433.) (SCHO-432,436)

Lab 6, Credit 2 (offered every year) (S, SR)

SCHO-601 Organic Chemistry of Polymers**Registration #1013-601**

The chemistry of high molecular weight organic polymers and their properties are introduced and discussed in depth. Mechanisms of step-growth and chain-growth polymerization reactions, polymer reactions and degradations are studied. (SCHO-433)

Class 4, Credit 4 (F-X*)

SCHP-301 Introduction to Polymer Technology

Introduction to the history of polymer chemistry, the terminology of polymers, the structures, methods of synthesis, and properties of commercially significant polymers, and the major polymer processing techniques. (SCHO-432 or equivalent)

Class 2, Credit 2 (offered every year) (F)

SCHP-340 Introduction to Physical Chemistry

Properties of gases, kinetic theory of gases, energy and the First Law; thermochemistry; entropy and the Second and Third Laws; introduction to Helmholtz and Gibbs free energy, gas equilibrium. (SCHC-253, SMAM-252, SPSP-311)

Class 3, Credit 3 (offered every year) (F, W)

SCHP-441 Physical Chemistry I

Review of the thermodynamic laws; criteria for equilibrium and spontaneity; chemical equilibrium; phase rule; equilibrium in ideal and non-ideal solutions; electrochemistry. (Should be taken concurrently with SCHP-445.) (SCHP-340)

Class 3, Credit 3 (offered every year) (S-X*, SR)

SCHP-442 Physical Chemistry II

Introduction to quantum mechanics and spectroscopy, radioactivity; Planck's law; photoelectric effect; the Bohr atom; deBroglie, Schrodinger, and Heisenberg theories; eigenvalue/eigenfunction equations; variation and perturbation theory; quantum statics; Heitler-London theory of covalent bonds; selection rules and spectroscopy. (Should be taken concurrently with SCHP-446.) (SMAM-306, SCHP-441)

Class 3, Credit 3 (offered every year) (F, W-X*)

SCHP-443 Physical Chemistry III

Kinetic molecular theory; transport properties of gases; chemical kinetics; surface chemistry; photochemical kinetics; irreversible processes in solution. (Should be taken concurrently with SCHP-447.) (SCHP-441)

Class 3, Credit 3 (offered every year) (S-X*, SR)

SCHP-445 Physical Chemistry Laboratory I

Introduction to physical chemistry laboratory; chemical thermodynamics and equilibrium. (Should be taken concurrently with SCHP-441)

Lab 3, Credit 1 (offered every year) (S-X*, SR)

SCHP-446 Physical Chemistry Laboratory II

Experiments in the application of quantum chemistry, atomic and molecular spectroscopy, and radioactivity. (Should be taken concurrently with SCHP-442.)

Lab 3, Credit 1 (offered every year) (F, W-X*)

SCHP-447 Physical Chemistry Laboratory III

Laboratory experiments in chemical dynamics. (Should be taken concurrently with SCHP-443.)

Lab 3, Credit 1 (offered every year) (S-X*, SR)

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 4, Credit 4 (offered every year) (S-X*)

SCHA-720 Instrumental Analysis Lab

Lab accompanying SCHA-711. Experiments include AA, FT-IR and RAMAN, GC/MS, electrochemistry, and thermal analysis. Problem solving and experimental design are emphasized. (Corequisite SCHA-711)

Lab 6, Credit 2 (offered every year) (F, W-X*)

SCHP-604 Characterization of High Polymers

Experiments on dilute solution viscosity, gel permeation chromatography, microscopy, differential scanning calorimetry, thermogravimetric analysis, tensile testing, infrared spectroscopy, NMR spectroscopy and other aspects of polymer characterization. (SCHO-60I or SCHP-602)

Lab 6, Credit 2 (S)

SCHP-605 Synthesis of High Polymers

Experiments on condensation, free radical, ring opening, and ionic polymerizations and polymer modification. (SCHO-437)

Lab 6, Credit 2 (F)

SCHP-630 Magnetic Resonance Imaging

This course introduces the principles of magnetic resonance imaging (MRI) at a level understandable by both the scientist and non-scientist. The course begins with the basics of nuclear magnetic resonance, the foundation of MRI. Magnetic resonance imaging techniques and instrumentation will be explained. Emphasis will be placed on understanding the imaging process. A discussion of information available for water proton content images of body parts and tissue types will be presented. Future directions of MRI will be presented. (SPSP-311, 312, 313 or SPSP-211,212,213; SCHP-648)

Class 4, Credit 4 (W) (X*)

SCHP-648 Basics of Pulsed NMR

An introduction to the principles of pulsed nuclear magnetic resonance (NMR) spectroscopy. Lectures on instrumentation, pulse sequences, Fourier transforms, and artifacts will be presented. (SCHA-311)

Class 1, Credit 1 (offered every year) (F)

*X, extended day (after 5 p.m.)

SCHA-711 Instrumental Analysis**Registration #1008-711**

Theory, applications, and limitations of selected instrumental methods in qualitative, quantitative, and structural analysis. Topics covered include mass spectroscopy, nuclear magnetic resonance, electrochemistry, surface methods and new analytical methods. (SCHP-340, SCHO-432)

Class 3, Credit 3 (offered every year) (F-X*, W)

SCHP-603 Structure-Property Relationships in Polymers

Registration #1014-603
An introduction to the microstructure and morphology of amorphous and semicrystalline polymeric systems and their influence on thermomechanical, optical, and electronic properties of polymers. Topics include viscoelasticity and composites. (SCHO-60I or SCHP-602)

Class 4, Credit 4 (F-X*)

SCHB-702 Biochemistry: Biomolecular Conformation & Dynamics

Registration #1009-702
Introduction to biological chemistry. Chemical structures, reactions, molecular organization and physiological functions of the molecular components of cells; amino acids, proteins, enzymes, enzyme kinetics, co-enzymes, biochemical thermodynamics, carbohydrates and lipids, membrane structure, and function. Emphasis is on the structure-function relationships of biomolecules, their solution behavior and dynamics. (SCHO-433, SCHP-340 or SCHP-742)

Class 3, Credit 3 (offered every year) (F, W)

SCHB-703 Biochemistry: Metabolism

Registration #1009-703
Bioenergetics principles; catabolism of carbohydrates, fatty acids and amino acids; photosynthesis, biosynthesis of carbohydrates, lipids, and nitrogenous compounds; metabolic diseases. (SCHB-702)

Class 3, Credit 3 (offered every year) (F, W)

SCHB-704 Biochemistry: Nucleic Acids and Molecular Genetics

Registration #1009-704
The biochemistry of inheritance, expression of genetic information, protein biosynthesis. Biochemical aspects of viral and bacterial infection. (SCHB-702)

Class 3, Credit 3 (offered every year) (S-X*, 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 are structured as ordinary courses and will have specified prerequisites, contact hours and examination procedures. Recent courses taught as Special Topics include Nuclear Chemistry, Polymer Morphology, Advanced Chromatographic Methods, and Applications of Computer Interfacing.

Class variable, Credit variable (offered every year)

SCHC-870 Chemistry Seminar

Registration #1010-870
Credit 1 (offered every year)

SCHC-877 External Research

Registration #1010-877
Industrial internship research
Credit 1-16 (offered every year)

SCHC-879-00 Continuation of Thesis**Registration #1010-879-99**

Credit 0 or 1

SCHC-879 Research and Thesis Guidance

Registration #1010-879
Hours and credits to be arranged. Chemical research in a field chosen by the candidate, subject to approval of the department head and advisor.

Credit variable (offered every year)

SCHC-899 Independent Study: Chemistry

Registration #1010-899
Credit variable (offered every year)

SCHI-762 Inorganic Chemistry I: Periodicity and Reactivity

Registration #1012-762
For the common elements, mastery will be required of chemical reactions which describe: (1) their isolation, (2) their characteristic chemical reactivities, and (3) large volume industrial processes. Relationships between the reactivities of neighboring elements will be elucidated and justified according to current theories. (SCHO-433, SCHP-442)

Class 3, Credit 3 (offered every year) (S, SR-X*)

SCHI-763 Inorganic Chemistry II: Isomerism, Symmetry, and Bonding

Registration #1012-763
This course provides an in-depth view of how bonding theories endeavor to account for and predict the physical properties (e.g., color, magnetism, stability, chemical potential, electrical conductivity, and others) of a wide variety of inorganic compounds. (SCHO-433, SCHP-442)

Class 3, Credit 3 (offered every year) (F, W-X*)

SCHI-764 Inorganic Chemistry III: Physical Methods and Recent Advances

Registration #1012-764
This course introduces the student to the more sophisticated tools with which an inorganic chemist investigates inorganic materials. These physical methods with the bonding theories from SCHI-763, are applied to inorganic reactions that exemplify the similarities and anomalous behavior of the elements in each family of the periodic table. Application of this knowledge to contemporary research areas of inorganic chemistry is conducted. (SCHI-763)

Class 3, Credit 3 (offered every year) (S, SR-X*)

SCHI-765 Preparative Inorganic Chemistry

Registration #1012-765
The complexity of many inorganic "building blocks" requires a detailed understanding of inorganic theory, special handling precautions, and special methods to investigate inorganic products. Different areas of the periodic table, new synthetic methods, and new characterization techniques are examined. (Corequisite SCHI-763) (SCHI-762 or permission of instructor)

Class 1, Lab 6, Credit 3 (offered upon sufficient demand) (F, W)

SCHO-730 **Chemical Toxicology**
Registration #1013-730

This course provides a comprehensive introduction to the basic science of toxicology, with emphasis on a) basic principles, methods of approach and applications of toxicological data; b) types and mechanisms of toxic injury produced in major mammalian organ systems; and c) characteristics and effects of major classes of environmentally and occupationally significant toxicants. (College biology and chemistry, some biochemistry helpful, or permission of instructor)

Class 4, Credit 4 (offered upon sufficient request) (F)

SCHO-736 **Spectrometric Identification**
Registration #1013-736 **of Organic Compounds**

Theory and application of proton and carbon and 2-D nuclear magnetic resonance, infrared, mass spectrometry, and ultraviolet spectra as applied to organic structure determination. (SCHO-433)

Class 4, Credit 4 (offered every year) (W)

SCHO-737 **Advanced Organic Chemistry**
Registration #1013-737

Several of the following advanced topics in organic chemistry are covered: polyfunctional compounds, modern synthetic methods, anion chemistry, stereospecific syntheses, protecting group chemistry, total synthesis, with strong emphasis on recent chemical literature. (SCHO-433)

Class 4, Credit 4 (offered every year) (F)

SCHO-739 **Advanced Organic Chemistry**
Registration #1013-739

Selected topics in physical organic chemistry including: techniques for elucidation of mechanism (kinetic, linear free, energy relationships, isotope effects), molecular orbital theory, electrocyclic reactions. (SCHO-433, SCHP-443)

Class 4, Credit 4 (offered alternate years) (S)

SCHO-832 **Stereochemistry**
Registration #1013-832

Advanced treatment of steric relationships, conformational analysis and stereoisomerism in organic compounds. (SCHO-433, SCHP-433)

Class 4, Credit 4 (offered upon sufficient request)

SCHO-833 **Heterocyclic Chemistry**
Registration #1013-833

This course will contain a general treatment of heterocyclic chemistry. Syntheses and relative reactivities of heterocyclic compounds as demonstrated by their chemical reactions. (SCHO-433)

Class 4, Credit 4 (offered alternate years)

SCHP-741 **Chemical Thermodynamics**
Registration #1014-741

A study of the basic fundamentals of thermodynamics, including an introduction to statistical mechanics, and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases will be calculated based on spectroscopic data. Theory of solutions and phase equilibria are discussed. (SCHP-443, SMAM-306)

Class 4, Credit 4 (offered alternate years)

SCHP-742 **Survey of Physical Chemistry**
Registration #1014-742

A study of the fundamental principles of physical chemistry for clinical chemistry and biotechnology students. Kinetic-molecular theory, quantum mechanics, spectroscopy, thermodynamics and kinetics are presented in application to the life sciences. Not acceptable for BS in chemistry.

Class 3, Credit 3 (offered alternate years) (W)

SCHP-743 **Chemical Kinetics**
Registration #1014-743

Methods of investigating the kinetics of chemical reactions and the theories used to interpret their results. Focus on homogeneous reactions in gas and liquid phases. Discussions of references from recent chemical literature. (SCHP-443)

Class 4, Credit 4 (offered alternate years)

SCHP-744 **Quantum Mechanics**
Registration #1014-744

Review of basic quantum theory and models. Variation and perturbation methods; atomic and molecular orbital theory; emphasis on relationship of spectroscopy and quantum chemistry. (SCHP-442)

Class 4, Credit 4 (offered alternate years)

SCHP-747 **Principles of Magnetic Resonance**
Registration #1014-747

A series of lectures designed to introduce the principles of magnetic resonance spectroscopies with emphasis on pulsed nuclear magnetic resonance (NMR) spectroscopy. Topics covered include classical and quantum mechanical theory, Fourier transform techniques, pulse sequences, instrumentation, instrumental techniques, and modern applications such as 2D-NMR and solid state NMR. (SCHP-443; SCHP-648)

Class 4, Credit 4 (S)

Mathematics

SMAM-200 **Algebra**
Registration #1016-200

An algebra course including such topics as operations involving polynomials, algebraic fractions, factoring, exponents and radicals, solution of linear and quadratic equations, and graphing linear equations.

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

SMAM-204 **College Algebra and**
Registration #1016-204 **Trigonometry**

Topics include a review of the fundamentals of algebra; solution of linear, fractional and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic and trigonometric functions; systems of linear equations. (2 years of high school algebra)

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-210,211 **Freshman Seminar**
Registration #1016-210,211

210: Orientation program for entering applied statistics, applied mathematics and computational mathematics majors. Several 2-3 week modules introducing students to various non-traditional areas of mathematics; brief orientation to co-op.

211: A continuation of 210 including a four-week introduction to co-op with cover letter and resume writing. Additional mathematical and statistical topics will be discussed. A technical report is required.

Class 1, Credit 1 (offered every year) (210-F; 211-W)

SMAM-214,215 **Introduction to Calculus I, II**
Registration #1016-214,215

214: Introduction to the study of differential calculus. The following topics will be covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, maxima and minima. (SMAM-204 or equivalent)

215: A continuation of SMAM-214, dealing with an introduction to integral calculus: The following topics will be covered: definite integral, area, work and distance problems, volumes, fundamental theorem of calculus, approximation techniques, exponential and logarithmic functions, applications, introduction to differential equations. (SMAM-214)

Class 3, Credit 3 (offered every year) (214-F, W, S; 215-W, S)

SMAM-220 **Fundamentals of Trigonometry**
Registration #1016-220

A study of the fundamental concepts in trigonometry including terminology, radian measures, trigonometric ratios, graphs of trigonometry, applications, and vectors.

Class 1, Credit 1 (offered every year) (S)

SMAM-225 **Algebra for Management Science**
Registration #1016-225

Introduction to functions including linear, quadratic, polynomial, exponential, logarithmic, and rational functions with applications to supply and demand, cost, revenue, and profit functions. Additional topics include matrices, linear programming, and mathematics of finance. (3 years of high school mathematics)

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-226 **Calculus for Management Science**
Registration #1016-226

A course stressing applications of calculus concepts to solving problems in business and economics. Topics include the limit concept; differentiation and integration of algebraic, logarithmic, exponential, and multivariate functions. (SMAM-225)

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-228 **Analytic Geometry**
Registration #1016-228

A course covering topics in analytical geometry such as slopes, lines, and conic sections. Also additional topics in polar coordinates, determinants, parametric equations, trigonometry, and two- and three-dimensional vectors. (SMAM-204)

Class 4, Credit 4 (W)

SMAM-241,242 **Calculus and Analytic Geometry**
Registration #1016-241,242

241: A study of pre-calculus topics needed to succeed in learning calculus combined with the course material covered in SMAM-251. (3 years of high school mathematics)

242: A continuation of the material from SMAM-241 combined with the course material covered in SMAM-252. (SMAM-241 or 251)

Class 6, Credit 6 (241-F, W; 242-W)

SMAM-251,252,253 **Calculus I, II, III**
Registration #1016-251,252,253

A standard first course in calculus intended for students majoring in mathematics, science or engineering with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter is divided as follows:

251: Two-dimensional analytic geometry, functions, limits, continuity, the derivative and its formulas, and applications of the derivative. (3 years of high school mathematics)

252: Anti-derivatives by various methods, the definite integral with applications to calculation of area, arc length, volumes of revolution, etc., transcendental functions, numerical integration. (SMAM-251)

253: Improper integrals, formal limits of sequences, infinite series, Taylor series, polar coordinates, conic sections. (SMAM-252)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-265 **Discrete Mathematics I**
Registration #1016-265

An introduction to discrete mathematics with applications in computer science and mathematics with an emphasis on proof techniques. It covers the basics of combinatorics, sets, functions, the natural numbers, and the integers modulo n . (Sophomore standing)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-266 **Discrete Mathematics II**
Registration #1016-266

A continuation of discrete mathematics with applications in computer science and operations research. It covers finite state machines, relations, graphs, trees, optimization and matching. **NOTE: The course may not be taken for credit if credit is to be earned in SMAM-467.** (SMAM-265)

Class 4, Credit 4 (W, S)

SMAM-267 **Introduction to Probability Models**
Registration #1016-267

An introduction to discrete and continuous random variables; probability density and distribution functions; expected value and variance of random variables; and applications of probabilistic concepts to elementary queuing models. (SMAM-266 and SMAT-421 or equivalent)

Class 4, Credit 4 (S, SR)

SMAM-289 **Contemporary Science: Mathematics**
Registration #1016-289

A basic survey of mathematical structures as well as an introduction to problem solving. Topics will be chosen from foundations of mathematics, algebra, topology, number theory, graph theory, probability and statistics. These structures will be examined as they occur naturally in modern settings. **NOTE: Not acceptable for science credit for College of Science majors.**

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-305**Calculus IV****Registration #1016-305**

A continuation of SMAM-253 treating 3-dimensional analytic geometry and vector algebra, partial derivatives, multiple integrals and applications. (SMAM-253, or may be taken concurrently)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-306

Differential Equations I

Registration #1016-306

This course provides an introduction to the study of ordinary differential equations and their application. Common first order equations and linear second order equations are solved. Method of undetermined coefficients, variation of parameters, linear independence and the Wronskian, numerical solution techniques of Runge Kutta, vibrating systems, Laplace transforms. (SMAM-305)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-307

Differential Equations II

Registration #1016-307

Second quarter course in ordinary differential equations which includes power series solution to ordinary differential equations about ordinary and regular singular points; Legendre's equations; Bessel's equations; hypergeometric equation; Picard's theorem; solution of systems of linear differential equations; phase plane analysis and stability. (SMAM-306)

Class 4, Credit 4 (offered every year) (S)

SMAM-309

Elementary Statistics

Registration #1016-309

An introduction to elementary techniques of statistical description and inference. Topics include descriptive statistics, probability, estimation of parameters, hypothesis testing, and simple linear regression. The statistical software package MINITAB will be used to introduce students to the use of computers in statistical analysis. **NOTE: This course may not be taken for credit if credit is to be earned in SMAM-314 or 319.** (SMAM-204 or equivalent)

Class 4, Credit 4 (offered every year) (W, S, SR)

SMAM-314**Statistics****Registration #1016-314**

Basic statistical concepts for engineers and scientists covering descriptive statistics, probability, and inference. Calculus will be used where appropriate and one of the software packages, RS/1 or MINITAB, will be incorporated. **NOTE: This course may not be taken for credit if credit is to be earned in SMAM-309 or 319.** (SMAM-253)

Class 4, Credit 4 (offered every year) (W)

SMAM-318

Matrices and Boundary

Registration #1016-318**Value Problems**

This course provides an introduction to matrix algebra and boundary value problems. Topics will include: matrix operations with applications to the solution of linear systems of algebraic equations, Fourier series, separation of variables, the heat equation, and the wave equation. **NOTE: This course may not be taken for credit if credit is to be earned in SMAM-338.** (SMAM-306)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-319**Data Analysis****Registration #1016-319**

This course will study the statistical principles of presenting and interpreting data. Topics covered will include: descriptive statistics and displays, random sampling, the normal distribution, confidence intervals, and hypothesis testing. The statistical software package MINITAB will be used to introduce students to the use of computers in statistical analysis. **NOTE: This course may not be taken for credit if credit is to be earned in SMAM-309 or 314.** (SMAM-204)

Class 4, Credit 4 (offered every year) (F, W, S)

SMAM-320

Elementary Statistics II

Registration #1016-320

An elementary introduction to the topics of regression and analysis of variance. The statistical software package MINITAB will be used to reinforce these techniques. (SMAM-309 or SMAM-319 or SMAM-314 or equivalent)

Class 4, Credit 4 (offered upon request)

SMAM-321**Elementary Statistics III****Registration #1016-321**

An elementary introduction to the topics of categorical data, non-parametrics, and control charts. The statistical software package MINITAB will be used to reinforce these techniques. (SMAM-309 or SMAM-319 or SMAM-314 or equivalent)

Class 4, Credit 4 (offered upon request)

SMAM-328

Engineering Mathematics

Registration #1016-328

This course provides an introduction to matrix algebra and vector calculus. Topics include: matrix operations with applications to the solution of linear systems of algebraic equations; gradient, divergence and curl; line and surface integrals; independence of path and the divergence theorem; and Stoke's theorem with discussion of engineering applications. (SMAM-306)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-331

Matrix Algebra

Registration #1016-331

An introduction to the basic concepts of linear algebra, with an emphasis on matrix manipulation. Topics will include Gaussian elimination, matrix arithmetic, determinants, Cramer's rule, vector spaces, linear independence, basis, null and column space of a matrix, eigenvalues, and numerical linear algebra. Various applications will be interspersed throughout the course. (SMAM-306)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-338**Series Solutions for Differential****Registration #1016-338****Equations**

The course includes: power series solutions of ordinary differential equations at ordinary and regular singular points; Fourier series and an introduction to their use in the solution of heat and wave equations. **NOTE: This course may not be taken for credit if credit is to be earned in SMAM-318.**

Class 4, Credit 4 (offered every year) (S)

SMAM-351 **Probability****Registration #1016-351**

Discrete and continuous probability models; random variables; probability density and distribution functions; mathematical expectation; measures of central tendency and dispersion; central limit theorem. (Corequisite SMAM-305) (SMAM-253)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-352 **Applied Statistics I****Registration #1016-352**

Basic statistical concepts, sampling theory, hypothesis testing, confidence intervals and nonparametric methods. A statistical software package will be used for data analysis. (SMAM-351)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAM-353 **Applied Statistics II****Registration #1016-353**

Topics in simple linear regression, an introduction to analysis of variance and the use of statistical software packages. (SMAM-352)

Class 4, Credit 4, (offered every year) (W, S, SR)

SMAM-354 **Introduction to Regression Analysis****Registration #1016-354**

A study of regression techniques with applications to the type of problems encountered in real-world situations. Includes extensive use of statistical software. Topics include review of simple linear regression; residual analysis; multiple regression; matrix approach to regression; model selection procedures; various other models as time permits. (SMAM-353 and 331 or permission of instructor)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-355 **Design of Experiments****Registration #1016-355**

A study of the design and analysis of experiments. Includes extensive use of statistical software. Topics include: single-factor analysis of variance; multiple comparisons and model validation; multifactor factorial designs; fixed, random, and mixed models; expected mean square calculations; confounding; randomized block designs; other designs and topics as time permits. (SMAM-353)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-358 **Statistical Quality Control****Registration #1016-358**

A review of probability models associated with control charts, control charts for continuous and discrete data, interpretation of control charts, acceptance sampling, O.C. curves, standard sampling plans. A statistical software package will be used for data analysis. (SMAM-352)

Class 4, Credit 4 (offered every year) (S)

SMAM-365 **Combinatorial Mathematics****Registration #1016-365**

An introduction to the mathematical theory of combination, arrangement and enumeration of discrete structures. Topics include: enumeration; recursion; inclusion-exclusion; block design; general functions. (SMAM-265 or permission of instructor)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-399 **Co-op Seminar****Registration #1016-399**

Exploration of cooperative education opportunities; practice in writing letters of application; resume writing; and interviewing procedures.

Class 1, Credit 0 (offered every year) (W)

SMAM-411,412 **Real Variables****Registration #1016-411,412**

411: An investigation and extension of the theoretical aspects of elementary calculus. Topics include: mathematical induction, real numbers, functions, limits, continuity, differentiation, l'Hopital's rule, Taylor's theorem. (SMAM-305 and either SMAM-265 or permission of the instructor)

412: A continuation of SMAM-411 which concentrates on integration; definition of integral—its existence and its properties, improper integrals, infinite series, sequences and power series. (SMAM-411)

Class 4, Credit 4 (offered every year) (411-F, W; 412-S, SR)

SMAM-420 **Complex Variables****Registration #1016-420**

A brief discussion of preliminaries leading to the concept of analyticity. Complex integration. Cauchy's integral theorem and integral formulas. Taylor and Laurent series. Residues. Real integrals by complex methods. (SMAM-305)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-432 **Linear Algebra****Registration #1016-432**

A further development of the basic concepts of linear algebra, including orthogonality. Topics will include similarity, linear transformations, diagonalization, inner products, Gram-Schmidt, quadratic forms, and various numerical techniques. Several applications of these ideas will also be presented. (SMAM-331)

Class 4, Credit 4 (offered every year) (F, W, SR)

SMAM-437 **Computer Methods in Applied****Registration #1016-437** **Mathematics**

Emphasizes the formulation of problems to allow solutions by standardized techniques and library routines. A study of numerical techniques such as direct and iterative methods for solving linear and nonlinear equations and optimizing functions, discrete methods for boundary value problems, and other techniques for solving problems. Computer-based homework. (SMAM-306, 331)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-451,452 **Mathematical Statistics I, II****Registration #1016-451,452**

451: Brief review of basic probability concepts and distribution theory; mathematical properties of distributions needed for statistical inference. (SMAM-352)

452: Classical and Bayesian methods in estimation theory; chi-square test; Neyman-Pearson lemma; mathematical justification of standard test procedures; sufficient statistics and further topics in statistical inference. (SMAM-451)

Class 4, Credit 4 (offered every year) (451-F, W; 452-S, SR)

SMAM-454 **Nonparametric Statistics**
Registration #1016-454

This course provides an in-depth study of inferential procedures that are valid under a wide range of shapes for the population distribution. Topics include: tests based on the binomial distribution, contingency tables, statistical inferences based on ranks, runs tests, and randomization methods. A statistical software package will be used for data analysis. (SMAM-353)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-457 **Research Sampling Techniques**
Registration #1016-457

This course provides a basis for understanding the selection of the appropriate tools and techniques for analyzing survey data. Topics include: design of sample surveys, methods of data collection, a study of standard sampling methods. A statistical software package will be used for data analysis. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-461 **Mathematical Modelling**
Registration #1016-461

The course will explore problem solving, formulation of the mathematical model from physical considerations, solution of the mathematical problem, testing the model and interpretation of results. Problems will be selected from the physical sciences, engineering and economics. (SMAM-306, 352, 331)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-465 **Linear Programming**
Registration #1016-465

A presentation of the general linear programming problem. A review of pertinent matrix theory, convex sets and systems of linear inequalities; the simplex method of solution; artificial bases; duality, parametric programming; and applications. (SMAM-432)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-466 **Advanced Mathematical Programming**
Registration #1016-466

The optimization of functions of integers; theory and practice of branch and bound; implicit enumeration; cutting plane duality and related solution techniques; heuristics, and applications. (SMAM-465)

Class 4, Credit 4 (offered every year) (S)

SMAM-467 **Theory of Graphs and Networks**
Registration #1016-467

The basic theory of graphs and networks, including the concepts of circuits, trees, edge and vertex separability, planarity and vertex coloring and partitioning. There is a strong emphasis on applications to physical problems and on graph algorithms such as those for spanning trees, shortest paths, non-separable blocks and network flows. (SMAM-265)

Class 4, Credit 4 (offered every year) (F, W)

SMAM-469 **Mathematical Simulation**
Registration #1016-469

An introduction to computer simulation, simulation languages, model building and computer implementation, and mathematical analyses of simulation models and their results using techniques from probability and statistics. (SMAM-352; 461; ICSP-241, 242)

Class 4, Credit 4 (offered every year) (S, SR)

SMAM-501,502 **Advanced Differential Equations**
Registration #1016-501,502

A study of first order, linear higher order and systems of differential equations including such topics as existence, uniqueness, properties of solutions, Green's functions, Sturm-Liouville systems and boundary value problems. (SMAM-338)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-511,512 **Numerical Analysis**
Registration #1016-511,512

511: Numerical techniques for the solution of non-linear equations, interpolation, differentiation, integration, initial value problems. (SMAM-306, ICSA-220)

512: Continuation of 511 that treats systems of equations, eigenvalue problems, boundary value problems, splines, additional topics at the discretion of the instructor. (SMAM-511)

Class 4, Credit 4 (offered every year) (511-F, W; 512-S, SR)

SMAM-521 **Topics in Probability and Statistics**
Registration #1016-521

Selected topics in applied probability and statistics to meet the needs and interest of the students. (SMAM-305, 352 or permission of instructor)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-524 **An Introduction to Time Series**
Registration #1016-524

A study of the modeling and forecasting of time series. Topics include ARMA and ARIMA models, autocorrelation function, partial autocorrelation function, detrending, residual analysis, graphical methods, and diagnostics. A statistical software package will be used for data analysis. (SMAM-353)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-525 **Stochastic Processes**
Registration #1016-525

This course will explore Poisson processes and Markov chains with an emphasis on applications. Extensive use will be made of conditional probability and conditional expectation. Further topics, such as renewal processes, Brownian motion, queuing models and reliability will be discussed as time allows. (SMAM-331, 351, or permission of instructor)

Class 4, Credit 4 (offered upon sufficient request)

SMAM-531,532 **Abstract Algebra**
Registration #1016-531,532

531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, Lagrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems. (SMAM-265, 432)

532: The basic theory of rings, integral domains, ideals and fields $GF(p^n)$, applications to coding theory or abstract vector spaces, function spaces, direct sums, applications to differential equations, and to scientific problems. (SMAM-531)

Class 4, Credit 4 (offered every year) (531-F, W; 532-S, SR)

SMAM-551 **Topics in Algebra**
Registration #1016-551

Topics in abstract algebra to be chosen by the instructor either to give the student an introduction to topics not taught in SMAM-531, 532 or to explore further the theory of groups, rings or fields. (Permission of instructor)

Class 4, Credit 4 (offered upon sufficient request)

- SMAM-552** **Topics in Analysis**
Registration #1016-552
 Topics in analysis to be chosen by the instructor, either to introduce the student to topics not covered in SMAM-411, 412 or to explore further the topics covered there. (SMAM-265, 412)
 Class 4, Credit 4 (offered upon sufficient request)
- SMAM-555** **Statistics Seminar**
Registration #1016-555
 This course introduces the student to statistical situations not encountered in the previous course of study. Topics include: open-ended analysis of data, motivating use of statistical tools beyond the scope of previous courses, introduction to the statistical literature, development of statistical communication skills, and the pros and cons of statistical software packages. (SMAM-354,355)
 Class 4, Credit 4 (offered every year) (F, W)
- SMAM-558** **Multivariate Analysis**
Registration #1016-558
 A study of the multivariate normal distribution, statistical inference on multivariate data, multivariate analysis of covariance, canonical correlation, principal component analysis, and cluster analysis. A statistical software package will be used for data analysis. (SMAM-354, 331)
 Class 4, Credit 4 (offered upon sufficient request)
- SMAM-559** **Special Topics: Mathematics**
Registration #1016-559
 Course in which topics of special interest to a sufficiently large group of students, and not covered in other courses, may be offered upon request.
 Class variable, Credit variable (offered upon sufficient request)
- SMAM-561,562** **Complex Analysis I, II**
Registration #1016-561,562
 Introduction to the theory of functions of one complex variable. Limits, continuity, differentiability; analytic functions; complex integration; Cauchy integral theorem and formula; sequences and series; Taylor and Laurent series; singularities; residues; analytic continuation; conformal mapping. A more in-depth study of analytic function theory than SMAM-420. (SMAM-411)
 Class 4, Credit 4 (offered upon sufficient request)
- SMAM-565** **Game Theory**
Registration #1016-565
 Introduction to the theory of games with solution techniques and applications. Topics include: game trees; matrix games; linear inequalities and programming; convex sets; the minimax theorem; n-person games; and Pareto optimality. (SMAM-331 or permission of instructor)
 Class 4, Credit 4 (offered every year) (F, W)
- SMAM-566** **Non-Linear Optimization Theory**
Registration #1016-566
 The theory of optimization of non-linear functions of several real variables. Topics include: unconstrained optimization (Newton-Raphson, steepest ascent and gradient methods); constrained optimization (Lagrange multipliers, Kuhn-Tucker theorem, penalty concept, dynamic programming); and computational aspects (rates of convergence, computational complexity). (SMAM-305,432)
 Class 4, Credit 4 (offered upon sufficient request)
- SMAM-571,572** **Topology**
Registration #1016-571,572
 Metric spaces, topological spaces, separation axioms, compactness, connectedness, product spaces. (SMAM-412 or permission of instructor)
 Class 4, Credit 4 (offered upon sufficient request)
- SMAM-581** **Introduction to Linear Models**
Registration #1016-581
 Introduction to the theory of linear models. Least squares estimators and their properties, matrix formulation of linear regression theory, random vectors and random matrices, the normal distribution model and the Gauss-Markov theorem, variability and sums of squares, distribution theory, the general linear hypothesis test, confidence intervals, confidence regions, correlations among regressor variables, ANOVA models, geometric aspects of linear regression, and less than full rank models. (SMAM-331, 354)
 Class 4, Credit 4 (offered upon sufficient request)
- SMAM-599** **Independent Study: Math**
Registration #1016-599
 Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature and not taught in regularly offered courses.
 Class variable, Credit variable (offered every year)
- SMAM-620** **The Fourier Transform**
Registration #1016-620
 This course provides an introduction to an important mathematical tool for the analysis of linear systems. Topics covered are: a Fourier integral theorem; the Fourier transform and its inverse; an introduction to generalized functions; the Dirac delta functions; evaluating transforms; convolution, serial products; the sampling theorem; Rayleigh, power convolution, and autocorrelation theorems; the discrete Fourier transform; the fast Fourier transform. (SMAM-420)
 Class 4, Credit 4 (offered every year) (S)
- SMAT-420** **Calculus for Technologists I**
Registration #1019-420
 The first course in a calculus sequence covering essential concepts and manipulations. Topics include: limits, derivative, indefinite and definite integrals, and numerical approximation. Applications to physical problems are stressed. (SMAM-204)
 Class 4, Credit 4 (offered every year) (F, W, S, SR)
- SMAT-421** **Calculus for Technologists II**
Registration #1019-421
 A continuation of SMAT-420. Topics covered in this course are applications of the integral calculus; differential and integral calculus of the transcendental functions; and basic techniques of integration with emphasis on applications to engineering technology problems. (SMAT-420 or equivalent)
 Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAT-422 Solutions of Engineering Problems
Registration #1019-422

A continuation of SMAT-421. Course covers selected applied mathematics topics including: differential equations through second order linear, LaPlace transforms, Taylor series, and other appropriate topics. Emphasis is on the application of these topics to engineering technology problems. (SMAT-421 or equivalent)

Class 4, Credit 4 (offered every year) (F, W, S, SR)

SMAT-423 Linear Mathematics for Technologists
Registration #1019-423

An introduction to aspects of linear mathematics, both finite and infinite dimensional. Topics include matrices and determinants, a survey of series, Fourier series, Laplace and Fourier transforms, and Dirac delta functions. (SMAT-422 or equivalent)

Class 4, Credit 4 (offered every year) (S)

Physics

SPSP-200 Physics Orientation
Registration #1017-200

An introduction to the nature and scope of physics for freshmen interested in physics as a profession. Topics include: (a) what is physics? (b) professional opportunities in physics; (c) the physics profession; (d) the literature of physics; (e) communicating in physics. Laboratory includes safety instruction; measurement and recording techniques; graphical analysis; error analysis and report writing. Each student will present a formal written or oral report on some topic of interest at the end of the course.

Class 1, Lab 2, Credit 1 (offered every year) (F)

SPSP-201,202 Physics in the Arts
Registration #1017-201,202

A study of topics from the world of art in which the underlying physical laws have influenced the art form and its development. A weekly laboratory will allow study of the relation of an art form to basic optical, mechanical, and electrical physics and in addition will provide time for the development of student projects. **NOTE: Not acceptable for science credit for College of Science majors.**

Class 2, Lab 2, Credit 3 (offered upon sufficient request) (W, S)

SPSP-211 College Physics I
Registration #1017-211

An elementary course in college physics. Mechanics: Newton's laws of motion, momentum, rotational motion, energy, (Competency in algebra, geometry, and trigonometry) (See SPSP-271 for lab)

Class 3, Credit 3 (offered every year) (F, W)

SPSP-212 College Physics II
Registration #1017-212

Heat and thermodynamics, fluids, wave motion, sound. (SPSP-211) (See SPSP-272 for lab)

Class 3, Credit 3 (offered every year) (W, S)

SPSP-213 College Physics III
Registration #1017-213

Geometrical and wave optics, electricity and circuits, magnetism, some elements of modern physics. (SPSP-211) (SPSP-212 is highly recommended) (See SPSP-273 for lab)

Class 3, Credit 3 (offered every year) (F, S)

SPSP-271 College Physics Lab I
Registration #1017-271

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-211)

Lab 2, Credit 1 (offered every year) (F, W)

SPSP-272 College Physics Lab II
Registration #1017-272

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-212) (SPSP-271)

Lab 2, Credit 1 (offered every year) (S, W)

SPSP-273 College Physics Lab III
Registration #1017-273

This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or coregistration in SPSP-213) (SPSP-271)

Lab 2, Credit 1 (offered every year) (F, S)

SPSP-289 Contemporary Science: Stellar Astronomy
Registration #1017-289

An introduction to the basic concepts of stellar astronomy such as celestial sphere, physical properties of the stars, principles of spectroscopy as applied to astronomy, double stars, variable stars, star clusters, stellar evolution, gaseous nebulae, stellar motions and distribution, Milky Way system, external galaxies, cosmology. (Algebra) **Note: Not available for science credit for College of Science majors**

Class 4, Credit 4 (F, S, odd academic years; W, even academic years)

SPSP-289 Contemporary Science: Solar System Astronomy
Registration #1017-289

An introduction to basic concepts of solar system astronomy such as sun, moon, eclipses, earth as a planet, planets and their satellites, comets, meteors, and theories of the origin of the solar system and related matters such as celestial sphere and constellations, and astronomical telescopes. (Algebra) **Note: Not available for science credit for College of Science majors**

Class 4, Credit 4 (W, odd academic years; F, S even academic years)

SPSP-289 Contemporary Science: Physics
Registration #1017-289

Introductory science for non-science students. One or more topics such as astronomy, space exploration, relativity, nuclear energy, and lasers are discussed and explained simply, to give an appreciation of the significance of physics in our contemporary technological society. A minimum of mathematics is used. A laboratory or discussion option may be offered for small group meetings once a week, which reinforce the material given in demonstration lectures and audiovisual presentations. **NOTE: Not available for science credit for College of Science majors.**

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

**SPSP-300 Introduction to Semiconductor
Registration #1017-300 Device Physics**

An introductory survey, using some calculus, of the physics underlying operation and manufacture of modern semiconductor devices used in integrated circuits and microcomputers. Review of classical physics, classical free-electron gas, atomic physics, molecular bonds and band theory, theory of metals, structure and properties of semiconductors and semiconductor devices. (SPSP-212, 213, 273; SMAT-422)

Class 4, Credit 4 (W, S)

**SPSP-311 University Physics I
Registration #1017-311**

An intensive course in general physics, using calculus, for majors in the sciences and engineering. Mechanics, kinematics and dynamics of a particle and of a rigid body, work and energy, momentum and impulse, rotational motion, oscillatory motion, gravitation. (Credit or coregistration in SMAM-252) (See SPSP-371 for three-hour lab, SPSP-375 for two-hour lab)

Class 4, Credit 4 (offered every year) (F, W, S)

**SPSP-312 University Physics II
Registration #1017-312**

Fluids and elastic properties, heat and thermodynamics, wave motion, sound, geometrical and physical optics. (Credit or coregistration SMAM-253) (SPSP-311) (See SPSP-372 for three-hour lab, SPSP-376 for two-hour lab)

Class 4, Credit 4 (offered every year) (F, W, S)

**SPSP-313 University Physics III
Registration #1017-313**

Electrostatics, Gauss' law, electric field and potential, dielectrics, dc circuits, magnetic fields, Ampere's law, Faraday's law, inductance and capacitance, magnetism in matter, ac series circuits. (Coregistration or credit in SMAM-253) (SPSP-311, 312) (See SPSP-373 for three-hour lab, SPSP-377 for two-hour lab)

Class 4, Credit 4 (offered every year) (F, W, S)

**SPSP-314 Introduction to Modern Physics
Registration #1017-314**

An introductory survey of modern physics at the sophomore level. Fundamentals of relativity, photons, interaction of radiation with matter, deBroglie waves, Bohr model, introduction to quantum mechanics, nuclear systematics, radioactivity, alpha, beta, and gamma decays, Q-values, nuclear fission, nuclear fusion. (SMAM-305; SPSP-312,313)

Class 4, Credit 4 (offered every year) (F, W, S)

**SPSP-315 Introduction to
Registration #1017-315 Semiconductor Physics**

Kinetic theory of gases and transport phenomena; Drude's theory of metals; quantum mechanics of a particle in a box; atomic orbitals; band theory of metals, insulators, and impurity semiconductors; Fermi-Dirac distribution; equilibrium charge-carrier densities in metals, insulators, and semiconductors; operation principles of diodes, bipolar junction transistors, and MOSFETs. (SMAM-306, SPSP-314)

Class 4, Credit 4 (offered every year) (W, S)

**SPSP-317 Introduction to Computational Physics
Registration #1017-317 with FORTRAN Applications**

An introduction to techniques of computational physics including: numerical differentiation, integration, solutions of the equations of Newtonian mechanics, and error propagation. FORTRAN programming including: type, conditional, and format statements; loops, subscripted variables, intrinsic functions, subprograms, reading from and writing to files. Introduction to the mainframe (VAX) environment. (Credit or coregistration in SPSP-312 and SMAM-252)

Class 4, Credit 4 (S)

**SPSP-319 Electrical Processes in Solids
Registration #1017-319**

Introduction to statistical mechanics; Planck's formula; transport equation; electronic properties of conductors and semiconductors; characteristics of metal-metal, metal-semiconductor, and pn junctions; operating principles of solid state devices; theory and application. (SPSP-315)

Class 4, Credit 4 (offered upon sufficient request) (S)

**SPSP-321 Introduction to Laboratory
Registration #1017-321 Techniques**

An introduction to equipment and procedures common to the physics research laboratory. The oscilloscope and ac circuit analysis, statistics, vacuum systems including vacuum pumps and gauges, the laboratory notebook, and writing for publication. (SPSP-312, 313,372, 373)

Class 3, Lab 3, Credit 4 (offered every year) (F, transfer students only; W)

**SPSP-331 Introduction to Electricity
Registration #1017-331 and Electronics**

Fundamentals of electricity; construction and measurements of electrical and electronic circuits encountered in a scientific laboratory. (Two quarters of college-level physics)

Class 3, Lab 3, Credit 4 (offered upon sufficient request) (S)

**SPSP-341 Foundations of Scientific Thinking
Registration #1017-341**

Definition of science; historical perspective; ingredients of the scientific quest; the scientific method; scientific explanation, laws, theories, and hypotheses; the role of mathematics; probability and induction; science and other disciplines. (At least a year of basic sciences at the college level)

Class 2, Credit 2 (offered upon sufficient request) (F, W)

**SPSP-350 Sophomore Physics Seminar
Registration #1017-350**

A study of concepts that unify the diverse topics covered in the introductory physics sequence. Preparation for Comprehensive Oral Exam I. Techniques of physics literature searches and the preparation and organization of technical papers. (SPSP-311, 312, 313,314)

Class 2, Credit 1 (offered every year) (S)

**SPSP-351 Radiation Physics I
Registration #1017-351**

Introductory modern physics emphasizing radiation phenomena. Atomic physics, nuclear physics, radioactivity, production of radionuclides, interaction of charged particles and neutrons with matter. (SPSP-213; competency in algebra, geometry, and trigonometry; SMAM-309 recommended)

Class 4, Lab 3, Credit 5 (offered every year) (F)

SPSP-352 Radiation Physics II**Registration #1017-352**

Interaction of x-rays and gamma-rays with matter. Radiation detectors; scintillation detectors, solid state detectors. Radionuclide imaging instrumentation. (SPSP-351)

Class 4, Lab 3, Credit 5 (offered every year) (W)

SPSP-353 Radiation Physics III**Registration #1017-353**

Principles of radiation protection. Radiation protection instrumentation. Internal and external dose calculations. Practical radiation health physics. Introduction to electronics, including laboratory. (SPSP-352)

Class 4, Lab 3, Credit 5 (offered every year) (S)

SPSP-355 Radiation Protection**Registration #1017-355**

Principles and practical aspects of radiation protection; calculation of external and internal radiation dose measurements. (Permission of instructor and one year of college-level physics)

Class 3, Credit 3 (offered every year) (S)

SPSP-361 Ultrasonic Physics**Registration #1017-361**

A course in the basic physics of ultrasound, covering ultrasonic wave generation and propagation, transducers, Doppler effect, reflection and refraction, biological effects, and applications of ultrasonic physics in medicine. (Permission of instructor and one year of college-level physics)

Class 4, Lab 3, Credit 5 (offered every year) (F)

SPSP-371 University Physics Lab I**Registration #1017-371**

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (See SPSP-375 for a 2-hour lab)

Lab 3, Credit 1 (offered every year) (W)

SPSP-372 University Physics Lab II**Registration #1017-372**

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (SPSP-371) (See SPSP-376 for a 2-hour lab)

Lab 3, Credit 1 (offered every year) (S)

SPSP-373 University Physics Lab III**Registration #1017-373**

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (SPSP-371, 372) (See SPSP-377 for a 2-hour lab)

Lab 3, Credit 1 (offered every year) (F)

SPSP-374 Modern Physics Laboratory**Registration #1017-374**

Basic experiments representative of the experimental foundations of modern quantum physics, such as: photoelectric effect; Franck-Hertz experiment; X-ray diffraction; optical diffraction and interference; atomic spectroscopy; electron microscopy; nuclear spectroscopy; radioactive half-life; Millikan oil drop; black-body radiation. Students enrolled in SPSP-315 may include experiments in semiconductor solid state physics. (SPSP-314, SPSP-321)

Lab 3, Credit 1 (offered every year) (S)

SPSP-375 University Physics Lab I**Registration #1017-375**

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-311) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-376 University Physics Lab II**Registration #1017-376**

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-312) (SPSP-375 or 371) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-377 University Physics Lab III**Registration #1017-377**

This laboratory course includes experiments related to the principles and theories discussed in the corresponding lectures. (Credit or coregistration in SPSP-313) (SPSP-375 or 371, SPSP-376 or 372) (This course recommended for all students in the University Physics lectures who are not required to take a 3-hr. lab)

Lab 2, Credit 1 (offered every year) (F, W, S)

SPSP-401,402 Intermediate Mechanics I, II**Registration #1017-401,402**

401: Particle dynamics in one, two, and three dimensions; systems of particles; conservation laws; rigid body motion; gravitational fields; and potentials. (Credit or coregistration in SPSP-480) (SMAM-306, SPSP-312, 313)

402: Translating and rotating coordinate systems, mechanics of continuous media, wave motion, Lagrangian formulation of mechanics. (Credit or coregistration in SPSP-481) (SPSP-401,480) Class 4, Credit 4 (offered every year) (401-F; 402-S)

SPSP-411,412 Electricity and Magnetism I, II**Registration #1017-411,412**

Electric and magnetic fields using vector methods, Gauss' law, theory of dielectrics, Ampere's law and Faraday's law, vector potential, displacement current, Maxwell's equations, wave propagation in dielectrics and conductors; production and propagation of radiation. (SMAM-306; SPSP-312, 313,480,481) 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-306; SPSP-312, 313)

Class 4, Credit 4 (offered every year) (F)

SPSP-421,422 Experimental Physics**Registration #1017-421,422**

The elements of advanced laboratory work, including the importance of detailed experiment planning, are presented. The requirement of effective communication of results is also an integral part of the course. Experiments are chosen from any area of physics compatible with department facilities: optics, thin films, cryogenics, semiconductors, acoustics, nuclear, etc. (SPSP-314, 321, 431 plus coregistration or credit in any one of these: SPSP-401,411,415,455)

Class 1, Lab 5, credit 3 (offered every year) (421-F; 422-S)

SPSP-431 Electronic Measurements**Registration #1017-431**

Laboratory course in electronic measurements and instrumentation, with theory and applications of discrete and integrated circuits in analog and digital electronics. (SPSP-313, 321)

Class 3, Lab 3, Credit 4 (offered every year) (S)

SPSP-432 Computer Interfacing to Laboratory**Registration #1017-432 Instrumentation**

An introduction to microcomputer interfacing with associated laboratory exercises. Emphasis on the interface circuits and TTL logic design using an 8088 based microprocessor. Covers elementary logic circuits, computer architecture, assembly language programming, serial and parallel interfaces, A/D and D/A conversion, RS-232C, IEEE488, and other industry standards. (SPSP-331 or 431 or equivalent)

Class 3, Lab 3, Credit 4 (offered upon sufficient request) (F)

SPSP-455 Optical Physics**Registration #1017-455**

Physical optics including interference, diffraction, and polarization. Brief introduction to modern optics. (SMAM-305; SPSP-312, 313,480)

Class 4, Credit 4 (offered every year) (F)

SPSP-480,481 Theoretical Physics I, II**Registration #1017-480,481**

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 integral transforms. Applications of these concepts to physics are presented. (SMAM-306, SPSP-312, 313)

481: Application of advanced mathematical methods to physics. Topics include: the solution of several ordinary differential equations and partial differential equations encountered in physics; examples taken from heat flow, diffusion, wave phenomena, electrostatics, and modern physics. (SPSP-480)

Class 4, Credit 4 (offered every year) (480-F; 481-S)

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. (SPSP-412,421)

Lab 6, Credit 2 (offered every year) (F)

SPSP-522 Introduction to Quantum Mechanics**Registration #1017-522**

A study of the concepts and mathematical structure of non-relativistic quantum mechanics. Exact and approximate techniques for solving the Schrodinger equation are presented for various systems. (SPSP-315,402,412,455,480,481)

Class 4, Credit 4 (offered every year) (S)

SPSP-531 Solid State Physics**Registration #1017-531**

The structure of solids and their thermal, mechanical, electrical and magnetic properties. (SPSP-315,415,480,481 and 522)

Class 4, Credit 4 (offered every year) (F)

SPSP-541,542,543 Physics Research**Registration #1017-541,542,543**

Faculty-directed student project or research usually involving laboratory work or theoretical calculations that could be considered of an original nature. (Permission of the instructor)

Class variable, Credit variable (offered every year)

SPSP-550 Senior Physics Seminar**Registration #1017-550**

A study of concepts that unify the diverse topics covered in the intermediate and advanced physics courses. Preparation for Comprehensive Oral Exam II. Preparation and organization of technical papers as well as the oral and poster presentation of such papers. (SPSP-402,412,415,455,522)

Class 2, Credit 1 (offered every year) (F)

SPSP-553 Nuclear Physics**Registration #1017-553**

A study of the structure of the atomic nucleus as determined by experiments and theory. Description and quantum mechanical analysis of nuclear properties, radioactivity, and nuclear reactions. (SPSP-522)

Class 4, Credit 4 (offered on sufficient request) (F)

SPSP-559 Special Topics: Physics**Registration #1017-559**

Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specific prerequisites, contact hours and examination procedures. Topics could include: introductory statistical mechanics; plasma physics; general relativity; linear integrated circuits; cryogenics; radio astronomy; history of physics; astrophysics; astronomy.

Class variable, Credit variable (offered upon sufficient request)

SPSP-599 Independent Study: Physics**Registration #1017-599**

Faculty-directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.

Class variable, Credit variable (offered every year)

General Science

SSEG-621 **Building Scientific Apparatus** **Registration #1018-621** **Laboratory**

Basic skills associated with the construction of scientific laboratory apparatus, some of which is not commercially available, will be covered: machine shop skills, working with glass, vacuum line technology, optical spectrometer design, and instrument electronics. (Corequisite SCHA-620) (SCHP-441; SPSP-212,213 or 312, 313; or permission of instructor)

Lab 4, Credit 1 (offered upon sufficient request)

Allied Health Sciences

SCLG-205 **Introduction to Diagnostic Medical** **Registration #1026-205** **Imaging**

An entry-level exploration of the historical, professional and occupational development of medical imaging. Current uses and future trends will be discussed in the areas of radiography, computed tomography, magnetic resonance, nuclear medicine, and ultrasound imaging.

Class 2, Credit 2 (F, S)

SCLG-203 **Allied Health Freshman Seminar** **Registration #1026-203**

Basic skills, techniques, and instruction for incoming students to develop strategies for a successful RIT experience. Topics include diversity, study skills, community service, and self-discovery and awareness.

Class 1, Credit 1 (F)

SCLG-289 **Contemporary Science:** **Registration #1026-289** **Health Sciences**

This course will examine areas within the health field, including evolutionary structural development and future projects, with emphasis on methods of diagnostic testing, selected disease conditions, the utilization of computers, and current topics in health care. Course content emphasis varies each quarter.

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

SCLG-301 **Medical Terminology** **Registration #1026-301**

Emphasizes etymology, definition, pronunciation and correct utilization of medical terms, which enables students to develop a vocabulary essential to the understanding of and communication with the various health areas in which allied health professionals will serve.

Class 3, Credit 3 (offered every year) (F, S)

SCLG-415 **Pathophysiology** **Registration #1026-415**

This course combines knowledge of human physiology with disease processes. The etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, diagnostic and therapeutic procedures of common diseases will be covered. Topics include cellular and tissue response to pathogenic agents, neoplasia, developmental disorders, disorders of body systems, and disease of major organs. (SBIB-306)

Credit 4 (S)

SCLG-559 **Special Topics** **Registration #1026-559** **Clinical Sciences**

Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours and examination procedures.

Class variable, Credit variable (F, W, S)

SCLG-599 **Independent Study:** **Registration #1026-599** **Clinical Sciences**

Faculty directed study of appropriate topics on a tutorial basis. This course will be used to enable an individual to pursue studies of existing knowledge available in the literature.

Class variable, Credit variable (F, W, S)

SCLB-201 **Introduction to** **Registration #1027-201** **Biomedical Computing**

An introduction to the applications of computers in health care. Information concerning career opportunities and cooperative education will be provided.

Class 1, Credit 1 (offered every year)

SCLB-305 **MUMPS Programming** **Registration #1027-305** **Language**

An in-depth study of the MUMPS programming language and its data base capabilities. Programming projects will be required and will be taken from the health care field. Direct mode, local/global/special variables, commands, arguments, operators, writing and executing routines, MUMPS editors, screen/printer formatting, string manipulation, pattern matching, concatenation, globals and arrays (trees), multilevel and string subscripts, input/output using devices, cross reference files, indirection. (ICSP-241, 242)

Class 4, Credit 4 (S)

SCLM-210 **Medical Technology Seminar** **Registration #1024-210**

This course is designed to introduce the student to the profession of medical technology through a series of lectures which provide an overview of the major departments within the modern clinical laboratory. Historical perspectives, development aspects, and regulating standards of the medical technology profession will be discussed. Insights into the dynamics of the profession will be facilitated by informal discussions with interning students, practicing medical technologists, area sales representatives and members of the Allied Health Sciences Department.

Class 1, Credit 1 (F)

SCLM-401 **Hematology/** **Registration #1024-401** **Immunohematology**

A study of the blood (erythrocytes, leukocytes, platelets, coagulation factors and blood group antigens). Descriptions of the cellular components of the blood in health and in disease. Cellular and immunological functions and their interrelationships. Hemostasis and coagulation mechanisms. Structures of antigens and antibodies and mechanisms of antigen-antibody reactions. Lab procedures demonstrate cell counting techniques, coagulation studies, antigen-antibody reactions and compatibility testing of various blood groups. (SBIB-306 or permission of instructor)

Class 3, Lab 3, Credit 4 (S)

SCLM-405 Diagnostic Bacteriology and Mycology
Registration #1024-405

Study of bacteria and fungi that cause human disease. Lecture and laboratory subjects include microorganisms growth, isolation, identification, antibiotic sensitivity, and related human immunological and serological responses. (SBIB-404)

Class 3, Lab 3, Credit 4 (W)

SCLM-406 Virology
Registration #1024-406

Molecular biology, chemistry, epidemiology and clinical aspects of viruses; morphology, genetics, immunology, environmental effects; methods of isolation, cultivation, identification; assays. Human virus diseases. (One year of general biology)

Class 4, Credit 4 (offered upon sufficient request)

SCLM-412 Parasitology
Registration #1024-412

Ecology, structure, life cycle metabolism, pathology and control of human parasites. Insects, protozoa, nematodes, flukes and tapeworms of medical importance. Chemotherapy and immunology of human parasites. Emphasis on recognizing human parasites.

Class 3, Lab 3, Credit 4 (offered upon sufficient request)

SCLM-432 Clinical Laboratory
Registration #1024-432 Instrumentation

Principles of clinical laboratory instruments in the analysis of body fluids. This quarter stresses the principles of instrumental methods of analysis including visible and ultraviolet spectrophotometry, nephelometry, fluorometry, flame photometry, refractometry, chromatography, electrophoresis, osmometry, radiation counters, and automated chemical analyzers. (SCHG-217 or equivalent, SBIB-306)

Class 2, Lab 6, Credit 4 (F, W)

SCLM-433 Basic Clinical Chemistry
Registration #1024-433

Principles of clinical chemistry in the analysis of the chemical component of body fluids. This quarter stresses the basic chemistries underlying the classical methodologies and relates them to the disease state. Topics include: liver function tests, renal function tests, carbohydrates, electrolytes, acid base balance, enzymes, lipids, endocrine function tests, drug analysis and statistical quality control. (SCHG-217 or equivalent, SBIB-306)

Class 2, Lab 6, Credit 4 (S)

SCLM-559 Special Topics in Medical Technology
Registration #1024-559

Topics related to the practice of medical technology are presented in a series of seminars. Each series is devoted to a specific aspect of the field and includes a discussion of contemporary issues affecting the practice of medical technology.

Class 1, Credit 1 (F, W, S)

SCLN-301 Clinical Aspects of MRI
Registration #1025-301

Principles of clinical magnetic resonance imaging in different organ systems. Lectures stress system operation, instrumentation, and protocols for imaging, applying basic MRI principles. Topics include: image quality and contrast, pulse sequences, clinical applications, and management of a MR center.

Credit 3 (S)

SCLN-401 Introduction to Clinical
Registration #1025-401 Nuclear Medicine

A combination lecture/laboratory course introducing clinical aspects of nuclear medicine. Hospital organization is presented as well as the relationship of nuclear medicine services to other hospital services. Laboratories in affiliated hospitals are correlated with lectures on nuclear medicine technology, patient care and emergency procedures. (Fourth-year standing in NMT program)

Credit 4(F)

SCLN-402 Nuclear Medicine Procedures
Registration #1025-402 Central Nervous System

A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the central nervous system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)

Credit 1 (F)

SCLN-502 Nuclear Medicine Procedures
Registration #1025-502 Skeletal System

A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the skeletal system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)

Credit 1 (F)

SCLN-503 Nuclear Medicine Procedures
Registration #1025-503 Respiratory System

A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the respiratory system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in NMT program)

Credit 1 (F)

SCLN-510 Nuclear Medicine Procedures
Registration #1025-510 Urinary System

A combination lecture/practicum course. Lectures are given on specific imaging procedures involving structures in the urinary system. Physiology and anatomy, medical indications, fundamental principles, technique and scan interpretation are covered. Students observe and perform these procedures in the clinical setting. (Fourth-year standing in the NMT program)

Credit 1 (F)

SCLN-524 **Clinical Nuclear Medicine III**
Registration #1025-524
 Continuation of Clinical Nuclear Medicine II. (Fourth-year standing in NMT program)
 Credit 7 (S)

SCLS-412 **Cross-Sectional Anatomy**
Registration #1030-412
 Basic cross-sectional anatomy of the head, neck, abdomen, and pelvis. Builds on the basic knowledge of anatomy. Prepares the student to recognize sectional anatomy of major human structures, especially as they relate to medical imaging techniques. Lectures are augmented with exercises using prepared human sections, organ modeling, and diagnostic imaging units. (SBIB-305, 306 or permission of instructor)
 Class 4, Credit 4 (W)

SCLS-413 **Ultrasound Instrumentation**
Registration #1030-413
 Principles of ultrasound physics are directly applied to the use of ultrasound instrumentation in medical imaging. Transducers, signal production, data display, manipulation of controls, quality control, biologic effects, and doppler will be discussed. Emphasis will be on the creation of high quality images on laboratory scanners.
 Class 4, Credit 4 (S)

SCLS-414 **General Vascular Examination**
Registration #1030-414
 A course designed to give basic knowledge of general vascular evaluation with an emphasis on the sonographic approach. Two-dimensional real-time imaging and Doppler techniques will be presented as well as a discussion of other imaging modalities and their use in vascular evaluation. Performance of examinations on laboratory equipment will be stressed. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
 Class 4, Credit 4 (S)

SCLS-552 **Introduction to Obstetrical Ultrasound**
Registration #1030-552
 Provides the ultrasound candidate with basic knowledge necessary to perform obstetrical examinations. High quality image production, recognition of normal structures and basic pathologic states will be stressed. Examination protocols, review of specific anatomy, film reading, and use of other imaging techniques will be addressed. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
 Class 3, Credit 3 (F)

SCLS-553 **Gynecologic Ultrasound**
Registration #1030-553
 Information necessary to perform basic gynecologic sonographic examinations is presented. Examination strategies for various procedures will be explored, as well as the integration of ultrasound into established clinical practices. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
 Class 3, Credit 3 (F)

SCLS-554 **Advanced Obstetrical Ultrasound**
Registration #1030-554
 Provides information necessary to perform more sophisticated obstetrical procedures utilizing ultrasound. Examination strategies for various procedures will be explored as well as the integration of ultrasound into established clinical practices. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
 Class 4, Credit 4 (W)

SCLS-556 **Abdominal Ultrasound I**
Registration #1030-556
 Laboratory simulation and classroom instruction are used to develop practical skills and clinical knowledge necessary to perform basic abdominal examinations utilizing ultrasound. High quality image production, recognition of normal abdominal structures and basic pathologic states will be stressed. Examination protocols, review of anatomy, film reading, and use of other scanning techniques will be addressed. This is an internship course. (Fourth-year standing in the Ultrasound Program or permission of faculty)
 Class 3, Credit 3 (F)

SCLS-557 **Abdominal Ultrasound II**
Registration #1030-557
 A continuation of SCLS-556. Laboratory simulation and classroom instruction are used to develop practical skills and clinical knowledge necessary to perform basic abdominal examinations utilizing ultrasound. High quality image production, recognition of normal abdominal structures and basic pathologic states will be stressed. Examination protocols, review of anatomy, film reading, and use of other scanning techniques will be addressed. This is an internship course. (Fourth-year standing in the Ultrasound Program or permission of faculty)
 Class 3, Credit 3 (F)

SCLS-558 **Small Parts Ultrasound**
Registration #1030-558
 This course provides the classroom and clinical knowledge necessary to perform basic sonographic examination of anatomy classified as small parts, usually utilizing specialized equipment and high megahertz frequencies. Examination strategies for various procedures will be discussed, as well as the role of ultrasound in established clinical practices utilizing small parts imaging. This is an internship course. (Fourth-year standing in the Ultrasound Program or permission of faculty)
 Credit 3 (S)

SCLS-560 **Seminar in Ultrasound I**
Registration #1030-560
 Speaking, writing, and researching skills are explored. This course presents methods of basic research, developing writing strategies, and oral presentations. Students develop or critique a research project and prepare a written document following common publishing guidelines in addition to making oral presentations. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)
 Class 2, Credit 2 (W)

SCLS-561 Seminar in Ultrasound II**Registration #1030-561**

Candidates will prepare a complete plan for an ultrasound department as if they had been hired to establish a new department in a hospital setting. The candidates will work together to develop the physical, administrative, and financial aspects of a department. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of faculty)

Class 2, Credit 2 (S)

SCLS-570 Clinical Ultrasound**Registration #1030-570**

Prepares the student for application of classroom knowledge to the practice of ultrasound by means of a clinical internship. Performing basic, general ultrasound examinations in both the laboratory and clinical settings will be stressed. Nursing procedures and medico-legal considerations will also be discussed as related to the practice of ultrasound examination. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of director)

Credit 7 (F)

SCLS-571 Clinical Ultrasound II**Registration #1030-571**

Further prepares the candidate for application of classroom knowledge to the practice of ultrasound by means of a clinical internship. Performing basic, general ultrasound examinations in both the laboratory and clinical settings will be stressed. The candidate will be expected to perform basic examinations with little, if any, assistance by the end of this course. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of director; SCLS-570)

Credit 7 (W)

SCLS-572 Clinical Ultrasound III**Registration #1030-572**

Final development of ultrasound examination skills by means of clinical internship. The candidate will be expected to perform general ultrasound examinations with no assistance by the end of this course. This is an internship course. (Fourth-year standing in Ultrasound Program or permission of director; SCLS-571)

Credit 7 (S)

Clinical Chemistry

SCLC-705 Mechanisms of Disease**Registration #1023-705**

Following a brief review of normal physiology, this course will cover such topics as: mechanisms of cellular injury, the healing process, atherosclerotic heart disease, hypertension, infectious disease, and many other important medical topics.

Class 4, Credit 4 (W)

SCLC-712 Statistics and Quality Control**Registration #1023-712**

The principles of statistics as applied to biomedical research as well as clinical laboratory analysis will be studied. Using a problem-oriented approach, probability, normal values, analysis of variance and quality control as well as the relationship of these procedures to patient care will be studied.

Class 3, Credit 3 (S)

SCLC-722 Clinical Laboratory**Registration #1023-722****Computer Applications**

The basic concepts of data processing, as well as the design evaluation and utilization of computer systems in both hospital and clinical laboratories, will be studied. The legal aspects of biomedical data processing as well as instrument interfacing will also be studied.

Class 3, Credit 3 (offered every other year)

SCLC-820 Advanced Clinical Chemistry I**Registration #1023-820**

Quality control, statistics, electrolytes, acid-base physiology, renal function, trace metals, lipids, carbohydrate metabolism, enzymes, and various standard methods are covered. (Permission of instructor)

Class 4, Credit 4 (offered every other year)

SCLC-821 Advanced Clinical Chemistry II**Registration #1023-821**

A study of the concepts and applications of therapeutic drug monitoring, pharmacokinetics, toxicology, inherited disorders of metabolism, liver function tests, protein measurement, hepatitis, porphyrias, vitamins, pediatric clinical chemistry, geriatric clinical chemistry, and gene probes. (Permission of instructor)

Class 4, Credit 4 (offered every other year)

SCLC-822 Advanced Clinical Chemistry III**Registration #1023-822**

Radioimmunoassay, hormones, fetal-placement unit, integration of laboratory data. (Permission of instructor)

Class 4, Credit 4 (offered every other year)

SCLC-870 Clinical Chemistry Seminar**Registration #1023-870**

Credit 1 (W)

SCLC-872 Special Topics in Clinical Chemistry**Registration #1023-872**

In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of regular courses will be presented. These courses will be structured as ordinary courses with specified prerequisites, contact hours and examinations.

Class variable, Credit variable (offered upon sufficient request)

SCLC-877 External Clinical**Registration #1023-877****Chemistry Research**

Research carried out in a laboratory outside of the College of Science. Prior to the initiation of external research, a proposal from the student as well as a commitment of support and direction from the laboratory are evaluated for determination of credit to be awarded.

Credit variable

SCLC-879 Clinical Chemistry Research**Registration #1023-879**

Research carried out in the College of Science laboratories under the direction of RIT faculty members. The amount of credit awarded for such projects is determined after evaluation of a research proposal.

Credit variable 1-16

SCLC-899 **Independent Study**
Registration #1023-899

Individual projects or studies carried out under the direction of a faculty member. Study objectives and design are developed through faculty-student interaction with evaluation and credit to be awarded determined after review of a study proposal.

Credit variable

Materials Science and Engineering

SESM-701 **Introduction to Materials Science**
Registration #1028-701

The course provides an understanding of the relationship between structure and properties for development of new materials. Topics include: atomic and crystal structure, crystalline defects, diffusion theories, strengthening mechanisms, ferrous alloys, cast irons. Structure of ceramic and polymeric materials and corrosion principles. (Graduate standing or permission of instructor)

Class 4, Credit 4 (offered every year)

SESM-702 **Introduction to Polymer Science**
Registration #1028-702

A study of the chemical nature of plastics detailing the relationships between polymerization conditions, structure and properties in both the solid and fluid states.

Class 4, Credit 4 (offered every year)

SESM-703 **Solid State Science**
Registration #1028-703

This course will survey topics in the physics of solids. Included in these will be crystal symmetry, structure, and binding; mechanical, thermal, and electrical properties of insulators, semiconductors, and conductors including band theory. (SESM-704 or equivalent)

Class 4, Credit 4 (offered every year)

SESM-704 **Introductory Theoretical Methods**
Registration #1028-704

Treatment of waves and fields; selected topics of interest in electrodynamics and fluid mechanics; statistical mechanics; Maxwell-Boltzmann, Bose Einstein, and Fermi-Dirac distributions and their applications.

Class 4, Credit 4 (offered every year)

SESM-705 **Introductory Experimental Techniques**
Registration #1028-705

The course introduces the student to laboratory equipment for hardness testing, impact testing, tensile testing, x-ray diffraction, and thermal treatment of metallic materials. Experiments illustrating the characterization of high molecular weight organic polymers will be conducted. (SESM-701 and 702 or equivalents)

Class variable, Lab variable, Credit 4 (offered every year)

SESM-706 **Experimental Techniques:**
Registration #1028-706 **Thin Films**

Production of thin films of metals and dielectrics by physical vapor deposition. Lectures cover vacuum systems, evaporation, sputtering, nucleation and growth of thin films, analysis and characterization of thin films, and application of thin films. Laboratories cover use of vacuum systems in evaporation and sputtering and some methods of characterizing the thin films thus produced. (Permission of instructor)

Class variable, Lab variable, Credit 4

SESM-707 **Experimental Techniques:**
Registration #1028-707 **Electron Microscopy & Spectroscopy**

The course includes a detailed study of scanning electron microscopy and modern applications in microelectronic engineering. (SESM-701 or equivalent)

Class variable, Lab variable, Credit 4

SESM-708 **Experimental Techniques**
Registration #1028-708

This course is designed to provide an in-depth integrated approach to the analysis, investigation and development of materials, concentrating on specific types or classes. (SESM-701 or equivalent)

Class variable, Lab variable, Credit 4

SESM-710 **Materials Properties and Selection**
Registration #1028-710

A study of the principles of material behavior as applied to design. Application of materials according to these principles is stressed. Ferrous, nonferrous and nonmetallic materials are considered. (SESM-701 or equivalent)

Class 4, Credit 4

SESM-714 **Glass Science**
Registration #1028-714

Topics covered will include the structure and properties of glass, applied areas such as glass melting and processing, and various technological applications of glass. (SESM-701 or equivalent; SESM-704)

Class 4, Credit 4

SESM-717 **Materials Degradation**
Registration #1028-717 **Corrosion**

This course introduces the student to the basic electrochemical nature of corrosion and considers the various factors which influence the rate of corrosion in a variety of environments. Various means of controlling corrosion are considered. (SESM-701 or equivalent)

Class 4, Credit 4

SESM-720 **Organic Polymers**
Registration #1028-720

This course is designed to meet the needs of students in the area of organic chemistry related to synthesis, polymerization mechanism, structures, stereochemistry and reactions of organic polymers and their industrial usage. (SESM-702 or equivalent)

Class 4, Credit 4

SESM-721 **Physical Chemistry of**
Registration #1028-721 **Polymers**

A study of the theoretical and experimental methods available for designing plastics products and selecting appropriate materials, with special emphasis on the interrelationships between materials, product design, tooling construction and manufacturing producibility. (SESM-702 or equivalent)

Class 4, Credit 4

SESM-722 Polymer Processing**Registration #1028-722**

A study of the basic principles and methods involved in the technology of processing polymeric materials, including treatments of heat transfer, mass transfer, mixing and shaping or molding of these materials. (SESM-702 or equivalent)

Class 4, Credit 4

SESM-730 Optical Properties of Materials**Registration #1028-730**

Fundamentals of geometrical and physical optics; interaction of radiation with matter; dielectrics and thin films; introduction to electro-optic and acousto-optic effects. (SESM-704 or equivalent)

Class 4, Credit 4

SESM-733 Magnetic Properties of Materials**Registration #1028-733**

Band structures of pure and doped solids and solid compounds, transport phenomena, semiconduction, optical properties, galvanomagnetic and magneto-optic effects. (SESM-701 and 704 or equivalents)

Class 4, Credit 4

SESM-734 Advanced Optics**Registration #1028-734**

Lasers: theory, types and construction; optics of metals; multilayer dielectrics; electro- and acousto-optic modulators and deflectors; optical detectors. (SESM-730 or equivalent)

Class 4, Credit 4

SESM-736 Amorphous and Semicrystalline Materials**Registration #1028-736**

Electrical, thermal, and optical properties of amorphous materials; model of conduction. (SESM-701, 703, 704 or equivalents)

Class 4, Credit 4

SESM-740 Nuclear Science and Engineering**Registration #1028-740**

Systemics of the atomic nuclei, radioactivity, nuclear reactions, fission, nuclear reactor principles, designs, materials and safety. (SESM-701 and 704 or permission of instructor)

Class 4, Credit 4

SESM-760 Plasma Science**Registration #1028-760**

An introduction to plasma science; a study of the basic phenomena and application of plasma to etching, deposition, polymerization, plasma production of materials, analytical emission spectroscopy and atmospheric science. (SESM-701 or equivalent)

Class 4, Credit 4

SESM-770 Physics and Chemistry of I. C. Processing**Registration #1028-770**

Study of the various processing steps used in integrated circuit fabrication technology with special emphasis on diffusion, thermal oxidation, ion implantation and plasma assisted deposition and etching processes. Process modelling using SUPREM. (SESM-703 or permission of instructor)

Class 4, Credit 4

SESM-800 Special Topics**Registration #1028-800**

In addition to in-depth study of any of the courses listed under Elective Courses, special topics may be selected from such areas as elastomers, organometallics, radiation damage, processing of materials, superconductivity, etc. (Permission of instructor)

Class variable, Credit 4

SESM-877 External Research Project**Registration #1028-877**

Research using equipment and facilities at a site other than RIT. Prior to enrollment in the course, a proposal from the student that includes a letter of support from the host facility is evaluated for determination of credit to be awarded upon successful completion of the project. A total of 8 quarter credit hours, with a maximum of 4 quarter credit hours per quarter, can be applied toward the MS degree. (Permission of program director)

Credit variable

SESM-879 Research and Thesis Guidance**Registration #1028-879**

A project involving research on a topic in materials science and engineering. An oral examination and written thesis are required.

Credit variable

SESM-890 Seminar**Registration #1028-890**

This course is required for completion of the program and will involve a one-hour presentation on some topic in materials science in engineering.

Class variable, Credit 1 (F, S)

SESM-899 Independent Study**Registration #1028-899**

This course number should be used by students wishing to study a topic on an independent study basis. (Permission of instructor)

Credit variable

National Technical Institute for the Deaf

School of Business Careers

Applied Accounting

NBTA-100 **Career Exploration:** **Registration #0801-100** **Business Technologies**

This course is designed to help students collect the information necessary to make an appropriate decision regarding careers in accounting and office occupations. Students learn about the nature of accounting and office jobs, work environments, career options, and program requirements through a combination of group and individual activities that include presentations by faculty members and related professionals, panel discussions, class observations, and student interviews.

Class 1, Credit 1 (F, W, S)

NBTA-201 **General Accounting I** **Registration #0801-201**

This course is an introduction to accounting for both accounting and non-accounting students. Topics covered are the basic accounting equation; the recording of transactions using debits and credits; general and subsidiary ledgers; and the accounting cycle, including recording transactions for service and merchandising enterprises, preparing trial balances, adjusting and closing processes, and preparing basic financial statements. Spreadsheet applications are used on microcomputers.

Class 6, Credit 3 (F)

NBTA-202 **General Accounting II** **Registration #0801-202**

This course is a continuation of General Accounting I for both accounting and non-accounting students. Topics covered include the calculation of interest on notes and the discounting of notes, adjustment for uncollectable accounts, merchandise inventory systems and calculations, internal control, and the voucher system. Coursework includes recording transactions in special journals and a practice set that applies accounting concepts in a simulated business situation. Spreadsheet applications are used on microcomputers. (Grade of C or better in NBTA-201)

Class 6, Credit 3 (W)

NBTA-231,232 **Fundamentals of Economics I, II** **Registration #0801-231,232**

This two-course sequence gives an overview of micro- and macroeconomic concepts. Students examine economic problems in a rational manner by learning the fundamental processes of economic analysis and the skills of economic reasoning. These courses include selected knowledge and skills from the economic discipline presented in the form of concepts and understandings deemed most important to economic literacy for students. (Applied accounting associate degree status, NBTA-101)

Class 3, Credit 3 (NBTA-231, W; NBTA-232, S)

NBTA-251 **Applied Accounting I** **Registration #0801-251**

This course for accounting students is a continuation of General Accounting I and II. Topics covered include a computerized review of the accounting cycle and financial reports, the components of a payroll system, the calculation and recording of employee earnings and employer payroll taxes, the recording and adjusting of deferrals and accruals, partnerships, and depreciation or amortization of assets. Coursework includes a computerized practice set designed to summarize General Accounting I and II and Applied Accounting I in a simulated business situation. (Grade of C or better in NBTA-202)

Class 6, Credit 4 (S)

NBTA-252 **Applied Accounting II** **Registration #0801-252**

This course introduces students to cost accounting with an emphasis on job order costing. Topics covered include manufacturing statements; cost theory; and integration of materials, labor, and overhead to the computerized job cost situation. The course culminates with practical application of course content through a practice set. Computer applications include spreadsheets. (Grade of C or better in NBTA-251)

Class 6, Credit 4 (F)

NBTA-253 **Applied Accounting III** **Registration #0801-253**

This course is a continuation of cost accounting, with particular concentration on process and managerial aspects. Topics covered include average and FIFO process costing methods, equivalent units, multiple products, changes in units, budgeting, cost classification, and computerized applications. Computer applications include spreadsheets, graphics, and data bases. (Grade of C or better in NBTA-252)

Class 6, Credit 4 (W)

NBTA-254 **Applied Accounting IV** **Registration #0801-254**

This course consists of managerial accounting topics and concepts. Topics covered include financial analysis, accounting concepts and principles, statement of cash flow, and corporate accounting. Computer applications include spreadsheets. (Grade of C or better in NBTA-253)

Class 6, Credit 4 (S)

NBTA-260 **Applied Accounting Techniques** **Registration #0801-260**

This course gives students an opportunity to reinforce and apply accounting topics and skills previously studied. Students work in a simulated accounting office as accounting clerks and perform a variety of general and process costing duties. Computer applications include cost accounting, general ledger, spreadsheets, graphics, and data bases. (Grade of C or better in NBTA-253)

Class 6, Credit 2 (S)

NBTP-286 **Fundamentals of Marketing**
Registration #0804-286

This course is an introduction to the field of marketing and its strategies. Topics include consumer behavior and its effect in the marketplace, product research and planning, pricing, distribution channels, marketing institutions, advertising and promotion, and organization. (NBTP-101)

Class 3, Credit 3 (S)

NBTP-290 **Small Business Organization**
Registration #0804-290 **and Management**

This is an elective course designed for business students but available to students from another technical program who have completed the prerequisites and have a desire to learn entrepreneurial skills for starting a business. Each student will write a business plan describing a selected business. (NBTP-201, NBTP-284, or NBTP-286)

Class 4, Credit 3 (S)

NBTP-291 **Applied Business Techniques**
Registration #0804-291

This course gives students an opportunity to review skill-oriented coursework on a microcomputer and electric typewriter prior to graduation and job entry. Skill review includes production and speed typing, business machines, payroll procedures, records management techniques, and word processing operations and applications using various word processing software packages. (NBTP-302)

Class 3, Credit 2 (S)

NBTP-299 **Co-op Work Experience**
Registration #0804-299

Credit 0 (Su)

NBTP-301 **Word Processing I**
Registration #0804-301

This self-paced course provides an introduction to basic word processing concepts and a discussion of various types of word processing office systems and procedures. Students learn basic documentation capabilities of the Xerox 6085 Professional Computer system. (NBTP-222)

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

NBTP-302 **Word Processing II**
Registration #0804-302

This self-paced course provides a continuation of the word processing concepts and applications presented in Word Processing I. Using the Xerox 6085 Professional Computer system, students learn applications, including creation of fill-in forms and tables, and are introduced to basic graphics. (NBTP-301)

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

NBTP-303 **Word Processing III**
Registration #0804-303

This self-paced course provides a continuation of the word processing concepts and applications presented in Word Processing II. Using the Xerox 6085 Professional Computer system, students learn procedures for creating basic business and data-driven graphics that are prepared in the office environment. (NBTP-302)

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

NBTP-304 **Word Processing IV**
Registration #0804-304

This self-paced course contains the concepts and applications for creating, maintaining, and printing files. Using the Xerox 6085 Professional Computer system and microcomputers, students use files to create repetitive letters, lists, and reports. Students also are exposed to advanced files.

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

NBTP-310 **Desktop Publishing Concepts**
Registration #0804-310 **and Applications**

This course for students in the office technologies program provides an introduction to the field of desktop publishing and telecommunications, utilizing word processing and microcomputer equipment. Students create documents on word processing equipment that contains business graphics, clip art, and self-created graphics. Current software programs also are introduced and provide a working knowledge of microcomputer-based desktop publishing. In addition to required projects, students select and design documents of their choice. (NBTP-303)

Class 4, Credit 3 (F, S)

NBTP-399 **Independent Study**
Registration #0804-399

Credit Variable

Data Processing

Note: Required laboratories may take place during evening hours or on Saturdays.

NBTD-100 **Introduction to Data Processing**
Registration #0802-100

This course provides an overview of the fields of business data processing and computer science. It is intended for students who need skill development prior to full entry into the in-depth data processing program courses. Logic skill development and the use of microcomputers are emphasized.

Class 3, Credit 2 (F)

NBTD-101 **Introduction to Business Programming**
Registration #0802-101

This course introduces students to the function of programming the computer. Using microcomputers, students learn to read, analyze, flowchart, and program various business applications. The course is the foundation for future programming courses and has a strong emphasis on developing logic skills. (Michigan Test score higher than 55 or California Reading Test score higher than 7.5, NBTD-122)

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

NBTD-105 **Career Exploration—Data Processing**
Registration #0802-105

This course is designed to help students collect the information necessary to make appropriate decisions about possible careers in data processing. Students are given opportunities to explore their interest in data processing through a combination of hands-on experiences with computers, presentations by faculty members and outside professionals, field trips, class observations, and student/faculty interviews. The course offers a unique integration of technical instruction and career counseling that enhances students' decision-making and career-planning abilities.

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

School of Science and Engineering Careers

Architectural Technology

NETA-100 Career Exploration: Registration #0808-100 Architectural Technology

This course provides students with information regarding careers in architectural technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETA-110 Construction Terminology Registration #0808-110

This course introduces students to the basic technical vocabulary for the construction industry. Topics include drafting equipment and procedures, materials, structural components, mechanical and electrical systems, site work, construction equipment, and procedures.

Class 4, Credit 4 (F)

NETA-111 Construction Drafting I Registration #0808-111

This course introduces students to the basic drafting techniques for construction projects. Topics include line quality, lettering, scale measurement, dimensioning, drafting media and equipment, graphic reproduction methods, sheet layout, floor plans, site plans, sections, and isometric views. Students begin to develop a portfolio of their best work. (Corequisite: NETA-110)

Lab 6, Credit 2 (F)

NETA-112 Construction Drafting II Registration #0808-112

In this course, students continue to learn and practice basic drafting techniques for construction projects. Topics include field measurement and measured drawings, preliminary drawings, basic rendering, base maps, perspectives, and site plans. Students also begin learning basic computer-assisted drafting (CAD) skills. (Corequisite: NETA-201) (NETA-111)

Lab 6, Credit 2 (W)

NETA-113 Construction Drafting III Registration #0808-113

Students continue to learn and practice basic drafting techniques. They also learn to make three-dimensional models. Topics include building models, topographic models, presentation drawings from sketches, free-hand drawings, measured drawings from field measurements, topographic contour maps from spot elevations, and design development drawings from preliminary drawings. Students also continue CAD-skill development. (Corequisite: NETA-202) (NETA-112)

Lab 6, Credit 2 (S)

NETA-201 Construction Methods and Procedures I Registration #0808-201

This is the first of two courses that orient students to the processes of building project development in design offices and at construction sites. This course concentrates on the processes of preliminary design, design development, production of contract documents, and bidding. Topics include roles of owners, consultants, and contractors; working drawings; specifications; analysis of total project; and bidding. (Corequisite: NETA-112) (NETA-110)

Class 3, Credit 3 (W)

NETA-202 Construction Methods and Procedures II Registration #0808-202

This course continues the orientation of students to the total building project development. In this course, students learn about construction processes. Topics include fabrication, placement, support, and fastening of building parts; identification and understanding of construction equipment; and scheduling of construction operations. (Corequisite: NETA-113) (NETA-201)

Class 3, Credit 3 (S)

NETA-211 Architectural Materials I Registration #0808-211

This course provides information about materials used in construction. Students learn the characteristics, origins, sources, standard shapes, sizes, and units of measure for materials and manufactured products. Students use the standard referencing and indexing system for materials and products. (NETA-202)

Class 3, Credit 3 (F)

NETA-212 Architectural Materials II Registration #0808-212

In this course, students apply information from the previous course, Architectural Materials I. Topics include building codes, comparison of materials, selection of materials and products for specific applications, and detailing. (NETA-211)

Class 3, Credit 3 (W)

NETA-220 Principles of Structural Systems Registration #0808-220

Students identify and describe the major structural systems and their components. These systems include steel frame, cast-in-place concrete, precast concrete, masonry, steel joists, trusses, light frame, and heavy timber. Students read structural framing plans, details, and schedules. (NETA-212)

Class 4, Credit 4 (S)

NETA-221,222,223 Architectural Design Drafting I, II, III Registration #0808-221,222,223

In this sequence of three courses, students learn drafting production techniques, production scheduling, and self-monitoring of progress. Students will produce drawings for one or more building projects during the three courses. The process will include preliminary drawings; design development; architectural working drawings; and working drawings for the mechanical, electrical, and structural elements of the project. Drawings may include cover sheets; site plans; floor plans; interior and exterior elevations; building, wall, and detail sections; interior and exterior perspectives; axonometric views; schedules; and diagrams. Students apply both manual and CAD drafting skills.

(NETA-113 for NETA-221; NETA-221 for NETA-222; NETA-222 for NETA-223)

Lab 12, Credit 4 (NETA-221, F; NETA-222, W; NETA-223, S)

NETA-224 **Construction Computations**
Registration #0808-224

This course introduces students to the basic techniques for calculating linear area, volume, and angular quantities. Students apply basic math, algebra, geometry, right angle trigonometry, law of sines, and law of cosines. (NTMM-151)

Class 2, Credit 2 (W)

NETA-299 **Co-op Work Experience**
Registration #0808-299

Credit 0 (Su)

NETA-340 **Planning Project**
Registration #0808-340

This course introduces students to the basic techniques for planning surveys. These include base map preparation, data collection from field surveys and public records, data base management, data analysis, graphic presentation of data, project organization, and work discipline skills. Students work as a team to perform an original planning survey. The team cooperates with a local planning agency. Students work in the field and in the laboratory. (NETA-223)

Lab 15, Credit 5 (F)

NETA-351,352 **Architectural Projects I, II**
Registration #0808-351,352

In this sequence of two courses, students complete one or more building design projects. Activities may include field inspection and measurement, measured drawings, preliminary design, presentation design development, models, and working drawings. The courses simulate the environment of an architectural office. (NETA-340 for NETA-351; NETA-351 for NETA-352)

Lab 15, Credit 5 (NETA-351, W; NETA-352, S)

NETA-375 **Architectural History**
Registration #0808-375

Students learn the major elements of architectural styles and building technologies throughout the history of Western architecture. This provides a background for discussion of current topics in the field of building design and construction.

Class 2, Credit 2 (S)

NETA-376 **Building Estimating**
Registration #0808-376

Students learn and apply basic concepts and skills for calculating the cost of a building project. Topics include elements of project cost, quantity survey techniques, material costs, installation costs, unit cost information sources, cost analysis, adjustments for locality, historical cost indexes, contingencies, overhead, and profit. (NETA-224 or NETA-128)

Class 2, Credit 2 (S)

NETA-377 **Building Equipment**
Registration #0808-377

Students learn to identify and understand the basic equipment and operation of mechanical and electrical systems in a building. These systems include water supply, drainage, fire protection, heating, ventilating, air conditioning, power, lighting, and conveying systems. Students become acquainted with the graphic representation for these systems in working drawings. (NETA-202)

Class 3, Credit 3 (F)

NETA-390 **Architectural Technology Seminar**
Registration #0808-390

This course helps students prepare for the job search and for employment. Topics related to job search include applications, resumes, interviews, and use of a portfolio. Topics related to the world of work include taxes, insurance, employee benefits, credit ratings, marriage, and deaf professionals.

Class 1, Lab 3, Credit 2 (W)

NETA-399 **Independent Study**
Registration #0808-399

Credit Variable

Civil Technology

NETC-100 **Career Exploration: Civil Technology**
Registration #0809-100

This course provides students with information regarding a career in civil technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETC-211 **Surveying and Mapping**
Registration #0809-211

This course combines the elements of surveying and mapping. Students have the opportunity to use survey equipment in the field to obtain and record angle, distance, and elevation measurements. Using the information gathered in the field, students perform calculations and produce drawings for a term project. Topics include error of closure, bearings, interior angles, distances, coordinates, slope, reducing field notes, and cut and fill volumes. Students draw with lead and ink on a variety of media and also use the CAD system to produce drawings. (NETA-113, NTMM-152)

Class 6, Lab 4, Credit 6 (S)

NETC-250 **Statics**
Registration #0809-250

This course requires students to apply physical concepts of equilibrium in co-planar force systems to structural members. Topics include vectors, forces, moments, equilibrium, distributed forces, centroids, and centers of gravity. Students calculate reactions, moments, and internal forces in beams, trusses, and frames. (NTMM-152, NTSP-126)

Class 3, Lab 3, Credit 4 (F)

NETC-260 **Strength of Materials**
Registration #0809-260

Students apply physical concepts of matter to calculate how forces affect structural members. Topics include stress, strain, behavior of common engineering materials, moment of inertia, section modulus, and basic beam theory. Students calculate the maximum tensile, compressive and shear stresses, and deflection in simple members. They also calculate deflection of beams and select simple tension, compression, and bending members and their connections. (NETC-250)

Class 3, Lab 3, Credit 4 (W)

NETC-283 Soil Mechanics**Registration #0809-283**

This course introduces students to the characteristics of soils related to construction projects. Topics include visual and laboratory classification of soils, compaction, sub-surface investigation, percolation, and soil nomenclature. Students perform laboratory experiments and tests and write laboratory reports.

Class 3, Lab 3, Credit 4 (W)

NETC-284 Engineering Materials**Registration #0809-284**

Students investigate the basic engineering properties of portland cement concrete, portland cement mortar, and asphaltic cement concrete. They learn and practice standard laboratory testing procedures and write laboratory reports. (NETC-283)

Class 2, Lab 6, Credit 4 (S)

NETC-285 Civil Technology Seminar**Registration #0809-285**

This course provides an overview of the field of civil technology. Students learn how the field is related to the profession of civil engineering. The course also introduces research and laboratory report writing, resume writing, and interviewing skills.

Class 1, Lab 3, Credit 2 (F)

NETC-290 Programming for Civil Technicians**Registration #0809-290**

This course introduces basic computer skills. Topics include keyboard operation, expressions, variables, programs, branching, input, subscripted variables, and loops. Students have hands-on experience on the computer.

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

NETC-299 Co-op Work Experience**Registration #0809-299**

Credit 0 (Su)

NETC-311 Surveying Projects**Registration #0809-311**

Students continue to learn the basic techniques of land measurement. Topics include electronic distance measurement (EDM), theodolites, modern levels, deed descriptions, deed research, tape locations, horizontal and vertical curves, aerial surveying, and surveying computations. Students have hands-on experience with surveying equipment in the field. (Corequisite: NETC-242) (NETC-231, NETC-241)

Class 1, Lab 6, Credit 3 (F)

NETC-312 Mapping and Site Design**Registration #0809-312**

Students apply skills learned in Mapping I to complete a site planning project. Requirements for the project include topographic, traverse, and highway mapping; cut and fill calculations; drafting with pencil and ink on a variety of media; and graphic reproduction. (Corequisite: NETC-232) (NETC-231, NETC-241)

Class 1, Lab 3, Credit 2 (F)

NETC-321,322,323 Structural Design Drafting I, II, III**Registration #0809-321,322,323**

In this sequence of courses, students apply the principles of statics and strength of materials and drafting skills. Students learn the basic principles of structural analysis and design, estimating quantities, preparation of structural and shop drawings, and construction. The first course and half of the second course concentrate on steel structures. The rest of the second course and the third course concentrate on concrete structures. (NETC-260 for NETC-321; NETC-321 for NETC-322; NETC-322 for NETC-323)

Class 2, Lab 6, Credit 4 (NETC-321, F; NETC-322, W; NETC-323, S)

NETC-340 Fundamentals of Fluid Mechanics**Registration #0809-340**

This course introduces students to the basic principles of fluid statics and fluid flow. Topics include hydrostatic pressure, forces on submerged surfaces, buoyancy, laminar and turbulent flow of incompressible fluids, fluid measurements, and open channel flow. Students perform experiments in the laboratory.

Class 3, Lab 3, Credit 4 (F)

NETC-350 Highway Design and Construction**Registration #0809-350**

This course introduces students to the basic practices in the study, design, plan, preparation, and construction of transportation facilities. Topics include horizontal and vertical alignments, typical sections, hydrology, quantity estimating, intersection design, and traffic control devices. (NETC-311)

Class 3, Lab 3, Credit 4 (W)

NETC-385 Principles of Environmental Technology**Registration #0809-385**

This course introduces students to the factors affecting the quality of the environment. Topics include testing, regulation, and management of water supplies, waste water, soil erosion, solid wastes, atmospheric pollutants, and noise; energy measurement and conservation; visual resource analysis; and environmental impact analysis. Field observations are an important part of this course. (NETC-340)

Class 3, Lab 3, Credit 4 (S)

NETC-390 Construction Seminar**Registration #0809-390**

This course helps students prepare for their job search and employment. Topics related to job search include applications, resumes, interviews, and use of a portfolio. Topics related to the world of work include taxes, insurance, employee benefits, credit ratings, marriage, and deaf professionals.

Class 1, Lab 3, Credit 2 (W)

NETC-399 Independent Study**Registration #0809-399**

Credit Variable

Electromechanical Technology

NETM-100 **Career Exploration:** **Registration #0811-100 Electromechanical Technology**

This course provides students with information regarding a career in electromechanical technology. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (W, S)

NETM-101 **Basic Drafting I** **Registration #0811-101**

This course provides instruction in the principles and techniques of basic drafting and includes an introduction to computer-assisted drafting. The emphasis is on understanding how drawings are made and used in industry. (NTMM-141)

Lab 6, Credit 2 (F)

NETM-171 **Digital Systems** **Registration #0811-171**

This course is an introduction to logic components and how they are used in machines. Students will study gates, switches, counters, flip-flops, multiplexers, demultiplexers, truth tables, Boolean algebra, logic families, registers, and counters. (NETM-368)

Class 3, Lab 4, Credit 4 (S)

NETM-209 **Technical Graphics** **Registration #0811-209**

This course is an introduction to electronic and mechanical drawings. Students learn how to draw using drafting standards; computer-assisted drafting experience is included. They also learn about electronic symbols, component outlines, block diagrams, schematic diagrams, cable drawings, military standards, and integrated circuits. (NETI-101, NETM-368)

Lab 6, Credit 2 (S)

NETM-210 **Computer Techniques** **Registration #0811-210**

This course emphasizes how the computer can be used to solve problems. Students learn a programming language and develop programming skills. Students are required to solve engineering problems through hands-on computer experience. (NTSP-100)

Class 3, Lab 3, Credit 4 (W)

NETM-211 **Mechanical Components** **Registration #0811-211**

This course introduces mechanical devices used in electro-mechanical equipment. The basic topics covered include torque, work, power, gears, cams, and drive systems. Students develop basic breadboarding skills. (NTMM-150, NTSP-100)

Class 3, Lab 4, Credit 4 (S)

NETM-213 **DC Circuits** **Registration #0811-213**

This course introduces students to the theory and use of direct current circuits. Students learn about direct current units and measurements, basic circuit laws, networks, Thevinin's Theorem, and superposition theorem. (NTMM-150, NTSP-135)

Class 3, Lab 6, Credit 5 (S)

NETM-234 **Optical Systems** **Registration #0811-234**

This course introduces students to the use of optics in engineering applications. Students learn about refraction, reflection, imaging, fiber optics, light emitting diodes, lasers, and optically controlled solid-state electronic devices. (NETM-369, NTMM-151)

Class 3, Lab 2, Credit 4 (F)

NETM-241 **Tool Skills** **Registration #0811-241**

This course introduces students to the use of basic hand tools used by electromechanical technicians. Students learn about safety, measuring, layout techniques, cutting, finishing metal, fasteners, drilling, counterboring, countersinking, tapping, soldering, and wiring. The course requires the completion of several projects. (NTMM-141)

Lab 6, Credit 2 (F, W)

NETM-299 **Co-op Work Experience** **Registration #0811-299**

(NETM-171, NETM-321, NETM-368)

Credit 0 (F, W, S, Su)

NETM-304 **AC Circuits** **Registration #0811-304**

This course emphasizes the theory and use of alternating current circuits. Students learn about inductance, capacitance, alternating current circuits, series, and parallel resonant circuits. (NETM-210, NETM-213)

Class 3, Lab 6, Credit 5 (F)

NETM-317 **Kinematics** **Registration #0811-317**

This course emphasizes the motion of machine parts. Students learn about linkages and levers, and the relation of these parts to velocities, accelerations, and distances. (NETM-211, NTMM-152)

Class 3, Lab 4, Credit 4 (F)

NETM-321 **Fluid Power** **Registration #0811-321**

In this course, students learn how power is transmitted by using fluids (liquids and gases). Topics covered include the character of fluids, pumps, valves, cylinders, motors, and the piping used. Students also learn how digital logic is used to control fluid power valves and equipment. (NETM-317)

Class 3, Lab 4, Credit 4 (W)

NETM-322 **Electrical Power Systems** **Registration #0811-322**

In this course, students learn how power is transmitted by electricity. Basic topics covered include generators, motors, transformers, and distribution lines. Both alternating and direct current machines are covered. (NETM-304, NETM-317)

Class 3, Lab 4, Credit 4 (S)

NETM-324 **Transducers** **Registration #0811-324**

This course introduces students to automatic controls. Students learn about electrical, thermal, hydraulic, and mechanical transducers. Emphasis is on the similar operating characteristics of all kinds of transducers. Students express results using mathematics and graphics. (NETM-321, NETM-368)

Class 3, Lab 4, Credit 4 (F)

NETM-325 Control Systems**Registration #0811-325**

This is the second course in a sequence on the topic of automatic controls. Students learn about the effects on a controlled process when different ways are used to connect the input transducer to the output transducer. The course covers open and closed loop systems. Graphic techniques are used to help students understand systems. (NETM-324)

Class 3, Lab 4, Credit 4 (W)

NETM-327 Microprocessor Control Systems I**Registration #0811-327**

This is the first course in a two-quarter sequence. The course introduces students to the theory of microprocessor-based control systems. Students learn about software techniques applied to electromechanical systems. This laboratory course emphasizes systems analysis and troubleshooting. (NETM-171, NETM-370)

Lab 6, Credit 2 (W)

NETM-328 Microprocessor Control Systems II**Registration #0811-328**

This course emphasizes the construction, testing, and troubleshooting of microprocessor-based systems. Students identify and solve problems and report solutions independently. This course is project-based and ties together many of the concepts learned in the electromechanical technology program. (Corequisite: NETM-334) (NETM-327)

Lab 6, Credit 2 (S)

NETM-330 Circuit Analysis**Registration #0811-330**

This course emphasizes the analysis of complex circuits. Students learn about Kirchoff's Laws, independent and dependent sources, power, equivalent sources and resistances, Thevinin's Theorem, Norton's Theorem, superposition theorem, mesh analysis, and nodal analysis. (NETM-370)

Class 4, Credit 4 (W)

NETM-332 Statics**Registration #0811-332**

This elective course covers characteristics of forces and force systems. Emphasis is placed on vectors, levers, moments, free body diagrams, touples, friction, and structure analysis. Problem-solving techniques are stressed throughout the course. (NETM-321)

Class 4, Credit 4 (W)

NETM-333 Strength of Materials**Registration #0811-333**

This course introduces students to the reactions of engineering materials to different types of loading. The course emphasizes the use of standard handbooks, stress and strain relationships, Poisson's Ratio, safe loading, and expected deflection of beam- and column-shaped machine parts. (NETM-332)

Class 3, Lab 3, Credit 4 (S)

NETM-334 Electromechanical Systems**Registration #0811-334**

This course emphasizes the interface between microprocessors and electromechanical devices. Students work on projects that include circuit design, software design, breadboarding skills, and troubleshooting techniques. (Corequisite: NETM-328) (NETM-325, NETM-327)

Class 3, Lab 3, Credit 4 (S)

NETM-368 Electronics I**Registration #0811-368**

This course introduces students to basic diode and transistor circuits. Students learn about semiconductor theory, diode circuits, bipolar transistors, transistor biasing circuits, and AC signal amplifiers. Students develop basic measurement and breadboarding skills. (NETM-304)

Class 3, Lab 6, Credit 4 (W)

NETM-369 Electronics II**Registration #0811-369**

This course introduces students to FET and linear amplifiers and their characteristics. Topics of study include FET transistor AC-equivalent circuits, small signal amplifiers, power amplifiers, and push-pull amplifiers. Students develop basic measurement and breadboarding skills. (NETM-368)

Class 3, Lab 6, Credit 5 (S)

NETM-370 Electronics III**Registration #0811-370**

This course introduces students to the theory and application of communications circuits. Students learn about regulator characteristics and applications, control circuits, and a variety of linear integrated circuits. Students are required to use manufacturers' data sheets and to develop proper breadboarding skills. (NETM-369)

Class 3, Lab 4, Credit 4 (F)

NETM-399 Independent Study**Registration #0811-399**

Credit Variable

Industrial Drafting Technology

NETI-100 Career Exploration: Industrial Drafting**Registration #0810-100**

This course provides students with information regarding a career in industrial drafting. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETI-103 Introduction to Computer-Aided**Drafting (CAD)**

In this introductory course, students acquire basic competency in computer-aided drafting (CAD) that may include using the B & L Producer system software and Auto CAD and Plan CAD programs on the IBM PC or DEC Rainbow computers. Students create basic computer drawings, add dimensions and lettering, and learn some useful functions of these systems. They also have the opportunity to work on selected special applications.

Class 1, Lab 3, Credit 2 (F, W, S)

NETI-131,132 Manufacturing Processes I, II**Registration #0810-131,132**

Students are exposed to various traditional and non-traditional manufacturing operations. Students develop an appreciation for tolerancing of manufactured parts. (NTMM-152 for NETI-131; NETI-131 for NETI-132)

Lab 3, Credit 1 (NETI-131, F; NETI-132, W)

NETI-141 Basic Technical Drafting I
Registration #0810-141

Students learn basic skills of engineering drawing through instruction and drafting projects. Students are introduced to the use of tools and equipment, constructions, orthographic projection, lettering, and basic dimensioning practices. (NTMM-142)

Class 1, Lab 6, Credit 3 (F)

NETI-142 Basic Technical Drafting II
Registration #0810-142

The major topics of this course are orthographic projection and dimensioning systems. Auxiliary views, sections, and developments are introduced through the use of instruction and projects. Students produce industrial-quality drawings. (NETI-141)

Class 1, Lab 6, Credit 3 (W)

NETI-143 Basic Technical Drafting III
Registration #0810-143

Students develop the skills necessary to produce industrial-quality working drawings, including assembly and detail drawings. Students solve problems related to tolerances, mating parts, fasteners, and standard engineering fits. (NETI-142)

Class 1, Lab 6, Credit 3 (S)

NETI-151 Materials and Processes I
Registration #0810-151

Students develop a working knowledge of the various materials and related manufacturing processes used in industry. (NTSP-156)

Class 3, Credit 3 (F)

NETI-152 Materials and Processes II
Registration #0810-152

Students investigate the properties of metals and plastics and their characteristics and methods of fabrication. (NETI-151)

Class 3, Credit 3 (W)

NETI-204 Technical Drafting IV
Registration #0810-204

Students design welded structures from realistic engineering requirements. They work in the laboratory to produce a team-based welding assembly and supporting detail drawings. (NETI-203)

Lab 8, Credit 3 (F)

NETI-205 Technical Drafting V
Registration #0810-205

Students solve a complex design problem from realistic engineering data, applying knowledge of power transmission components and mechanisms. This laboratory course creates a concept layout supported by engineering data. (NETI-204)

Lab 9, Credit 3 (W)

NETI-206 Technical Drafting VI: Seminar Project
Registration #0810-206

Students design a working layout of a complex power transmission problem based on an engineering concept layout. This laboratory course provides a fully documented layout suitable for drafters to draw all individual parts. (NETI-205)

Lab 15, Credit 5 (S)

NETI-213 Statics
Registration #0810-213

Students learn the basic principles of statics, including reactants and equilibrium of force systems, trusses containing two-force members, structures containing three-force members, centroids, moments of inertia, and dry friction. (NTMM-202, NTSP-135)

Class 6, Credit 5 (F)

NETI-214 Strength of Materials
Registration #0810-214

Students learn the basic concepts of strength of materials, including stress and strain analysis, both elastic and plastic, with emphasis on elastic analysis of axially loaded members, connectors, beams, and columns. The laboratory experience includes testing of materials utilizing appropriate machines. Field trips to see test demonstrations also occur. (Corequisite: NETI-221) (NETI-213)

Class 3, Lab 3, Credit 5 (W)

NETI-215 Mechanisms
Registration #0810-215

Students learn about basic mechanical components such as linkages and levers, and combinations of these devices as they are applied in machines. Analysis of force, deflection, velocity, and acceleration is stressed. The laboratory experience includes mathematical and graphical solutions of problems. (NTMM-202)

Class 3, Lab 4, Credit 4 (F)

NETI-221 Machine Design I
Registration #0810-221

This is a study of the analytical design of bearings, clutches, couplings, brakes, springs, gearing systems, and power shafting. (Corequisite: NETI-214) (NETI-213)

Class 3, Lab 3, Credit 4 (W)

NETI-222 Machine Design II
Registration #0810-222

Students learn methods of constructing machine parts as well as specifications of materials and manufacturing processes. (NETI-221)

Class 3, Lab 3, Credit 4 (S)

NETI-230 General Tolerancing
Registration #0810-230

This introductory course provides instruction in the principles of dimensioning and tolerancing. The course is designed to provide students with basic skills for recognizing, understanding, calculating, and applying different tolerance systems to individual and mating parts. These tolerance systems conform to industrial standards and practices and to the American National Standards Institute document *Dimensioning and Tolerance* (ANSI Y 14.5M-1982).

Class 2, Lab 1, Credit 2 (F)

NETI-231 Geometric Tolerancing I
Registration #0810-231

This is the first of two sequential courses that introduce students to geometric dimensioning and tolerancing. The course is designed to give students an overview of geometric symbols and how the assigned symbols indicate the shape and features of a part or object in relation to size. Tolerancing is applied in theory only, and the rules are presented to students to facilitate the concepts of geometric characteristic symbols per the American National Standards Institute (ANSI Y 14.5M-1982).

Class 2, Lab 1, Credit 2 (W)

NETI-232 Geometric Tolerancing II**Registration #810-232**

This is the second of two sequential courses that introduce students to geometric dimensioning and tolerancing. Students continue their study of a pictorial language that fosters uniform understanding among design, production, and inspection groups. This course completes the study of the individual feature characteristic symbols and introduces related feature and positional characteristic symbols per the American National Standards Institute (ANSI Y 14.5M-1982).

Class 2, Lab 1, Credit 2 (S)

NETI-241 Technical Mechanical Drafting I**Registration #0810-241**

This is the first of three sequential courses that simulate an industrial drafting team project. Topics, taught in a lecture and laboratory format, include drawing and layout procedures, drawing media, basic drafting skills, basic dimensioning, circular dimensioning, common dimensioning, dimensioning methods, limits and tolerances, fits and allowances, working drawings, and assembly drawings. Students develop additional skills in manual and CAD drafting.

Class 2, Lab 6, Credit 3 (F)

NETI-242 Technical Mechanical Drafting II**Registration #0810-242**

This is the second of three sequential courses that simulate an industrial drafting team project. Topics, to be taught in a lecture and laboratory format, include surface texture; detail, assembly, subassembly, and purchased-part drawings; engineering change notices; sections and conventions; and threaded fasteners. Students develop additional skills by producing drawings using manual and CAD formats.

Class 2, Lab 6, Credit 3 (W)

NETI-243 Technical Mechanical Drafting III**Registration #0810-243**

This is the third of three sequential courses that simulate an industrial drafting team project. Topics, taught in a lecture and laboratory format, include working drawings, engineering change notices, purchased-part drawings, threaded fasteners, miscellaneous fasteners, forming processes, dies, and stamping and manufacturing materials. Students develop advanced skills by producing drawings using manual and CAD formats.

Class 2, Lab 6, Credit 3 (S)

NETI-251 Technical Electrical Drafting I**Registration #0810-251**

This course is the first in a three-course sequence and is designed to provide students with the necessary skills to identify, draw, and differentiate between various electronics components. Topics include graphic symbols, reference designations, color code systems components, schematic diagrams, and control drawings. Students develop skills in manual and computer-assisted drafting.

Class 2, Lab 6, Credit 3 (F)

NETI-252 Technical Electrical Drafting II**Registration #0810-252**

This is the second in a three-course sequence and is designed to provide students with the necessary skills to identify, draw, and differentiate between various electronics diagrams. Topics include reference designation systems; block, logical, connection, interconnection, cable, and industrial electronics diagrams; and wiring harnesses. Students develop their skills in manual and computer-assisted drafting.

Class 2, Lab 6, Credit 3 (W)

NETI-253 Technical Electrical Drafting III**Registration #0810-253**

This course is the third in a three-course sequence and is designed to provide students with the necessary skills to identify, define, and produce drawings required for printed circuit board assemblies. Topics include artwork, board detail, marking, assembly drawings, productive processes, and fabrication.

Class 2, Lab 6, Credit 3 (S)

NETI-299 Co-op Work Experience**Registration #0810-299**

Credit 0 (Su)

NETI-399 Independent Study**Registration #0810-399**

Credit Variable

Manufacturing Processes

NETN-150 Introduction to Numerical Control**Registration #0812-150**

This course provides students with information regarding careers in computer-assisted machining. Activities include field trips, career information, and instructional demonstrations. Hands-on experiences include the fundamentals of cutting tools, programming for part making, and demonstrations of machine tools. (NETT-135)

Class 1, Lab 2, Credit 2 (S)

NETN-151 Numerical Control I**Registration #0812-151**

This course introduces students to computer-controlled machine tools. Students develop the skills required to program a machine, using several canned cycles, and to write programs that include point-to-point, linear, and circular interpolation operations. (NETT-134, NTMM-152)

Class 4, Lab 3, Credit 4 (W)

NETN-152 Numerical Control II**Registration #0812-152**

Students use on-line computers to prepare and verify programs. Students are introduced to advanced concepts through computer numerical control programming of a CNC milling machine. (NETN-151)

Class 4, Lab 3, Credit 4 (S)

NETN-253 Numerical Control III**Registration #0812-253**

This course introduces students to computer numerical control. Topics covered include programming, set-up, and operation of machining and turning centers with industrial applications. Programming with manual data input, basic graphics, and machine language is emphasized. Safety is stressed throughout the course. (NETN-152)

Class 4, Lab 3, Credit 4 (S)

NETT-100 Career Exploration:**Registration #0813-100****Manufacturing Processes**

This course provides students with information regarding a career in manufacturing processes. Activities may include field trips, hands-on experiences, career information presentations, and interaction with graduates of the program and professionals in the field. These experiences help students understand work activities, conditions, and settings.

Lab 3, Credit 1 (F, W, S)

NETT-101 Basic Drafting I**Registration #0813-101**

This course provides instruction in the principles and techniques of basic drafting for students in other technical programs. The emphasis is on understanding how drawings are made and used in industry. (NTMM-142)

Lab 6, Credit 2 (F)

NETT-102 Basic Drafting II**Registration #0813-102**

This course is a continuation of Basic Drafting I and is designed for students who desire or need greater depth of knowledge of drafting in industry. Topics include auxiliary views, sections, applied mathematics, and isometric and pictorial drawings with greater attention to drawing quality. (NETT-101, NTMM-150)

Lab 6, Credit 2 (W)

NETT-131,132,133 Manufacturing Processes I, II, III**Registration #0813-131,132,133**

Students develop the basic skills necessary to use traditional machine tools. Laboratory instruction simulates an industrial environment. Emphasis on safety in the operation of machines is an integral part of the courses. (NTMM-140 for NETT-131; NETT-131 for NETT-132; NETT-132 for NETT-133)

Class 1, Lab 8, Credit 4

(NETT-131, F; NETT-132, W; NETT-133, S)

NETT-134,135,136 Manufacturing Processes IV, V, VI**Registration #0813-134,135,136**

Students apply the theory associated with the set-up and operation of lathes, milling machines, drill presses, grinders, and bench operations. Students also are introduced to non-traditional machining. Greater emphasis is placed on accuracy and tolerance of machine parts. Safety is stressed throughout all courses. (NETT-133 for NETT-134; NETT-134 for NETT-135; NETT-135 for NETT-136)

Class 1, Lab 8, Credit 4

(NETT-134, F; NETT-135, W; NETT-133, S)

NETT-139,140 Blueprint Reading I, II**Registration #0813-139,140**

Students develop the skills necessary to read and interpret prints of engineering drawings of details and assemblies. (NTMM-141 for NETT-139; NETT-139 for NETT-140)

Class 1, Lab 3, Credit 2 (NETT-139, F; NETT-140, W)

NETT-151 Industrial Materials**Registration #0813-151**

This course introduces students to the many materials used in industry and the reasons why the final cost of producing a part is influenced by material selection. Metals, plastics, and ceramics are covered from the perspective of physical, mechanical, and dimensional properties. (NETT-134)

Class 3, Credit 3 (W)

NETT-152 Manufacturing Analysis**Registration #0813-152**

This course introduces students to manufacturing concepts. Students learn about production, management, and sales. The text and class discussions focus on problem solving and industrial operations. (NETT-134)

Class 3, Credit 3 (S)

NETT-153 Welding I**Registration #0813-153**

Students learn about basic oxyacetylene and shielded metal arc welding processes as well as how to set up and operate equipment properly. Safety rules pertaining to welding are emphasized. (NETT-134)

Lab 4, Credit 2 (W)

NETT-154 Precision Measurement**Registration #0813-154**

Students develop the skills necessary to measure to the highest tolerances commonly used in industry. They measure parts or groups of parts using industrial methods and equipment. Analysis of measurements and problem solving are stressed. (NETT-132)

Class 1, Lab 3, Credit 2 (S)

NETT-155 Welding II**Registration #0813-155**

Students develop skills in gas tungsten arc welding, gas metal arc welding, and resistance welding. The course emphasizes proper operation of equipment and related safety measures. (NETT-153)

Lab 4, Credit 2 (S)

NETT-237 Advanced Machining and Processes**Registration #0813-237**

This course introduces students to advanced-level machining and non-traditional processes. Students develop additional skills in tool-room grinding and are introduced to electrocharge machining and heat treatment of steels. Safety is stressed throughout the course. (NETT-136)

Class 1, Lab 8, Credit 4 (F)

NETT-256 Advanced Precision Measurement**Registration #0813-256**

This course introduces students to advanced-level precision measuring equipment and methods of operation. Students develop additional skills in the use of optical and computer-programmed measuring equipment. (NETT-136)

Class 2, Lab 2, Credit 3 (W)

NETT-260 Senior Seminar**Registration #0813-260**

This course provides exiting manufacturing processes students with a structured forum for discussions with program faculty members about employee relations and ethics, industrial employment trends, apprentice programs, and continued technical skills development. (NETT-136)

Class 2, Credit 1 (S)

NETT-299 Co-op Work Experience**Registration #0813-299**

Credit 0 (Su)

NETT-399 Independent Study**Registration #0813-399**

Credit Variable

Medical Laboratory Technology

NTSB-107 MLT Biology I Registration #0814-107

This course is a preparatory program for students interested in pursuing the medical laboratory technology program. Principles of inorganic and organic chemistry as they relate to biology are studied. The metric system, cell theory, cellular transport mechanisms, mitosis, meiosis, and nucleotides are among the topics treated. Laboratory activities include the microscopic study of plant and animal cells, the performance of experiments related to concepts learned during class sessions, and additional activities that emphasize the application of the scientific method.

Class 4, Lab 4, Credit 4 (F)

NTSB-108 MLT Biology II Registration #0814-108

This course is a continuation of MLT Biology I. It is designed to introduce students to principles of biochemistry: the synthesis and metabolism of carbohydrates, proteins, and lipids; DNA; and ATP. The laboratory program is designed to reinforce principles and concepts learned during class sessions. (NTSB-107)

Class 4, Lab 4, Credit 4 (W)

NTSB-109 MLT Biology III Registration #0814-109

This course is a continuation of MLT Biology II. The principles of general genetics, anatomy, physiology, histology, hematology, and microbiology are studied in this segment of the biology program. Laboratory activities provide students with opportunities to apply principles learned in class and to acquire the basic and transitional skills needed for the medical laboratory technology program. (NTSB-108)

Class 4, Lab 4, Credit 4 (S)

NTSC-115 MLT Chemistry I Registration #0815-115

This course is for students preparing to pursue the medical laboratory technology program. The course includes an introduction to exponential notation, measurement, the fundamental laws and concepts of matter and energy, formula writing, chemical bonding, and the mole concept. Laboratory work includes general techniques of metric measurement, density, physical properties, and evidence of chemical reactions. Introduction to radiochemistry, volume, temperature-pressure relationships of gases, reactivity of metals, and factors that affect reaction rates are measured qualitatively.

Class 4, Lab 4, Credit 4 (F)

NTSC-116 MLT Chemistry II Registration #0815-116

This is a continuation of MLT Chemistry I. Solubility, concentration of solutions, calculations involving acid-base titrations, and pH are covered. Introduction to organic chemistry begins with hydrocarbon nomenclature. Discussion of the alcohols, phenols, ethers, aldehydes, and ketones as well as organic acids and their derivatives are included. Laboratory experiences related to these topics focus on the various methods of pH measurement and the use of indicators, including control of acidity through use of buffers and analysis of the acid and alkali content of some consumer products. Chemical and physical properties of some organic compounds are examined, including alcohols, phenols, mercaptans, aldehydes, ketones, carboxylic acids, and esters. (NTSC-115)

Class 4, Lab 4, Credit 4 (W)

NTSC-117 MLT Chemistry III Registration #0815-117

This is a continuation of MLT Chemistry II. This part of the chemistry program lays the foundation for the relationship between chemistry and living organisms. Topics include the amines, carbohydrates, and lipids as well as amino acids and proteins. Description of the structure and function of nucleic acids, vitamins, and hormones bring together the interrelationships of biochemical reactions. Laboratory procedures include preparation, identification, and qualitative tests for the amines, amides, carbohydrates, triglycerides, and amino acids. Preparation and examination of aspirin, nylon, and soaps, and analysis of a peanut conclude this portion of the course. If time permits, students may explore instrumental analysis involving use of spectrophotometers and gas chromatography. (NTSC-116)

Class 4, Lab 4, Credit 4 (S)

NTSC-215 Introduction to College Chemistry I Registration #0815-215

This course is for students enrolled in programs requiring review or preparation for College of Science chemistry courses. The course includes principles of measurement, composition of matter, energy changes, behavior of gases, atomic structure, and bonding. Laboratory work includes experiments related to topics covered. (Math completion or concurrent registration in NTMM-152)

Class 4, Lab 4, Credit 4 (F)

NTSC-216 Introduction to College Chemistry II Registration #0815-216

This is a continuation of Introduction to College Chemistry I. Solutions and equilibrium principles are studied. Also included are stoichiometric solution calculations involving ionization and solubility, product constants, and acid-base pH calculations. Laboratory work includes qualitative analysis of common cations and anions. (NTMM-152, NTSC-215)

Class 4, Lab 4, Credit 4 (W)

NTSC-217 Introduction to College Chemistry III Registration #0815-217

This course provides an introduction to quantitative analysis utilizing both gravimetric and volumetric techniques. Topics include evaluation of analytical data, gravimetric analysis, acid-base titrations, redox titrations, and principles of colorimetry and spectrophotometry. (NTSC-216)

Class 4, Lab 4, Credit 4 (S)

NTSL-101,102 Anatomy/Physiology and Disease I, II Registration #0816-101,102

These courses provide students with the fundamentals of human anatomy with emphasis on physiology and related diseases. Students perform a variety of experiments and dissections in the laboratory portion of the courses.

Class 2, Lab 2, Credit 4 (NTSL-101, F; NTSL-102, W)

NTSL-105 Introduction to Medical Parasitology Registration #0816-105

This course introduces students to the host/parasite relationship, life cycle, and identification procedures for intestinal and arial protozoa, nematodes, cestodes, and trematodes. Classes include discussion of diseases and use of preserved microscopic slides, 35mm captioned slides, and laboratory preparation.

Class 1, Lab 2, Credit 2 (S)

NTSL-111 Basic Histology**Registration #0816-111**

Theory and practice in tissue preparation for paraffin techniques are presented. Laboratory techniques include preparation of solutions, stains, sectioning, slide mounting, and staining of various tissues. Students develop skills in the operation, use, and care of histologic instruments.

Class 12, Credit 6 (S)

NTSL-115 Electrocardiography**Registration #0816-115**

This course emphasizes use of instrumentation for selecting and monitoring tracings of common heart maladies.

Class 4, Credit 2 (W)

NTSL-121 Urinalysis**Registration #0816-121**

This course provides theory and practice in the estimation of urinary constituents, microscopic examination, and additional tests of clinical significance.

Class 4, Credit 2 (F)

NTSL-122 Hematology**Registration #0816-122**

This course is a study of routine blood tests, including white count, red count, hematocrit, hemoglobin, sedimentation rate, differential count, and the calculations of the hemacytometer. Emphasis also is placed on recognition of normal and abnormal cellular elements of blood.

Class 8, Credit 4 (F)

NTSL-123 Advanced Hematology**Registration #0816-123**

This course provides instruction and practice in automated methods of cell counting quality control, red cell description, reticulocyte counts, and test procedures in coagulation. The course emphasizes the correlation between laboratory work and diseases, such as anemia and leukemia, as well as bleeding and coagulation disorders. (NTSL-122)

Class 9, Credit 5 (W)

NTSL-131 Microbiology I**Registration #0816-131**

This course is an introduction to the study of microscopic organisms such as viruses, bacteria, yeast, protozoa, fungi, and algae. The course also includes clinical procedures for the study of common disease-causing organisms with concentration in bacteriology. Techniques in the laboratory include media preparation, sterilization, culturing, mounting, staining, agglutination, antimicrobial susceptibility testing, and biochemical reactions.

Class 9, Credit 5 (S)

NTSL-132 Immunology/Serology**Registration #0816-132**

The nature of immunity, the basic principles of the immune system, immunoassay, immunopathology, histocompatibility, and oncoimmunology are among the topics considered in this course. A variety of routine and special immunological procedures are learned during laboratory sessions.

Class 2, Lab 3, Credit 3 (W)

NTSL-133 Blood Banking**Registration #0816-133**

The theory of blood banking and routine procedures is presented in this course. Emphasis is placed on quality control, ABO grouping, sub-grouping, Rh testing, antiglobulin testing, antibody screening, antibody detection and identification, transfusion reactions, compatibility testing, erythroblastosis fetalis, preparation and storage of blood components, and recordkeeping.

Class 2, Lab 3, Credit 3 (S)

NTSL-140 Electron Microscopy**Registration #0816-140**

Electron optics and the mechanics of the electron microscope are studied prior to any work on the electron microscope. The principles of specimen preparation, fixation, embedding, microtomy, staining, and photographic processing are studied in depth. The course grade is based on the quality of final products. (NTSB-109, NTSL-111)

Class 2, Lab 5, Credit 3 (F, W, S)

NTSL-200 MLT Co-op Seminar**Registration #0816-200**

This course provides students with knowledge and skills to prepare them for a successful co-op experience, including guidelines on professional ethics, employee-employer responsibilities, communication skills, and interpersonal relationship development. Class activities include discussion groups, panel presentations, hospital visitations, lectures, and the preparation of co-op materials. (Completed first year in program)

Class 2, Credit 1 (W)

NTSL-201,202,203 Clinical Chemistry I, II, III**Registration #0816-201,202,203**

This three-quarter sequence provides theory and practice in the quantitative and qualitative analyses of physicochemical parameters. The sequence includes fundamental concepts of clinical analysis, theory and practical application of clinical instrumentation, and the relationship of clinical analysis to methodology, disease, and the diagnostic process. The winter and spring quarters include a hospital affiliation in clinical instrumentation twice weekly. (NTSL-201 for NTSL-202; NTSL-202 for NTSL-203)

Class 12, Credit 6 (NTSL-201, F)

Class 9, Credit 5 (NTSL-202, W; NTSL-203, S)

NTSL-211 Histology II**Registration #0816-211**

This course is a continuation of Basic Histology with emphasis on histochemistry, special stains, and tissue preparation techniques. (NTSL-111)

Class 12, Credit 6 (W, S)

NTSL-224 Laboratory Simulation**Registration #0816-224**

This course is a review and summary of all specialties included in the total medical laboratory technology program. Students rotate into all departments in the clinical laboratory environment. Students meet one hour per week with medical laboratory technology faculty members on campus. The remaining 12 hours each week are spent on rotation in an affiliated hospital or clinical laboratory under supervised conditions.

Class 1, Lab 6, Credit 3 (S)

NTSL-232 Microbiology II**Registration #0816-232**

This course is an in-depth study of medical bacteriology and the related diseases. Theory and practice are provided in specimen collection, culturing, staining, media preparation and selection, normal flora, identification procedures for disease-producing organisms, susceptibility testing, agglutination reactions, and reporting results. (NTSL-131)

Class 12, Credit 6 (F)

NTSL-233 Microbiology III**Registration #0816-233**

This course is a continuation of Microbiology II, with an emphasis on special techniques for anaerobic organisms, mycobacteriology, mycology, and virology. The theory portion of the course includes the study of diseases and their symptoms. This course takes place on campus and in affiliated hospital laboratories. (NTSL-232)

Class 9, Credit 5 (W)

NTSL-299 Co-op Clinical Experience**Registration #0816-299**

Credit 0 (Su)

NTSL-399 Independent Study**Registration #0816-399**

Credit Variable

Medical Record Technology

**NTSR-100 Career Exploration:
Registration #0819-100 Medical Record Technology**

This course provides a general overview of experiences related to the medical record profession. It is offered to students who want to explore their interest in selecting medical record technology as a career. Students enrolled in the course typically have not attended the Summer Vestibule Program (SVP) or attended SVP but did not sample medical record technology at that time.

Class 2, Credit 1 (S)

NTSR-106 Biology I**Registration #0819-106**

This is the first in a three-quarter series of courses. Topics covered in this course are basic atomic structure, molecular biology, cellular structure and function, cellular respiration, DNA structure, protein synthesis, mitosis, and the relationship of bacteria and viruses to disease. Laboratory activities involving microscopic and macroscopic observations of prepared and live specimens are performed to supplement classroom lectures and discussion. Study skills development and refinement are emphasized.

Class 4, Lab 2, Credit 4 (F)

NTSR-107 Biology II**Registration #0819-107**

This course concentrates on human biology. Topics covered include hematology and the digestive, excretory, cardiovascular, respiratory, immune, and nervous systems. Laboratory activities, including the use of prepared specimens, supplement classroom lectures and discussion. Medical terminology is introduced through discussion of exemplary pathological conditions. (NTSR-106)

Class 4, Lab 2, Credit 4 (W)

NTSR-108 Biology III**Registration #0819-108**

The final course in this sequence continues to focus on human biology. Topics covered are the endocrine system, reproduction, embryology, meiosis, and cellular and human genetics. Basic medical terminology related to each topic is discussed. Laboratory activities include dissecting a pig embryo as well as reviewing the anatomy of all body systems studied in this course and Biology II. (NTSR-107)

Class 4, Lab 2, Credit 4 (S)

NTSR-111,112 Anatomy/Physiology and Disease I, II**Registration #0819-111,112**

This is a two-quarter, in-depth study of human anatomy and physiology using a systematic approach to basic disease processes. Emphasis is placed on related medical terminology and clinical procedures. (NTSR-111 for NTSR-112)

Class 6, Credit 4 (NTSR-111, F; NTSR-112, W)

NTSR-141 Medical Record Science I**Registration #0819-141**

The career in medical record technology is introduced through discussion and laboratory practice. Topics covered are the medical record content and record numbering and filing systems. Procedures in the laboratory include filing, admissions, chart assembly and analysis, and chart deficiencies.

Class 9, Credit 5 (F)

NTSR-142 Medical Record Science II**Registration #0819-142**

This course includes coding rules and laboratory experience in practical application of coding diseases and operations. (NTSR-141)

Class 9, Credit 5 (W)

NTSR-143 Medical Record Science III**Registration #0819-143**

This unit uses the content of patient records to continue the practical experience in manual and automated coding. Students learn manual and computerized abstracting of statistical data as well as how to compute and interpret health statistics; they also learn to interpret computerized statistical reports. (NTSR-142)

Class 9, Credit 5 (S)

NTSR-145 Health Care Organization and Structure**Registration #0819-145**

This course gives an overall introduction to health care delivery systems. It includes the composition, responsibilities, and functions of the administrative staff, health care providers, and allied health departments and professionals. Students discuss the purposes of and responsibility for the health record.

Class 5, Credit 4 (S)

NTSR-161,162,163 Medical Terminology I, II, III**Registration #0819-161,162,163**

These are the first three courses in a five-quarter sequence. Etymology, definition, pronunciation, spelling, and correct utilization of medical terms are stressed. Common medical terms are discussed in relation to disorders and diseases of each body system. (NTSR-161 for NTSR-162; NTSR-162 for NTSR-163)

Class 3, Credit 3 (NTSR-161, F; NTSR-162, W; NTSR-163, S)

NTSR-244 **Medical Record Science IV**
Registration #0819-244

Students study data regulations and activities associated with health information control and quality as well as legal aspects of medical records. (NTSR-243)

Class 9, Credit 5 (F)

NTSR-245 **Medical Record Science V**
Registration #0819-245

This course includes management and supervision of health information departments as well as health facilities/records in long-term care, ambulatory care, home care, hospice, and mental health care. (NTSR-244)

Class 9, Credit 5 (W)

NTSR-246 **Medical Record Science VI**
Registration #0819-246

This final course includes clinical affiliations in long-term, ambulatory, and mental health care at local facilities; cancer registry with abstracting of cases; and review/evaluation of medical record technology knowledge and skills. (NTSR-245)

Class 9, Credit 5 (S)

NTSR-251, 252 **Pathophysiology I, II**
Registration #0819-251,252

This two-quarter sequence combines knowledge of human physiology with disease processes. The etiology, pathological mechanisms, characteristic symptoms, clinical manifestations, and diagnostic and therapeutic procedures of common diseases are presented. (NTSR-112 or equivalent for NTSR-251; NTSR-251 for NTSR-252)

Class 3, Credit 3 (NTSR-251, W; NTSR-252, S)

NTSR-264 **Medical Terminology IV**
Registration #0819-264

This is a review of terms encountered in Medical Terminology I, II, and III supplemented by secondary vocabulary selected from the same topics. Etymology, definition, spelling, pronunciation, and correct utilization of medical terms are reinforced. (NTSR-163)

Class 3, Credit 3 (F)

NTSR-267 **Medical Terminology V**
Registration #0819-267

In this course, terms related to disorders, diagnosis, treatment, and surgical procedures are selected from a variety of specialty topics. These topics include aging, microbiology, oncology, ontology, pharmacology, psychiatry, radiology, nuclear medicine, and radiation therapy. Etymology, definition, spelling, pronunciation, and correct utilization of medical terms are reinforced. (NTSR-264)

Class 3, Credit 3 (S)

NTSR-299 **Co-op Work Experience**
Registration #0819-299

Credit 0 (Su)

Ophthalmic Optical Finishing Technology

NTSF-105 **Introduction to Optical**
Registration #0827-105 **Finishing Technology I**

This course emphasizes a continuation of sampling in optical finishing technology, including an overview of the career, admissions and graduate requirements, sources of employment, and expectations of students in the program. Students learn the titles, roles, and responsibilities of vision care personnel, including the M.D., O.D., dispensing optician, and optical finishing technologist. Laws and regulations governing the ophthalmic laboratory industry are introduced.

Class 2, Credit 2 (F)

NTSF-106 **Introduction to Optical**
Registration #0827-106 **Finishing Technology II**

This course teaches the function and use of optical laboratory equipment necessary to the production of single-vision eyewear. Students learn the basic concepts of sphere, cylinder, axis, and geometric center as well as how to fabricate single-vision uncut lenses into finished eyewear.

Class 2, Credit 2 (W)

NTSF-107 **Introduction to Optical**
Registration #0827-107 **Finishing Technology III**

This course introduces the concept of writing functions of given vertometer parts. Students learn the process of writing step-by-step sequential procedures for equipment operation. They practice determining lens powers from vertometer readings and calculating decentration from given prescription information. They also learn the meanings of various optical terms found on prescription forms. (NTSF-106)

Class 2, Credit 2 (S)

NTSF-111 **Optical Finishing Technology Math I**
Registration #0827-111

This course focuses on the rules of transposition, including transposition of lens powers. Students learn to apply mathematic functions, solving for binocular and monocular P.D.s, near-vision prescriptions, and bifocal segment height and inset. The concepts of plus and minus cylinder prescription powers are discussed, and definitions and determinations of lens powers from given base curves, cross curves, and inside curves are taught. (NTMM-140)

Class 4, Credit 3 (F)

NTSF-112 **Optical Finishing Technology Math II**
Registration #0827-112

This course teaches students how to select and determine appropriate base curves, cross curves, and inside curves of given lens powers. Students learn mathematic formulas used in determining effective diameter, smallest lens blank, and prism. They also learn to apply mathematic functions related to vertometer power readings, heat treat times, and lens measurer readings. (NTMM-140, NTMM-141, NTSF-111)

Class 4, Credit 3 (W)

NTSF-115 **Prescription Analysis I**
Registration #0827-115

This course teaches students the meaning of various optical terms found on prescription forms. Students learn what information should be on a complete prescription and how to analyze single-vision and multifocal prescriptions for laboratory processing.

Class 4, Credit 3 (F)

NTSF-116 Prescription Analysis II**Registration #0827-116**

Students continue to analyze and write ophthalmic prescriptions in various forms with an emphasis on ortholite plastic, cataract, and trifocal prescriptions. (NTSF-115)

Class 4, Credit 3 (W)

NTSF-117 Lens Design**Registration #0827-117**

This course teaches students how to design lens systems based on specific optical factors such as frame selection, lens material, lens thickness, index of refraction, size of lens, lens power, blank manufacturer, and cosmetic appeal. Students learn trade names of lenses, percentages of lens transmission multifocal segment placement, and occupational and recreational lens forms. (NTSF-111, NTSF-112)

Class 5, Credit 3 (S)

NTSF-121 Optical Finishing Techniques I**Registration #0827-121**

This course teaches students the techniques of using the vertometer, layout marker, heat treat units, and pattern maker, automatic edging machines, and development of hand-beveling skills. (NTSF-112, NTSF-116, NTSF-162)

Class 6, Credit 5 (W)

NTSF-122 Optical Finishing Techniques II**Registration #0827-122**

This course teaches students how to block and edge lenses using a variety of automatic edging machines. Students learn how to edge given lenses with a Vee bevel, rimless bevel, and hide-a-bevel. Edging concepts and operational techniques are emphasized. (NTSF-121)

Class 6, Credit 5 (S)

NTSF-123 Optical Finishing Techniques III**Registration #0827-123**

This course teaches students the use of the vertometer and various layout markers to prepare lenses for edging. Students learn to process uncut ophthalmic lenses according to ANSI standards. (NTSF-122)

Class 12, Credit 6 (S)

NTSF-161 Optical Finishing Terminology I**Registration #0827-161**

This course emphasizes comprehension, spelling, and application of terminology related to the optical profession, including the laboratory environment, function and disorders of the eye, and optics/lens characteristics.

Class 5, Credit 3 (F, W, S)

NTSF-162 Optical Finishing Terminology II**Registration #0827-162**

This course emphasizes the comprehension, spelling, and application of terminology related to the vertometer, lensometer, pattern maker, heat treat units, and ceramic and diamond head beveling wheels. (NTSF-161)

Class 5, Credit 3 (F, W, S)

NTSF-163 Optical Finishing Terminology III**Registration #0827-163**

This course emphasizes the comprehension, spelling, and application of terminology related to lens tolerances, functions, procedures, operation and troubleshooting of selected auto edge machines, layout markers, and blocking systems. Students complete a paper describing the procedures used in making prescription eyeglasses. (NTSF-162)

Class 5, Credit 3 (F, W, S)

NTSF-224 Optical Finishing Techniques IV**Registration #0827-224**

Concepts taught in Optical Finishing Techniques III are further developed, with an emphasis on layout techniques, including multifocal and specialized vocational lens systems. Students learn to identify metal frame types by manufacturer. Procedures for lens insertion, frame alignment, and proper use of assembly-alignment tools are emphasized. (NTSF-123)

Class 9, Credit 5 (F)

NTSF-225 Optical Finishing Laboratory**Registration #0827-225****Simulation I**

This course provides practice in the total processing of actual eyeglass prescriptions from uncut stage through completion and final inspection. Students practice various methods of assembling lenses into plastic (Zylonite) frames, symmetrical alignment of the finished product, and repair and restoration techniques for damaged or distorted plastic frames. Students rotate positions to demonstrate competence in all phases of operation.

Class 9, Credit 5 (W)

NTSF-226 Optical Finishing Laboratory**Registration #0827-226****Simulation II**

This course teaches the techniques of rimless mounting, notching, drilling, grooving, frame repair (soldering), lens dyeing, use of Shave computer, and operation of Kirk Chemical Unit. Students select frame and lens for layout and processing to finished product. (NTSF-225)

Class 9, Credit 5 (S)

NTSF-241 Management of Optical**Registration #0827-241****Stockroom Procedures**

In this course, students learn to identify the function and job responsibilities of stockroom personnel, suppliers of laboratory products, consumers (customers) of laboratory products, and flow of operations. Emphasis is on basic ophthalmic frames, receipt of orders, picking stock, stock check-in, and related administrative procedures.

Class 6, Credit 4 (F)

NTSF-243 Optical Finishing Inspection**Registration #0827-243****and Correction**

Students evaluate finished prescription orders as final inspectors, comparing all optical and mechanical details with written specifications. Emphasis is placed on accuracy, quality of workmanship, and the inspector's ability to recommend and produce any changes that may be necessary. Study will include acceptable tolerance levels and prism beveling.

Class 5, Credit 3 (S)

**NTSF-251 Professional Optic Seminar
Registration #0827-251**

In this seminar, professionals from Rochester's ophthalmic community discuss their roles in the complex field of visual care. They offer valuable background information on the many kinds of services, instrumentation techniques, and technologies that comprise the unending efforts to maintain and improve the quality of visual acuity.

Class 2, Credit 2 (W)

**NTSF-299 Co-op Work Experience
Registration #0827-299
(NTSF-101)**

Credit 0 (Su)

**NTSF-399 Independent Study
Registration #0827-399**

Credit Variable

Technical Mathematics

**NTMM-120 Introduction to College Mathematics
Registration #0817-120**

This course improves students' fundamental skills in mathematics. Topics covered emphasize the use of language as it relates to basic mathematical computations. The use of calculators is stressed.

Class 3, Credit 3 (F)

**NTMM-140 Fundamentals of College Mathematics I
Registration #0817-140**

This course is an introduction to the application of mathematics as a problem-solving tool. Emphasis is placed on measurement, use of proportion, approach to verbally expressed problems, and computation with and without a calculator. Elementary topics from geometry and statistics are included. (NTMM-120 or approval of the offering department)

Class 5, Credit 3 (F, W)

**NTMM-141 Fundamentals of College Mathematics II
Registration #0817-141**

This course deals with the application of the basic tools of algebra, geometry, and trigonometry as solutions to problems. The course deals with the concepts of an algebraic variable as well as techniques for solving simple equations and inequalities. Simple applications of geometric principles are taught as well as elementary applications of right-angle trigonometry. Attention also is paid to graphic display of data. (NTMM-140 or approval of the offering department)

Class 5, Credit 3 (W, S)

**NTMM-142 Fundamentals of College Mathematics III
Registration #0817-142**

This course deals with the application of a variety of algebraic and geometric techniques to problem solving. Emphasis is placed on the concepts of function and relation and on graphing linear relations. Concepts of area and volume, powers and radicals, and geometry on the coordinate plane are included as well as an introduction to the use of vectors. (NTMM-141 or approval of the offering department)

Class 5, Credit 3 (F, S)

**NTMM-150 Integrated College Mathematics I
Registration #0817-150**

Topics from algebra, geometry, trigonometry, and other areas of mathematics are explored. Relations, functions, geometric loci, loci on the coordinate plane, algebraic functions, graphing, and right-angle trigonometry are studied. Calculators are used extensively as aids in problem solving. (NTMM-142 or approval of the offering department)

Class 5, Credit 4 (F, W)

**NTMM-151 Integrated College Mathematics II
Registration #0817-151**

Additional topics from algebra, geometry, trigonometry, and other areas of mathematics, including statistical concepts, are explored. Inequalities, graphing, polynomial and rational functions, geometry of the circle, trigonometric identities, measurement error, fractional exponents, and exponential functions are studied. Calculators are used extensively as aids in problem solving. (NTMM-150 or approval of the offering department)

Class 5, Credit 4 (W, S)

**NTMM-152 Integrated College Mathematics III
Registration #0817-152**

Additional topics from algebra, geometry, trigonometry, and other areas of mathematics, including concepts from formal logic, are explored. Inverse relations, logarithms, truth statements, constructions, congruence, introduction to formal mathematical proofs, areas of geometric figures, law of sines, law of cosines, vectors, and complex numbers are studied. Calculators are used extensively as aids in problem solving. (NTMM-151 or approval of the offering department)

Class 5, Credit 4 (F, S)

**NTMM-163 Mathematics for Data Processing
Registration #0817-163**

This course provides basic mathematical skills relevant to the field of data processing. The course emphasizes arithmetic operations in various number systems and logical formulation of problems.

Class 3, Credit 3 (F, W, S)

**NTMM-170 Medical Laboratory Mathematics
Registration #0817-170**

This course provides mathematical skills supporting medical laboratory procedures. Topics taught include use of electronic calculators, use of logarithms for computation, conversion between English and metric unit systems, temperature conversions, and calculations with molar and percentage solutions.

Class 3, Credit 3 (S)

**NTMM-210 Advanced Mathematics II
Registration #0817-210**

Advanced topics from statistics, pre-calculus, and trigonometry are explored. Techniques of data organization and description; properties of real numbers; and functions, including circular functions, are studied. A scientific calculator is used as an aid in problem solving.

Class 4, Credit 3 (F, W)

NTMM-211 **Concepts of Calculus**
Registration #0817-211

Linear structures and advanced topics from trigonometry and pre-calculus are explored. Vectors, matrices and complex numbers, transformations, trigonometric identities, inverse trigonometric functions, and polar graphing are studied. A graphing calculator and the computer language APL are used to explore mathematical concepts and to demonstrate applications of technology to problem solving in mathematics.

Class 4, Credit 3 (W, S)

Technical Physics

NTSP-100 **Technical Physics I**
Registration #0818-100

This course is required for all engineering technologies students as well as for students preparing for study in the colleges of Engineering and Science. The course provides background in measurement techniques and use of metrics, vector problem solutions, rectilinear motion, dynamic and static forces, Newton's Laws of Motion, work, energy power, energy conservation laws, torque, and Law of Moments. (NTMM-141)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-125 **Construction Technology Physics II**
Registration #0818-125

The following concepts are taught in this career-integrated course: heat, temperature, heat transfer, linear and volumetric expansion and contraction, insulation materials, specific heat capacities, calorimetry, fusion and vaporization, energy costs, electrical resistance, DC circuits, fuses and circuit breakers, Ohm's Law, electrical metering, electrical power and cost of electricity, transformers, properties of light, reflection and refraction, Snell's Law, photometry and lighting, properties of sound, and acoustical principles. (NTSP-100)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-126 **Construction Technology Physics III**
Registration #0818-126

A variety of topics are covered in this final course: work; friction; machines; physical properties of matter, stress, and strain; Young's Modulus; Hooke's Law; concurrent forces; vector analysis; linear equilibrium; density and specific gravity; fluid pressure; Pascal's Principle; fluid dynamics; Bernoulli's Equation; Torricelli's Law; viscous drag; and pressure and velocity in parallel and series pipe systems. (NTSP-125)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-135 **Technical Physics II**
Registration #0818-135

This is the second course required for industrial drafting, electro-mechanical technology, and College of Science students. Course topics include magnetism, electrostatics, magnetic and electrostatic forces, static and current electricity, electromagnetic induction, AC and DC motors, electrical meters, photoelectric effect, potential difference and voltage drop, electrical resistance and resistivity, resistor code, electrical circuits, fuses and circuit breakers, Ohm's Law, use of electrical meters, Gauss' Law, principles of capacitors and circuitry, dielectrics, electrical power, and cost of electricity. (NTSP-100)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-136 **Technical Physics III**
Registration #0818-136

This course includes the following topics: Kirchoff's Voltage and Current Laws, mesh circuit problem solutions using the determinant and superposition methods, current division and voltage division rules for circuits, Wheatstone Bridge, mutual and self inductance, Oersted Fields, Lenz's Law, inductance in circuits, electrical transformers, alternating current, rms current and voltage in AC circuits, inductive and capacitive circuits, electrical resonance, and power factor. (NTSP-135)

Class 4, Lab 1, Credit 3 (F, W, S)

NTSP-168 **Optical Finishing Physics**
Registration #0818-168

This course involves the study of light, reflection, and refraction. These principles are applied to the study of the behavior of spherical and piano mirrors, prisms, and lenses. The usefulness and application of dioptric power, the lensmaker's equation, image and object dimensions, and focal length measurements are addressed. Also included are basic optical instruments and a study of the electromagnetic spectrum. Emphasis is placed on geometrical (ray) optics. The course includes a comprehensive laboratory experience that supplements and closely follows classroom instruction. (NTMM-141)

Class 4, Lab 1, Credit 3 (W, S)

NTSP-399 **Independent Study**
Registration #0818-399

Credit Variable

School of Visual Communications

Applied Art

NDAR-100 **Career Exploration: Applied Art**
Registration #0849-100

This course is designed to help students collect the information necessary to make appropriate decisions about a possible career in the art field. Students have opportunities to explore their interests and skills in art through structured hands-on experiences with art tools and equipment. Emphasis is on increasing students' awareness of their art skills, applied art career options, working conditions, salaries, and job responsibilities.

Studio 2, Credit 1 (F, W, S)

NDAR-111,112,113 **Basic Design I, II, III**
Registration #0849-111,112,113

This course sequence is an introduction to the concepts and elements of design as they relate to a vocation in applied art. Emphasis is on exploration and analysis of all design principles such as point, line, shape, texture, space, and color as they apply to two- and three-dimensional forms. (NDAR-100 for NDAR-111; NDAR-111 for NDAR-112; NDAR-112 for NDAR-113)

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

NDAR-121,122,123 Basic Drawing I, II, III
Registration #0849-121,122,123

This is a fundamental course sequence that introduces students to various freehand drawing concepts, methods, and techniques. Emphasis is placed on eye-hand coordination, rendering techniques, one- and two-point perspective, and various drawing media. A variety of forms are used, including still life objects, architectural forms, and the human figure. (NDAR-100 for NDAR-121; NDAR-121 for NDAR-122; NDAR-122 for NDAR-123)

Lab 6, Credit 3 (F, W, S)

NDAR-141,142,143 Career Seminar I, II, III
Registration #0849-141,142,143

This course sequence provides experience in the development of a personal career plan in art and assists with the development of college survival skills. Students explore personal interests, aptitudes, art program opportunities, and college adjustment issues through presentations, field trips, discussions, and research of art careers. This course sequence emphasizes systematic decision making related to art careers.

Class 2, Credit 1 (F, W, S)

NDAR-151,152 Computer Graphic
Registration #0849-151,152 Systems I, II

This course sequence is an introduction to computer graphics systems. Emphasis is placed on learning how to use hardware and software for generating images and type and for file management. Specific computer-related vocabulary also is covered. In this course, students have hands-on experience using various types of hardware and software. (NDAR-100 for NDAR-151; NDAR-151 for NDAR-152)

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

NDAR-161,162,163 Media and Processes I, II, III
Registration #0849-161,162,163

The basic tools, materials, and equipment used in the professional applied art studio are introduced to students. Emphasis is placed on identification, vocabulary, maintenance, and correct use of media, mechanical tools, photostat equipment, and a variety of materials. (NDAR-100 for NDAR-161; NDAR-161 for NDAR-162; NDAR-162 for NDAR-163)

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

NDAR-231,232,233 Introduction to Typography I, II, III
Registration #0849-231,232,233

This sequence is a study of the use of typography in applied art: the origins of typographic form, type classifications, production processes, measurement systems, and type specification methods. Students gain experience in design, copy marking, planning formats, copyfitting, and using the computer as a composition tool. (NDAR-113, NDAR-123, NDAR-152, NDAR-163 for NDAR-231; NDAR-231 for NDAR-232; NDAR-232 for NDAR-233)

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

NDAR-241,242,243 Art Survey I, II, III
Registration #0849-241,242,243

These courses offer a survey of major historical developments in the visual arts as they relate to applied art. Students are introduced to research methods used in the field of art as the basis for design concept development.

Class 2, Credit 2 (F, W, S)

NDAR-258 Applied Art Photography
Registration #0849-258

This is an elective course in the use of photographic processes as they relate to the applied artist. Emphasis is on understanding and using the camera, black-and-white film processing, contact printing, and enlarging. Students practice darkroom procedures and methods for obtaining a basically well-crafted photographic image.

Class 4, Credit 2 (F, S)

NDAR-261, 262,263 Traditional/Electronic
Registration #0849-261,262,263 Layout I, II, III

This course sequence applies design concepts, principles, and methods developed in first-year courses. Students learn how to use both electronic and traditional methods to develop design solutions and produce accurate comprehensive layouts. Students receive hands-on experience using computer hardware and software related to page layout. Marker skills are taught. The development of creative thinking skills is stressed. Emphasis also is placed on practices and procedures evident in a professional art studio. (NDAR-113, NDAR-123, NDAR-163, NDAR-152 for NDAR-261; NDAR-261 for NDAR-262; NDAR-262 for NDAR-263)

Lab 6, Credit 3 (F, W, S)

NDAR-267 Three-Dimensional Applications
Registration #0849-267

This elective course extends basic concepts, principles, and methods as they apply to three-dimensional form. Emphasis is on material characteristics, tool/material processes, construction techniques, and basic model making.

Lab 3, Credit 2 (S)

NDAR-271,272,273 Production Methods I, II, III
Registration #0849-271,272, 273

Emphasis is placed on understanding printing methods used to produce black-and-white and color artwork. The creation and preparation of artwork, including color separation, are taught using both traditional hand skills and computers. Specific vocabulary related to reproducing artwork also is covered. (NDAR-113, NDAR-123, NDAR-163, NDAR-152 for NDAR-271; NDAR-271 for NDAR-272; NDAR-272 for NDAR-273)

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

NDAR-277 Air Brush/Retouching
Registration #0849-277

This elective course provides basic experience with the air brush as a tool for original art, retouching, and illustration. Emphasis is on care and maintenance, dyes, paints, masks, working surfaces, and a variety of working techniques. (NDAR-112, NDAR-122, NDAR-162)

Class 3, Credit 2 (F, S)

NDAR-280 Computer Illustration Methods
Registration #0849-280

This course provides students with advanced skills in the area of computer illustration. In the course, students learn how to use the advanced functions of black-and-white and color graphic software to create professional-quality renderings for print publication. (NDAR-113, NDAR-123, NDAR-152, NDAR-163)

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

NDAR-284 **Mechanical Perspective**
Registration #0849-284

Students learn the use of mechanical drawing methods for visualizing three-dimensional form in perspective. Experiences in this elective course include orthographic projection and one- and two-point perspective based on forms ranging from simple geometric solids to complex patterns. Emphasis is on mastery of basic methods for constructing a technically accurate drawing. (NDAR-121)

Class 3, Credit 2 (W)

NDAR-285 **Mechanical Drawing Methods**
Registration #0849-285

Students are introduced to mechanical processes for depicting three-dimensional forms on a flat surface. This elective course includes drawing methods, such as oblique and isometric, based on simple and complex forms. Emphasis is on translating the three-dimensional form into a technically accurate drawing. (NDAR-284)

Class 3, Credit 2 (S)

NDAR-287 **Drawing Applications**
Registration #0849-287

This is an advanced elective course refining freehand and technical drawing concepts, methods, and techniques developed in Basic Drawing I, II, and III. Emphasis is on development of advanced drawing skills, using various types of subject matter, media, and processes. (NDAR-123)

Class 3, Credit 2 (F)

NDAR-294 **Freehand Lettering**
Registration #0849-294

Students are introduced to the basic processes of freehand lettering. The emphasis of this elective course is on identification, care, and use of various lettering tools such as carpenter's pencil, speedball pen, and lettering brush. Use of basic methods of stroking, letterspacing, word spacing, linespacing, and rendering of both serif and sans serif letterforms are taught. (NDAR-161)

Class 3, Credit 2 (W)

NDAR-295 **Finished Lettering**
Registration #0849-295

This elective course is an introduction to the processes, tools, equipment, and methods for producing finished lettering for reproduction. Included are exercises designed to develop skills in rendering script, serif, sans serif, and decorative letterforms. (NDAR-294)

Class 3, Credit 2 (S)

NDAR-311,312 **Graphic Applications I, II**
Registration #0849-311,312

This is an advanced course sequence stressing layout, mechanical, and computer skills within the context of a professional studio environment. The courses involve practical work experience, with an emphasis on studio procedures, work habits, professional skills, and dealing with clients as well as refinement of individual portfolios. (NDAR-233, NDAR-263, NDAR-273, NDAR-280 for NDAR-311; NDAR-311 for NDAR-312)

Lab 10, Credit 5 (F, W, S)

NDAR-321,322,323 **Employment Seminar I, II, III**
Registration #0849-321,322,323

Students are oriented to the total working/living environment of the professional applied art field, with an emphasis on processes for securing and maintaining employment. Experiences include resume preparation, interviewing techniques, guest lectures, field trips, presentations, discussions, and personally directed job-seeking. (NDAR-233, NDAR-263, NDAR-273, NDAR-280 for NDAR-321; NDAR-321 for NDAR-322; NDAR-322 for NDAR-323)

Class 3, Credit 3 (F, W, S)

NDAR-330 **Graphic Applications/Portfolio Review**
Registration #0849-330

This course is applied art students' final professional preparation course prior to graduation. It includes practical work experience, interaction with clients, and involvement with all phases of studio production, including layout, mechanicals, and computer graphics. As part of this course, students must submit a portfolio of artwork for final review by a jury composed of department faculty members and professional artists. (NDAR-312)

Lab 10, Credit 5 (F, W, S)

NDAR-399 **Independent Study**
Registration #0849-399

Credit Variable

Photo/Media Technologies

NVPP-100 **Career Exploration:**
Registration #0851-100 **Photo/Media Technologies**

This course explores the photo/media field to help students make well-informed decisions regarding their college area of specialization. Students have opportunities to explore their interest in the field through hands-on experiences with photo/media equipment and tools. Opportunities are provided for students to increase their awareness of necessary photo/media skills, industries, program, and expectations of the photo/media technologies department. Technical areas of study include color negative printing, computer graphics, special effects slides, storyboards from 35mm slides, and video equipment.

Lab 2, Credit 1 (F, W, S)

NVPP-101 **Introduction to Photographic Printing**
Registration #0851-101

Students learn proper use of equipment and how to process, enlarge, and evaluate black-and-white prints. (Corequisites: NVPP-111, NVPP-121)

Lab 8, Credit 4 (F, W, S)

NVPP-102 **Black-and-White Printing**
Registration #0851-102

This course builds on previously learned basic printing skills. Students use a variety of negative sizes to develop more advanced skills in controlling print contrast and exposure. The making of a quality photographic print is emphasized. (Grade of C or better in NVPP-101, NVPP-111, NVPP-121)

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

NVPP-111 Introduction to Film Processing
Registration #0851-111

This course introduces and gives students practice techniques for processing and process control of black-and-white roll film. Emphasis is on consistency and high quality film processing through control of processing variables. (Corequisites: NVPP-101, NVPP-121)

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

NVPP-112 Film Processing
Registration #0851-112

This course extends the skills learned in Introduction to Film Processing. Various types and sizes of black-and-white films are used. Emphasis is placed on control and repeatability. (Grade of C or better in NVPP-101, NVPP-111, NVPP-121)

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

NVPP-121 Introduction to Cameras
Registration #0851-121

This course introduces students to the proper operation of the camera and the control and manipulation of exposure through use of a light meter. Students have the opportunity to demonstrate their abilities by photographing assigned subjects.

(Corequisites: NVPP-101, NVPP-111)

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

NVPP-122 Introduction to Copy Work
Registration #0851-122

Students use and extend basic camera skills to meet the special needs of copy work. They use 35mm and 4 x 5 copy cameras with a variety of black-and-white and color film types and are introduced to special lighting and exposure techniques. (Grade of C or better in NVPP-101, NVPP-111, NVPP-121)

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

NVPP-132 Orientation to Photo/Media Careers
Registration #0851-132

This course teaches students about careers in custom photographic laboratory services and media production through field trips, class discussions, and hands-on experiences. After completing this course, students are expected to choose their major area of study (custom photographic laboratory services or media production options). (Grade of C or better in NVPP-101, NVPP-111, NVPP-121)

Class 1, Lab 3, Credit 2 (F, W, S)

NVPP-142 Introduction to Advanced
Registration #0851-142 Photographic Studies

This course teaches students about programs and career areas offered by RIT's School of Photographic Arts and Sciences. Students develop both creative and technical skills in still photography and have an opportunity to evaluate their interest and readiness for advanced program areas. Class time is spent reviewing services offered by the visual communications support department.

Class 2, Credit 2 (W)

NVPP-151 Introduction to Materials and
Registration #0851-151 Processes of Photography

This course is designed for, and its enrollment is limited to, students who plan to apply to RIT's School of Photographic Arts and Sciences. Students are introduced to the technical and theoretical aspects of photography, including variability, tone reproduction, photo chemistry, color, and light. These skills prepare them to meet the challenges of a similar course in the School of Photographic Arts and Sciences.

Class 2, Credit 2 (S)

NVPP-161 Preparation for the School of
Registration #0851-161 Photographic Arts and Sciences

This course is designed for, and its enrollment is limited to, students who plan to apply to RIT's School of Photographic Arts and Sciences. Through a variety of photographic assignments, students learn creative and technical photographic skills. They also practice academic skills such as test taking, time management, classroom participation, understanding instructions, and use of support services that are essential to effective learning in a mainstream educational setting.

Class 2, Lab 5, Studio 5, Credit 7 (S)

NVPP-171 Machine Printing I
Registration #0851-171

Students develop basic skills for operating machine color printers and color paper processors as well as operation of a roll paper printer and miniprinter. They also learn how to set up printers, classify and print color negatives, process paper, cut prints and negatives, and inspect orders.

Lab 16, Credit 8 (F, W, S)

NVPP-172 Machine Printing II
Registration #0851-172

Students learn additional skills using the roll paper printer and miniprinter as well as how to organize work flow, sort film, set up and check printers, and monitor paper processing. (NVPP-171)

Lab 16, Credit 8 (F, W, S)

NVPP-200 Basic Color Printing
Registration #0851-200

This course introduces techniques for printing color negatives and evaluating color prints. Students learn principles of color theory and materials and relate these to making prints from color negatives. (Corequisites: NVPP-210, NVPP-220)

Lab 8, Credit 4 (F, W, S)

NVPP-201 Custom Lab Services I
Registration #0851-201

This course builds on skills learned in Basic Color Printing and Mechanized Processing. It introduces additional concepts in color negative printing, mechanized processing, and custom lab practices. (Corequisites: NVPP-211, NVPP-221) (Grade of C or better in NVPP-200, NVPP-210, NVPP-220)

Lab 8, Credit 4 (F, W, S)

NVPP-202 Custom Lab Services II
Registration #0851-202

This course, a continuation of Custom Lab Services I, introduces additional skills related to color: negative printing, mechanized processing, internegative calibration and production, quality control, and negative evaluation techniques. (Corequisites: NVPP-212, NVPP-222) (Grade of C or better in NVPP-201, NVPP-211, NVPP-221)

Lab 8, Credit 4 (F, W, S)

NVPP-203 Custom Lab Services III
Registration #0851-203

This Course continues to build on concepts and skills learned in Custom Lab Services **II**. Topics include color analyzers, related translators, and other printing systems. In addition, students learn techniques to produce large color prints and transparencies for display use and prepare a portfolio of finished work. (Corequisites: NVPP-213, NVPP-223) (NVPP-202, NVPP-212, NVPP-222)

Lab 8, Credit 4 (F, W, S)

NVPP-210 Mechanized Processing
Registration #0851-210

This course teaches students how to operate automatic processing equipment for color print, color negative, and color transparency materials. Basic process monitoring and chemical mixing are included. (Corequisites: NVPP-200, NVPP-220)

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

NVPP-211,212,213 Integrated Custom Lab I, II, III
Registration #0851-211,212,213

These courses offer students real and simulated custom production opportunities to prepare them for work in the photographic laboratory industry. Students practice and maintain skills learned in Custom Lab Services I, II, and III. (Corequisites: NVPP-201, NVPP-221 for NVPP-211; NVPP-202, NVPP-222 for NVPP-212; NVPP-203, NVPP-223 for NVPP-213)

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

NVPP-220 Print Finishing
Registration #0851-220

This course teaches students how to retouch color prints, including spattering, adjusting selected print areas, and the correction of other defects. Students practice and further develop dry mounting and other print finishing methods. (Corequisites: NVPP-200, NVPP-210)

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

NVPP-221 Advanced Black-and-White Printing
Registration #0851-221

This course continues the development of skills taught in Black-and-White Printing and extends skills to cover a variety of paper types and processes. Students learn the relationship between black-and-white and color printing. (Corequisites: NVPP-201, NVPP-211) (Grade of C or better in NVPP-200, NVPP-210, NVPP-220)

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

NVPP-222 Introduction to Slide Duplicating
Registration #0851-222

Students learn slide duplicating techniques and how to use the related equipment and sensitized materials. Evaluation methods related to slide duplication techniques also are presented. (Corequisites: NVPP-202, NVPP-212)

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

NVPP-223 Introduction to Color Copy Work
Registration #0851-223

Students learn and practice camera and calibration skills necessary for color copy work. Students use 35mm and 4 x 5 copy cameras with a variety of color film types and sizes. (Corequisites: NVPP-203, NVPP-213)

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

NVPP-241 Presentation Graphics I
Registration #0851-241

Students learn to use electronic tools to produce charts, graphs, and work for slide or video reproduction. Methods used to produce typography are taught and practiced and the basics of graphic composition are introduced. Good work habits are emphasized.

Lab 6, Credit 3 (F, W, S)

NVPP-242 Presentation Graphics II
Registration #0851-242

This course teaches students advanced techniques for preparing graphics as well as design principles that can be used to focus attention and convey concepts in presentation graphics. Students gain practice in the use of photostat machines, digital image typesetters, computers, and other production equipment. (NVPP-241)

Lab 6, Credit 3 (F, W, S)

NVPP-251 Presentation Graphics III
Registration #0851-251

This course prepares students to use computer applications in producing graphic displays. The use of advanced graphics packages is taught. (NVPP-242)

Lab 6, Credit 3 (F, W, S)

NVPP-261 Media Photography I
Registration #0851-261

This course provides students in the media production option with an opportunity to increase their skills with cameras, exposure, and light meters. Students are expected to use these skills to meet the needs of specific media-related assignments. Supporting skills in film processing and printing also are practiced.

Lab 6, Credit 3 (F, W, S)

NVPP-262 Media Photography II
Registration #0851-262

This course teaches advanced methods of studio and location photography for creating product, portrait, titling, and scenic images. It also teaches multi-image photography techniques. (NVPP-261)

Lab 6, Credit 3 (F, W, S)

NVPP-271 Videography I
Registration #0851-271

This course introduces students to videography, cameras, videocassette recording, editing, and lighting. Emphasis is on proper operation of video equipment for single-camera productions. Students gain hands-on experience in making a single-camera production. (NVPP-262)

Lab 6, Credit 3 (F, W, S)

NVPP-281 Slide Production I
Registration #0851-281

This course introduces students to the production of duplicate, captioned, and basic special effect slides as well as the production of slides from flat art. Emphasis is on the correct use of equipment and appropriate choice of materials. (NVPP-122, NVPP-241)

Lab 6, Credit 3 (F, W, S)

- NVPP-282** **Slide Production II**
Registration #0851-282
 This course presents advanced slide duplication techniques, filmstrip production, special effects slide variations, digital film recorders, and color correction techniques. (NVPP-281)
 Lab 6 Credit 3 (F, W, S)
- NVPP-283** **Slide Production III**
Registration #0851-283
 Students calibrate and use 35mm slide duplicating film and produce intermediate special effects slides requiring computer generated mattes and countermattes. This course, which introduces the operation of basic slide programming equipment and dissolver, emphasizes quality control and testing of film and materials. (NVPP-262, NVPP-282)
 Lab 6, Credit 3 (F, W, S)
- NVPP-290** **Audiovisual Equipment Applications**
Registration #0851-290
 Students learn to set up, operate, and maintain the various types of recorders, optical cameras, projectors, computers, and electronic accessories commonly used in media and media production. Identification and application of various projection and audio formats also are covered.
 Lab 4, Credit 2 (F, W, S)
- NVPP-296** **Media Production Workshop I**
Registration #0851-296
 Students apply previously learned skills to user-oriented media projects in a simulated work environment where the emphasis is on good work habits, material use, working with others, and professionally produced media products. Students use job tickets and interact with clients. (NVPP-251, NVPP-271, NVPP-282)
 Lab 12, Credit 6 (F, W, S)
- NVPP-299** **Co-op Work Experience**
Registration #0851-299
 Credit 0 (F, W, S, Su)
- NVPP-301** **Advanced Lab Services Printing I**
Registration #0851-301
 Students begin working with advanced color printing techniques and calibrate representative equipment and sensitized materials. They also learn color slide, negative, and print monitoring systems as well as corrective/prescriptive actions for these processes. (Corequisite: NVPP-314) (Grade of C or better in NVPP-203, NVPP-213, NVPP-223)
 Lab 8, Credit 4 (F, W, S)
- NVPP-302** **Advanced Lab Services Printing II**
Registration #0851-302
 Students continue to build advanced color printing skills. Specialized techniques such as masking, multiple printing, replenishment and processor utilization calculations, and advanced theories related to these topics are covered. (Corequisite: NVPP-315) (Grade of C or better in NVPP-301, NVPP-314)
 Lab 8, Credit 4 (F, W, S)
- NVPP-303** **Advanced Custom Lab Services III**
Registration #0851-303
 This course emphasizes critical color printing skills and techniques and presents additional color theory. Students work to develop portfolios that reflect their technical skills. (Corequisite: NVPP-316) (Grade of C or better in NVPP-302, NVPP-315)
 Lab 8, Credit 4 (F, W, S)
- NVPP-314,315,316** **Integrated Custom Lab IV, V, VI**
Registration #0851-314,315,316
 These courses provide students with real and simulated custom production work. Students practice and maintain skills learned in Advanced Custom Lab Services I, II, and III. (Corequisite: NVPP-301 for NVPP-314; NVPP-302 for NVPP-315; NVPP-303 for NVPP-316)
 Lab 4, Credit 2 (F, W, S)
- NVPP-343** **Presentation Graphics IV**
Registration #0851-343
 In this course, students produce graphics for slide and computer applications and prepare multicell graphics for optical effect slides. A series of graphs is designed for computer application. (NVPP-251)
 Lab 6, Credit 3 (F, W, S)
- NVPP-352** **Presentation Graphics V**
Registration #0851-352
 In this course, students continue to solve graphic problems and use computer graphic systems as tools to create presentation graphics. (NVPP-343)
 Lab 6, Credit 3 (F, W, S)
- NVPP-372** **Videography II**
Registration #0851-372
 This course teaches operation of television studio cameras, lighting, switching, and digital titling. Students gain experience working in a television studio and control room. Post-production techniques are taught, and productions are made. (NVPP-271)
 Lab 6, Credit 3 (F, W, S)
- NVPP-373** **Videography III**
Registration #0851-373
 This course combines single-camera remotes with studio productions and teaches advanced post-production techniques. Students produce their own television programs and are encouraged to try new video techniques. (NVPP-372)
 Lab 6, Credit 3 (F, W, S)
- NVPP-384** **Slide Production IV**
Registration #0851-384
 This course emphasizes the production of advanced special effects slides and introduces the production of in-camera matte techniques and the creation of animation sequences. Optical and digital cameras are used for slide production. (NVPP-283)
 Lab 6, Credit 3 (F, W, S)
- NVPP-385** **Slide Production V**
Registration #0851-385
 In this course, students produce a catalog of special effects slides and document slide production procedures, materials, and equipment. (NVPP-384)
 Lab 6, Credit 3 (F, W, S)
- NVPP-396** **Media Production Workshop II**
Registration #0851-396
 This course, taken in the last quarter of the program, requires practical solutions to problems in presentation graphics, still photography, computers, television, and slide production. Students must produce appropriate media materials when given projects in a typical work environment. Portfolios are expanded. (NVPP-352, NVPP-373, NVPP-385)
 Lab 12, Credit 6 (F, W, S)

NVPP-397 Media Seminar**Registration #0851-397**

This course, taken during the last quarter of the associate degree option in media production, provides a relevant framework for students' previous media production courses. It also prepares students for continued growth on the job by emphasizing new directions in media production. Students may study independently a topic agreed upon with their instructor. Portfolios are expanded. (NVPP-352, NVPP-373, NVPP-385)

Class 1, Lab 5, Credit 2-6 (F, W, S)

NVPP-399 Independent Study**Registration #0851-399**

Credit Variable

Printing Production Technology

NVCR-100 Printing Production Technology**Registration #0822-100****Career Exploration**

This course explores printing as a career choice to help students make well-informed decisions regarding the area in which they will concentrate their studies. Students receive opportunities to explore their interest in printing through hands-on experiences with printing equipment and tools. Although non-technical in nature, this course does provide opportunities for students to increase their awareness of necessary printing skills, the industry as a whole, the program, and expectations of the printing production technology department. Technical areas of study include composition and paste-up, reproduction photography, stripping and platemaking, and press and finishing.

Lab 2, Credit 1 (F, W, S)

NVCR-141 Page Creation Methods—Level I**Registration #0822-141**

This course prepares students to be paste-up artists and photoletering machine operators. Students learn the use of layout grids, adhesives, and mechanical drawing tools. State-of-the-art headline and special effect typographic equipment is used and maintained. The course includes an introduction to direct input phototypesetters.

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-142 Fundamentals of Reproduction**Registration #0822-142****Photography—Level I**

This course prepares students to be entry-level camera operators. Workers with this job title make films and paper prints used in the preparation of printed products. Students learn chemical mixing, lith and rapid access tray processing, machine processing, basic contact printing, basic halftone negative and print production, camera maintenance, and how to determine basic exposures and change copy size.

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-143 Basic Film Assembly and**Registration #0822-143****Platemaking—Level I**

This course prepares students to be single-color strippers and platemakers in the offset printing industry. Students learn single-color stripping, including halftones, tints, reverse and surprint type, manual step, and various signature impositions. Students learn to use contact and duplicating film and proofing methods to calibrate, expose, and process subtractive and direct photo plates.

Class 4, Lab 4, Credit 5 (F, W, S)

Registration #0822-144 Operation—Level I

This course prepares students to be duplicator operators. Included is instruction on various duplicators that are widely used by in-plant and commercial printers. A systematic method of preparation, operation of small power stitchers, paper drills, paper cutters, and commercial type folders is taught.

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-170,269,270,271,272 Production Printing I,**Registration #0822-170, 269,270,271,272****II, III, IV, V**

The production printing laboratory sequence is a simulated work experience in which each student is expected to work from a job ticket. Job procedures, good skills, production rates, and work habits are emphasized. Previously learned skills are reinforced. The complexity of jobs increases in each production course. (NVCR-170 for NVCR-269; NVCR-269 for NVCR-270; NVCR-270 for NVCR-271; NVCR-271 for NVCR-272)

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

NVCR-251 Computerized Typesetting—Level II**Registration #0822-251**

This course prepares students to be keyboard and phototypesetter operators. Special keyboard functions of various machines are presented and practiced for familiarity. Special function codes are used to drive different phototypesetters. Complete operation of several phototypesetters is taught. (Touch-typing skills, NVCR-141)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-252 Electronic Publishing—Level III**Registration #0822-252**

This course teaches students with advanced keyboarding procedures for complex typographic formats, including skills in telecommunication with computers and word processors. The layout and paste-up skills learned in Page Creation Methods are used in new, more complex applications. (Touch-typing skills, NVCR-251)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-254 Computer Publishing Methods—Level IV**Registration #0822-254**

This advanced course in electronic publishing methods and techniques emphasizes paint/draw programs, interactive and format-based page makeup, image scanning, special effects typography, and elementary PostScript programming. (NVCR-252)

Class 2, Lab 6, Credit 5 (F, W, S)

NVCR-255 Advanced Halftone and Line**Registration #0822-255****Technique—Level II**

This course prepares students to be camera operators. Graduates with this job title can do advanced line photography, halftones, 50 percent dot placement for tone reproduction, related contacting, proofing, and film processing as required by in-plant printing departments, newspapers, and commercial printing companies. (NVCR-142)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-256 **Color Separation Methods—Level III**
Registration #0822-256

This course prepares students to be color separators, color scanner operators, and dry-dot etchers. Graduates with these job titles can make duotones, direct color separations, color corrections by dry-dot etching, required color proofs, and with limited on-the-job training, operate a color scanner. (NVCR-255)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-257 **Color Scanning Methods—Level IV**
Registration #0822-257

This course prepares students to enter the printing industry as color scanner operators. Areas of study include copy evaluation, color separation of transparencies and reflection copy, scanner linerization, scanning problem copy, color proofing and correction, gray component replacement, and color separation for different reproduction methods. (NVCR-256)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-261 **Flat Color Film Assembly—Level II**
Registration #0822-261

This course continues students' preparation for the offset printing industry. Students learn skills necessary for stripping, proofing, and platemaking flat color. Skills learned include multitone and multicolor work using tints, duotones, special effects, and spot color. Students use a precision pin register system throughout the stripping, proofing, and platemaking operations for all jobs. Additional skills include determining imposition planning and quality control systems for film, proof, and plate exposures and processing. (NVCR-143)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-262 **Process Color Film Assembly—Level III**
Registration #0822-262

This course teaches students process color stripping procedures and considerations. Included are various methods of aligning negatives, stripping multiple sets on the same form, matching color using process color tints, stripping reverse and surprint type in process color areas, split-page/form stripping, making spread and choked negatives and positives, and making composite negatives and positives. (NVCR-161)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-263 **Film Assembly Systems and Quality**
Registration #0822-263 **Control—Level IV**

This course continues the study of process color film assembly techniques and related applications. Areas of study include computer-aided masking methods, use of a precision line-up table, web offset film assembly considerations, quality control targets, and auto stripping/register systems. (NVCR-262)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-265 **Lithographic Press Operator—Level II**
Registration #0822-265

This course is an introduction to the small press. Systematic methods of small press preparation and operation are taught. Students learn how to read and use a micrometer. Adequate practice time is provided for students to reach a level of competence required for placement as beginning press operators. (NVCR-144)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-266 **Advanced Lithographic Press—Level III**
Registration #0822-266

This course emphasizes the use of close registration systems. Four-color process printing is done, but not at normal production rates. Students learn how to use a packing gauge and are instructed in the use of a densitometer for measuring ink densities. Opportunity to gain sufficient skills to do routine troubleshooting is provided. (NVCR-265)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-267 **Production Presswork—Level IV**
Registration #0822-267

This course continues the study of lithographic press operation in a production-related setting. Areas of study include blanket squeeze and its effect on image length, systematic methods of solving press-related problems, and development of production skills. It reinforces skills developed in prerequisite press courses. The course simulates on-the-job training, using sheet-fed single- and multicolor offset presses. (NVCR-266)

Class 4, Lab 4, Credit 5 (F, W, S)

NVCR-299 **Co-op Work Experience**
Registration #0822-299

Credit 0 (Su)

NVCR-399 **Independent Study**
Registration #0822-399

Credit Variable

Division of Communication Programs

English

Entry Courses

NCPN-100 **Ideas in English/A**
Registration #0862-100

This course includes work on basic English sentence structure for reading, writing, speaking, and speechreading; practice with vocabulary and comprehension skills needed to read about contemporary topics; and the use of writing to report events. English Learning Center assignments are required. The course is for students with basic English skills.

Class 5, Lab 2, Credit 4 (F)

NCPN-103 **English in American Life**
Registration #0862-103

This is a summary course that integrates four communication skills—reading, writing, grammar, and vocabulary. Materials in each area provide reinforcement, follow-up activity, or context for the three other areas. To this end, grammar and vocabulary are contained in the reading assignments; reading provides inspiration for the writing assignments; and writing assignments contain vocabulary and structures taught in the grammar portion. English Learning Center assignments are required. This course is for students with low to intermediate English skills.

Class 4, Lab 2, Credit 4 (F)

NCPN-105 **Social Issues**
Registration #0862-105
 This English course is designed to help students develop better reading and writing skills. Social issues such as child abuse and drug misuse are discussed. Students have opportunities to improve communication skills by completing a variety of vocabulary, grammar, and writing exercises. Summary writing is stressed and is preceded by a variety of writing exercises. English Learning Center assignments are required. This course is for students with intermediate to high English skills.
 Class 3, Lab 2, Credit 4 (F, W, S)

NCPN-107 **Language Structure in Written English**
Registration #0862-107
 This course provides students with instruction and practice in using appropriate language structures for different writing purposes. The course has three parts: reading and studying the content and meaning of different modes of writing; analyzing and practicing the various grammatical and structural strategies used in different modes; and writing and editing papers in the various modes. Generally, descriptive, narrative, and several forms of expository writing are reviewed. This course is appropriate for students with high-level English skills.
 Class 4, Credit 4 (F, W, S)

Integrative Courses

NCPN-110 **Ideas in English/B**
Registration #0862-110
 In this course, students study English grammar for compound and beginning complex sentences. Reading materials and vocabulary practice include world knowledge needed for college learning. Students are expected to write paragraphs and longer compositions about reading materials and short films. English Learning Center assignments are required. (NCPN-100)
 Class 5, Lab 2, Credit 4 (W)

NCPN-111 **Ideas in English/C**
Registration #0862-111
 In this course, students work on English needed for college reading and writing activities. Students study complex sentences and advanced verb patterns, reading for understanding, summarizing information, and communicating ideas clearly in longer writing assignments. English Learning Center assignments are required. (NCPN-110)
 Class 5, Lab 2, Credit 4 (S)

NCPN-112 **Writing for Different Purposes**
Registration #0862-112
 In this course, students use English skills to organize ideas and solve problems in situations related to their technical coursework in college and to their employment environments after graduation. Students are expected to work individually and in small groups to read and prepare written descriptions, requests, recommendations, and short reports. (California Reading Test score of 6.5-8.5, 12 credits of NTID English, one year in an area of specialization)
 Class 3, Credit 3 (W, S)

NCPN-113 **Verbs and Complements**
Registration #0862-113
 This course deals with verb tense, agreement, and active and passive voice. It includes a detailed study of complementation, which involves the writing of several short passages. Students also work on vocabulary development. (NCPN-174, California Reading Test score of 8.0-10.0, Michigan Test score of 55-70)
 Class 4, Lab 1, Credit 4 (W, S)

NCPN-114 **Reading English Dialogue**
Registration #0862-114
 This course is designed to help students improve their skills in writing English and using English words. It provides instruction in two areas: the use of verbs in different kinds of sentences and the independent analysis of vocabulary words. There is heavy emphasis on reading with practice also in writing skills. English Learning Center assignments are required. (California Reading Test score of 7.0-9.0, Michigan Test score lower than 60)
 Class 4, Lab 2, Credit 4 (F, W, S)

NCPN-118 **Self-Expression**
Registration #0862-118
 In this course, students explore communication and self-expression through discussions; viewing films; reading materials; and practicing reading, writing, signing, and speechreading. The course uses vocabulary and structural forms that are common in social, academic, and professional situations. Vocabulary clues, reading skills, and descriptive phrases are important parts of this course. English Learning Center assignments are required. (California Reading Test score higher than 7.5)
 Class 4, Lab 2, Credit 4 (W)

NCPN-119 **Mass Communication**
Registration #0862-119
 This course utilizes selections from literature and current newspaper and magazine articles to give students an idea of the power of language and to teach them sentence structure and paragraph organization in popular literature. English Learning Center assignments are required. (California Reading Test score higher than 7.5)
 Class 4, Lab 2, Credit 4 (W)

NCPN-120 **English and the Arts**
Registration #0862-120
 This course uses vocabulary and structural forms common in social, academic, and professional situations as well as slides and reading materials that provide an opportunity to practice complex sentence forms. Students learn idioms and verb forms in connection with art history and photojournalism. English Learning Center assignments are required. (California Reading Test score higher than 7.5)
 Class 4, Lab 2, Credit 4 (S)

NCPN-121 **Improving Vocabulary Through Reading**
Registration #0862-121
 This course is a continuation of English in American Life. The focus is on integrating the four communication skills—reading, writing, vocabulary, and grammar. Vocabulary, grammar, and writing assignments are based exclusively on the readings and are intended to provide continual follow-up, review, and support for material learned. English Learning Center assignments are required. (NCPN-103)
 Class 4, Lab 2, Credit 4 (W)

NCPN-122 **Quantitative Concepts**
Registration #0862-122

This course teaches students vocabulary and sentence structures that are used in mathematical word problems. Students practice reading, writing, and performing calculations for word problems dealing with subjects that include wages, taxes, working hours, and cost of products. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)

Class 4, Lab 2, Credit 4 (F)

NCPN-123 **Famous Scientists**
Registration #0862-123

This course teaches students vocabulary and sentence structures that are used in technical reading and writing. Students read a textbook covering the lives of famous scientists, then practice reading and writing biographical information about these people. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)

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

NCPN-124 **The Earth and Universe**
Registration #0862-124

This course examines vocabulary and sentence structures used in technical reading and writing. Students read textbooks covering various topics in geology and astronomy. Electronic media is used to practice reading and writing compositions on geology and astronomy. English Learning Center assignments are required. (California Reading Test score of 7.0-8.5)

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

NCPN-125 **Library Research for Writing**
Registration #0862-125

This course teaches library techniques for writing research papers and helps students develop vocabulary, sentence structure, and composition skills. Students read textbooks about libraries and writing, visit the library several times, and write one or more college research papers. Classroom lectures cover card, microfiche, and computer catalogs; indexes; organizing and outlining ideas; and word processing as applied to research papers, including how to prepare footnotes and bibliographies. (California Reading Test score of 8.0-10.0)

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

NCPN-131 **Changing World**
Registration #0862-131

This course reviews parts of speech, selected phrases and clauses, and kinds of sentences. It applies this review to the practical task of understanding a variety of texts related to the theme of idealism and reality in American life. Texts have included *Of Mice and Men*, "I Have a Dream," personal accounts of communal living, and a science fiction short story. English Learning Center assignments are required. (NCPN-105)

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

NCPN-132 **Medical Issues**
Registration #0862-132

This is an advanced technical English course designed to help students develop better reading and writing skills. Students discuss medical issues, including the cause, spread, and prevention of disease, and have opportunities to become familiar with the language of everyday medical science. English Learning Center assignments are required. (NCPN-105)

Class 3, Lab 2, Credit 4 (S)

NCPN-133 **Visual Arts**
Registration #0862-133

Students in this course read a variety of texts that develop the human dimensions of issues related to photography. The course stimulates students to improve their English through use of captioned and uncaptioned slides; famous photos, including shots of Iwo Jima and Kent State; song lyrics; and art. English Learning Center assignments are required. (NCPN-105)

Class 3, Lab 2, Credit 4 (W)

NCPN-134 **Beginning Scientific English**
Registration #0862-134

This course introduces students to a broad range of topics related to the technical aspects of society. Emphasis is placed on developing reading skills, acquiring new vocabulary in context, and skimming and scanning procedures. This course is most useful to engineering and science students. English Learning Center assignments are required. (California Reading Test score higher than 8.0, Michigan Test score higher than 60)

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

NCPN-135 **Writing Scientific English**
Registration #0862-135

In this course, designed to improve reading and writing skills, students discuss measurements, dimensions, and properties of objects used in experiments. General technical reading and grammar skills also are used. Homework includes writing short compositions, letters, and laboratory reports. This course is recommended for engineering and science students. English Learning Center assignments are required. (California Reading Test score higher than 8.0, Michigan Test score higher than 60)

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

NCPN-136 **American Experiences**
Registration #0862-136

This integrative course focuses on the theme of alienation in American society. The course requires students to read and discuss articles or a novel, do vocabulary work, complete comprehension exercises, and write compositions related to the articles or novel. English Learning Center assignments are required. (NCPN-105)

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

NCPN-144 **Clear Thinking and Writing**
Registration #0862-144

This critical thought course includes critical reading, using language for personal analysis, writing for persuasive purposes, and studying the vocabulary of inference and implication. (NCPN-107)

Class 4, Credit 4 (W, S)

Emphasis Courses—Reading

NCPN-150 **English in Context**
Registration #0862-150

This course focuses on reading a novel and discussing the structures of English involved in the description of location (setting) and sequence of events (plot) in a narrative. It also touches on the organization and sequencing of facts in a composition. (California Reading Test score of 7.0-9.0)

Class 2, Credit 2 (F, W, S)

NCPN-152 Reading a Novel**Registration #0862-152**

This course, which emphasizes the reading process, offers instruction in the elements of a novel. It provides experience in discussing and writing about a novel in terms of its setting, characterization, and conflict. To encourage reading for details, drawing conclusions, and making inferences, the course also provides experience with an interactive computer novel. (California Reading Test score lower than 8.5)

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

NCPN-153 Reading for Language Learning**Registration #0862-153**

This course is designed to help students use reading as a means of improving general English skills. The course emphasizes the skills involved in controlling reading processes to improve understanding and in learning new information while reading. Students learn the skills involved in using dictionaries and encyclopedias to increase world knowledge while reading. Some of the reading assignments involve the use of interactive computer materials that require problem solving and use of information during the reading process. (California Reading Test score of 7.0-9.0, Michigan Test score higher than 50)

Class 3, Credit 3 (F, W, S)

NCPN-155 Reading for Comprehension**Registration #0862-155**

This course allows students to practice college reading skills while they learn vocabulary and develop reading strategies for learning abstract ideas and acquiring information. Materials in this course emphasize important background knowledge and vocabulary useful for a variety of liberal arts courses while sampling from traditional liberal arts disciplines such as anthropology, history, religion, and science. Vocabulary units include key concepts from these disciplines. The course includes practice reading and studying textbooks, outlining, taking lecture notes, and using reference books to provide background knowledge and help in solving reading comprehension problems. (California Reading Test score higher than 9.2 or grade of A or B in another reading emphasis course)

Class 3, Credit 3 (F, W, S)

NCPN-156 Literature Seminar**Registration #0862-156**

This course involves reading novels or short stories based on a specific theme. The course helps students become interactive, reflective, and thoughtful readers. Interaction between students and instructors helps students gain a cultural and historical perspective. (California Reading Test score higher than 9.0)

Class 3, Credit 3 (F, W, S)

Emphasis Courses—Vocabulary**NCPN-160 Vocabulary Through ASL****Registration #0862-160**

This course is for students whose preferred method of communication is American Sign Language (ASL). The course is designed to develop ability and confidence in translating ASL vocabulary into English equivalents. It includes translation principles, ASL vocabulary items, and English idioms. (ASL knowledge, rating of 4 or 5 on the Sign Instruction Placement Interview)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPN-161 Business Vocabulary**Registration #0862-161**

In this course, students read nine stories about famous business people/inventors. Each week, more than 60 vocabulary words are chosen for students to use in practice exercises and games, and weekly tests are given on half of these words. Other exercises include weekly reading comprehension, determination of anaphoric references, derivational morphology, and some inductive syntax. All vocabulary, grammatical, morphological, and anaphoric exercises relate to the context of the readings. (California Reading Test score higher than 8.0)

Class 3, Lab 2, Credit 4 (S)

NCPN-162 Vocabulary/Dictionary Skills**Registration #0862-162**

This course helps students develop self-reliant methods for improving their vocabulary. To achieve the course's primary goal of developing advanced dictionary skills, students use the *Longman* and *Merriam-Webster* dictionaries. (California Reading Test score of 7.5-9.9, Michigan Test score of 60-80)

Class 2, Credit 2 (F, W, S)

NCPN-163 English Idioms**Registration #0862-163**

This course is designed to help students understand and use common English idioms. Students are encouraged to bring to class for discussion idioms that they encounter. Idioms are discussed and practiced in context. Activities include written assignments and student participation. (California Reading Test score higher than 8.5)

Class 2, Credit 2 (F, W, S)

NCPN-164 Popular Film and English**Registration #0862-164**

This course is designed to expose students to popular films and readings related to films in order to develop vocabulary skills and general world knowledge. Students then use the vocabulary in essays that express opinions about a variety of film genres. By viewing captioned films, students are introduced to the concept of genre and learn about the connection between film and literature. (California Reading Test score higher than 9.0, Michigan Test score higher than 65, or completion of a writing emphasis course with grade of B or better or permission of instructor)

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

Emphasis Courses—Grammar**NCPN-171 Introduction to Complex Sentences****Registration #0862-171**

This course is designed to improve English skills for constructing sentences and using new vocabulary. It provides instruction in two areas: the structure of sentences with two verbs and a connector and the analysis of independent vocabulary words. The course concentrates on improving written communication and developing reading skills. English Learning Center assignments are required. (NCPN-100)

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

**NCPN-172 Identifying Parts of Speech
Registration #0862-172**

In this course students learn definitions of parts of speech and their functions in a sentence. Students also learn how to identify the parts of speech of new vocabulary and how to use the words appropriately in a sentence. The course focuses on the different uses of words that can function as more than one part of speech. It also explains root words and how different derivational morphemes can change words into different parts of speech. (Michigan Test score lower than 70)

Class 2, Credit 2 (F, W, S)

**NCPN-173 Basic English Phrase Structure
Registration #0862-173**

This course emphasizes grammar and deals with phrase structure, including noun and verb phrases. Gerunds also are introduced. Students are required to read a short novel and work on vocabulary development.

Class 4, Lab 1, Credit 4 (F)

**NCPN-174 Adverbials and Basic Clause Structure
Registration #0862-174**

This course emphasizes grammar and deals with adverbials, including single-word and adverb phrases; basic clause structure, including adjective and adverb clauses; and noun clause complements. Students also are introduced to coordination. In addition, students are required to read a short novel and work on vocabulary development. (NCPN-173)

Class 5, Lab 1, Credit 4 (W)

**NCPN-175 English Phrase Structure
Registration #0862-175**

This course, the first in a sequence of two, deals with parts of speech and phrase structure, including noun, verb, adjective, and adverb phrases. In addition, students are required to read a short novel and work on vocabulary development. This course is not for students who have completed Basic English Phrase Structure or Adverbials and Basic Clause Structure. (California Reading Test score of 7.0-8.5, Michigan Test score of 55-65)

Class 4, Lab 1, Credit 4 (F, W, S)

**NCPN-176 English Clause Structure, Tense, and
Registration #0862-176 Passive Voice**

This course, which emphasizes grammar, is the second in a sequence of two. It deals with English clause structure, including adjective, adverb, and noun clause complements. Coordination also is introduced, and verb tense is covered. In addition, students are required to read a short novel and work on vocabulary development. (NCPN-175)

Class 4, Lab 1, Credit 4 (F, W, S)

**NCPN-178 English Discourse Grammar
Registration #0862-178**

This course is designed to help students better express ideas in written English. Two hours a week, formal grammar is studied, including the semantic function of sentence constituents and classical grammar (fragments, run-ons, pronoun reference, subject/verb agreement, consistent tense, etc.). One hour each week is devoted to composition, which then is evaluated for discourse and grammar components. One hour each week is devoted to reading for comprehension through grammatical cues (passive voice, tense, etc.). (NCPN-107)

Class 4, Credit 4 (W, S)

Emphasis Courses—Writing

**NCPN-180 Basic Composition
Registration #0862-180**

The course provides instruction in composition writing at the basic level. It focuses on the areas of English sentence structures for composition coherence, development of a more flexible vocabulary, and practice with different styles of composition organization. Students write compositions based on nonverbal films and discuss the areas mentioned above. (Michigan Test score lower than 60)

Class 2, Credit 2 (F, W, S)

**NCPN-181 Organizing Paragraphs
Registration #0862-181**

This course offers instruction and practice in developing short, well-organized compositions. The course focuses on two areas: intensive practice in developing specific writing skills, such as topic sentences, detail (supporting) sentences, outlining, and transition words; and learning to use different composition styles such as description, classification, cause/effect, comparison/contrast, and personal opinion. (California Reading Test score higher than 7.5, Michigan Test score higher than 55, or NCPN-180)

Class 2, Credit 2 (F, W, S)

**NCPN-183 Essay Writing
Registration #0862-183**

This course focuses on the development of essay writing skills. Essays provide the basis for many types of writing, including proposals, research papers, and memos. Skill in writing essays also is required for the liberal arts curriculum. This course reviews basic paragraph structure, structure of essays, how to express a view or opinion, and how to defend it logically with reason or examples. (California Reading Test score higher than 8.5, Michigan Test score higher than 60, or grade of **B** or better in NCPN-181)

Class 3, Credit 3 (F, W, S)

**NCPN-187 Creative Writing
Registration #0862-187**

This course is designed for students who need or want to improve their creative thinking and writing skills. The focus of the course is on stories and poetry. Students learn the mechanics of short stories and poetry and participate in assignments designed to improve their ability to think and write using imagination, imagery, descriptions, and feelings. (Michigan Test score higher than 60)

Class 2, Credit 2 (F, W, S)

**NCPN-188 Practical Writing
Registration #0862-188**

This course is designed to help students become skilled in practical, everyday writing. Students practice writing directions, forms, letters, notes, memos, ads, and reports that may be encountered in both the workplace and their personal lives. The emphasis is on form, content, and special grammatical structures necessary for professional writing. (Michigan Test score of 50-65)

Class 3, Credit 3 (F, W, S)

**NCPN-189 Professional Writing
Registration #0862-189**

This course examines various types of letters, memos, and reports that students may encounter in the workplace. The emphasis is on form, content, and special grammatical structures necessary for professional writing. (Michigan Test score higher than 65)

Class 3, Credit 3 (F, W, S)

**NCPN-399 Independent Study
Registration #0862-399**

This course is designed for students with special needs that cannot be met by another English course. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should talk to their communication advisor.

Credit 1-4 (F, W, S)

Speech-Language-Hearing Center

Audiology

**NCPU-101 Strategies and Speech
Registration #0861-101**

This introductory course is recommended for students interested in speech therapy. It is designed to help students improve communication with people who do not know sign language. The course introduces basic speech and speechreading concepts as well as a variety of alternative communication strategies. Particular emphasis is placed on oral strategies to facilitate communication. (Speech score lower than 3.0, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-103 Survival Strategies for the Basic
Registration #0861-103 Speechreader**

This course is designed to help students improve their communication with people who do not know sign language. Students are introduced to speechreading and learn a variety of alternative communication strategies. Particular emphasis is placed on writing as a means of facilitating communication. (Speech score lower than 3.0, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-105 Practicing Communication Strategies
Registration #0861-105**

This course provides review, practice, and integration of newly acquired listening, speechreading, speech, and strategy skills. It is a follow-up course for students who have completed any basic speechreading or strategy courses. Students role play a variety of everyday and work-related situations with people who do not know sign language. Overall communication success is evaluated by both students and instructor using a videotape format. Students also learn how to use these communication skills to succeed in basic conversations and conflict situations with non-signers. (One of the following: NCPH-177, NCPU-101, NCPU-103, NCPU-155, or NCPU-157; speechreading score [with or without sound] lower than 35 percent)

Class 2, Credit 2, (F, W, S)

**NCPU-115 Communication for the Job Interview:
Registration #0861-115 Writing**

This course focuses on improving the communication aspect of the job interview through a series of practice interviews. It is designed for students who have difficulty communicating during an interview. This course is appropriate for students who prefer to use writing to communicate during the interview. For students with speech scores higher than 3.0, the speech-language department offers Communication for the Job Interview: Speaking, (NGGE-101, speech score lower than 3.0)

Class 2, Lab 1, Credit 2 (W, S)

**NCPU-118 Orientation to Hearing Aids and Listening
Registration #0861-118**

This course is for students who have not used a hearing aid in a long time. It provides information about hearing aids and an opportunity to use them in supportive and structured situations. It also exposes students to the benefits of amplification through listening practice. This course meets twice for class lecturing and listening practice and once for individual hearing aid evaluation/listening laboratory practice each week. (Recommendation by audiologist, new earmold, \$50 fee upon acceptance of new hearing aid)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-120 Auditory Training for Auditory Profile 1
Registration #0861-120 and 2 Students**

This auditory training course is designed to help students learn the meaning of sound. Since students in the first two auditory profiles often are part-time hearing aid users, the major goal is to help them become better listeners. Students meet three times each week to participate in both group and individual practice listening for syllables, stress, and duration. Practice with these materials helps students' speechreading skills. Environmental sound training, with special emphasis on warning sounds and music, also is included. (Use of hearing aid, auditory profile of 1 or 2)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-130 Auditory Training I for Profile 3 Students
Registration #0861-130**

The goal of this course is acquisition of listening skills. Listening materials include words, sentences, short stories, and songs. Development of vocabulary skills is integrated into all listening activities. Classes meet twice weekly and a weekly one-hour laboratory is held for additional listening activities and lectures on topics related to audition and amplification. (Auditory profile of 3, use of amplification all or most of the time, speechreading score [with or without sound] higher than 35 percent)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-135 Auditory Training II for Profile 3 Students
Registration #0861-135**

This course is a continuation of Auditory Training I for Profile 3 Students in which auditory training is continued for the acquisition of listening fluency and comprehension. (NCPH-130, auditory profile of 3, use of amplification all or most of the time, speechreading score [with or without sound] higher than 35 percent)

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

**NCPU-140 Auditory Training I for Profile 4 and 5
Registration #0861-140 Students**

The focus of this course is to help students acquire listening fluency and auditory comprehension skills. Classes meet twice weekly for group listening activities, group discussions, and lectures on special topics related to audition and amplification. A one-hour listening laboratory is held weekly for individual listening activities. Auditory activities for this course include books and short stories on audiotapes, music listening, and speech perception in noise. Vocabulary skill development also is emphasized. (Auditory profile of 4 or 5, use of amplification all or most of the time)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-145 Auditory Training II for Profile 4 and 5
Registration #0861-145 Students**

This course is a continuation of Auditory Training I for Profile 4 and 5 Students. The focus of the course is to continue auditory training for the acquisition of listening fluency and auditory comprehension skills. Vocabulary skill development is emphasized, and listening activities include music and books on audiotape. Special emphasis is placed on auditory skills and strategies for successful communication in social and vocational situations. Classes meet twice weekly for group lectures, discussions, and listening activities, and a one-hour laboratory is held weekly for individual listening activities. (NCPU-140, auditory profile of 4 or 5, use of amplification all or most of the time)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-155 Speechreading and Listening
Registration #0861-155**

This course develops reception of words, everyday sentences, and on-the-job social sentences by using speechreading and listening. Some auditory-only exercises are done in class and for laboratory assignments. Knowledge of strategies and associational cues is reviewed. (NCPU-101 or NCPU-103, speechreading score [with or without sound] lower than 35 percent, Michigan Test score lower than 70, auditory profile higher than 1, use of amplification in class and lab)

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

**NCPU-157 Speechreading and Strategies
Registration #0861-157**

This course is designed to help students use their visual skills to understand speakers. Students practice interpreting verbal and nonverbal information, facial expressions, eye glances, gestures, and body movements as people talk. Practice activities include speechreading and listening to individual words and everyday sentences. Students may be required to speechread hearing people during a practice interview. (Speechreading score [with or without sound] lower than 35 percent, Michigan Test score higher than 69)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-160 Intermediate Speechreading
Registration #0861-160**

In this course, speechreading and listening are used to help students understand sentences and short paragraphs. Strategies to assist communication are reviewed and practiced in conversational interviews with hearing staff members. (Speechreading score [with or without sound] of 35-60 percent, Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-167 Receptive Technical Communication
Registration #0861-167**

This course uses an experiential learning approach to help students improve their ability to understand other people in technical on-the-job situations. Deaf faculty and staff members share their own communication strategies and discuss the importance of attitude for effective communication. Students gain experience in various communication settings and develop personal goals/ strategies through discussions with peers. Practice materials include vocabulary sentences and paragraphs from students' areas of specialization. Primary emphasis is on the use of communication strategies for spoken language, with secondary emphasis on written language. (Speechreading score [with or without sound] of 35-60 percent, completion of at least three quarters in program of study)

Class 2, Lab 1, Credit 2 (W, S)

**NCPU-168 Receptive Social/Academic
Registration #0861-168 Communication**

This course uses an experiential learning approach to help students improve their ability to understand other people in social and academic settings. Deaf faculty and staff members share their own communication strategies and discuss the importance of attitude for effective communication. Students develop personal goals/strategies through discussions with peers. Practice materials include vocabulary, sentences, and paragraphs commonly found in social and academic environments. Primary emphasis is on the use of communication strategies for spoken language, with secondary emphasis on written language. (Speechreading score [with or without sound] of 35-60 percent, Michigan Test score higher than 69)

Class 2, Lab 1, Credit 2 (F, W)

**NCPU-170 Advanced Speechreading: Non-Technical
Registration #0861-170**

The intent of this course is threefold: to improve students' ability to speechread in noisy environments and to speechread difficult speakers, to develop factual knowledge to optimize receptive communication skills, and to develop useful strategies for communicating with hearing people. Students are challenged by a variety of speechreading exercises with and without sound. They learn pronunciation techniques, practical strategies for communicating in social and job environments, and skills for speechreading sentences and paragraphs. Class participation is strongly emphasized. (Speechreading score [with or without, sound] higher than 60 percent, use of amplification in class and lab)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-177 Technical Speechreading and Speech
Registration #0861-177**

This course is designed to help students improve their speech and speechreading of technical vocabulary associated with their areas of specialization. This is a small-group class, with one discussion hour, one individual practice hour, and one homework laboratory hour weekly. Group discussions are provided on work communication, strategies, associational cues, and interviews. Individual practice includes speechreading key vocabulary as well as sentences and short paragraphs from technical areas of specialization. Students also practice pronouncing technical vocabulary with a speech instructor during individual practice hours. (Speech score higher than 3.0, speechreading score [with or without sound] higher than 60 percent, pass vocabulary test on first day of class, completion of at least three quarters in program of study)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPU-178 Technical Speechreading and Strategies
Registration #0861-178**

This course helps students improve their speechreading of technical vocabulary in their areas of specialization. It focuses on the use of writing strategies for communicating at work. The class consists of a small group with one discussion hour, one individual practice hour, one homework hour, and up to two laboratory hours weekly. Group discussions are provided on work communication strategies, associational cues, and job interviews. Individual practice includes speechreading key vocabulary, sentences, and short paragraphs from technical areas of specialization. Students also practice writing strategies with the instructor during individual practice hours. (Speech score lower than 3.0, speechreading score [with or without sound] higher than 60 percent, pass vocabulary test on first day of class, completion of at least three quarters in program of study)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-180 **Telecommunication Aids**
Registration #0861-180

This course teaches students about regular telephones and different kinds of telecommunication devices for the deaf (TDDs). Students use TDDs to make long-distance and emergency calls and appointments. They learn what to do if they have a bad connection or are disconnected. Each student makes calls using amplifiers and pay telephones. They are taught special codes for listening and speaking on the telephone. (Auditory reception score below 40 percent)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPU-186 **Telephone Communication**
Registration #0861-186

This course is offered to help students improve their ability and confidence in using the telephone with strangers. Students learn a variety of techniques, including the best way to use their hearing aids with the telephone, how to make long-distance calls, get information, make appointments over the telephone, and what to do if they have problems or an emergency. Students practice using special strategies to improve their talking and listening over the telephone. They also practice with pay phones. Students are required to practice making telephone calls every week. The instructor works with each student individually during four special appointments. (Speech score 3.4 or higher, auditory reception score 40 percent or higher, telephone in room or apartment, use of amplification all or most of the time)

Class 2, Lab 1, Credit 2 (F, W, S)

NPCU-399 **Independent Study**
Registration #0861-399

This course is designed for students with special needs that cannot be met by another communication course. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in taking an independent study must talk to their communication advisor.

Credit 1-4 (F, W, S)

Speech-Language

NCPH-101 **Speech Therapy I**
Registration #0860-101

This course helps students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours per week and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. Students practice words, phrases, sentences, and conversations. (Speech priority rating of C)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-102 **Speech Therapy II**
Registration #0860-102

This course is designed to help students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours per week and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. (Therapist's recommendation, NCPH-101)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-103 **Speech Therapy III**
Registration #0860-103

This course is designed to help students improve their speech. Special tests allow the teacher to evaluate individual needs. Students meet with a speech instructor for two hours and practice in the laboratory for one hour each week. Instruction may include training in voice, pitch control, articulation (speech sounds), and loudness control. (Therapist's recommendation, NCPH-102)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-115 **Pronunciation A**
Registration #0860-115

Students practice pronunciation of vocabulary through the use of *Merriam-Webster Dictionary* and knowledge of pronunciation rules. (Speech score of 2.0-3.5)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-116 **Pronunciation B**
Registration #0860-116

Students practice independent pronunciation of vocabulary through the use of *Merriam-Webster Dictionary* and knowledge of pronunciation rules. (Speech score higher than 3.5)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-120 **Speech and Listening Lab I**
Registration #0860-120

This course is appropriate for students who wish to improve articulation, listening, and self-monitoring skills. Students meet with a speech instructor to establish goals. Students work individually at their own pace using a variety of prerecorded audiotapes. The speech instructor monitors students and provides feedback. (Speech scores higher than 3.5, auditory reception score higher than 16 percent)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-121 **Speech and Listening Lab II**
Registration #0860-121

This course is a continuation of Speech and Listening Lab I. Students continue to work on speaking and listening skills. (Recommendation from instructor of NCPH-120)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-124 **Speech Improvement**
Registration #0860-124 **Using Songs and Poems**

In this class, students use singing and poetry readings to improve their speech. Exercises in pitch control, loudness control, and breath support are used to improve voice, vocal quality, and listening skills. (Speech score higher than 3.0 and auditory reception score higher than 16 percent)

Class 2, Lab 1, Credit 2 (S)

NCPH-130 **Strategies for Organizing**
Registration #0860-130 **Word Knowledge/A**

The purpose of this course is to introduce strategies for organizing word knowledge. The course helps students better understand the relationships among words, including similarities, differences, classification, association, analogies, and different ways to order words in rank and degree. (California Reading Test score lower than 8.5)

Class 2, Credit 2 (F, W, S)

**NCPH-131 Strategies for Organizing
Registration #0860-131 Word Knowledge/B**

The purpose of this course is to introduce strategies for organizing word knowledge. The course helps students better understand the relationships among words, including similarities, differences, classification, association, analogies, and different ways to order words in rank and degree. (California Reading Test score higher than 8.5)

Class 2, Credit 2 (F, W, S)

**NCPH-132 Vocabulary Development
Registration #0860-132**

In this course, students use a workbook, textbook, and computer laboratory practice to develop vocabulary. Students develop strategies to determine vocabulary meaning through use of contextual clues and knowledge of prefixes and suffixes. (Michigan Test score lower than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPH-133 Understanding Vocabulary in Context
Registration #0860-133**

This course focuses on and develops students' ability to determine the meaning of unfamiliar words encountered in everyday reading. Students identify specific types of vocabulary difficulties in their reading. Using newspaper and magazine articles in class, students practice word attack skills based on context. Implications; connotations; and a knowledge of prefixes, suffixes, and roots are used to determine meaning in reading passages. (Michigan Test score higher than 70)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPH-136 Spoken Language Learning I/A
Registration #0860-136**

This course focuses on the use of spoken English to express information effectively. Students who have some intelligible speech will practice basic patterns of English structures, including asking and answering questions, conveying basic information, and brief descriptions. This course uses a text and workbook for grammar development and the self-instruction laboratory for speech and speechreading practice. (Corequisite: NCPN-100) (Speech score higher than 3.0, California Reading Test score lower than 7.0)

Class 2, Lab 1, Credit 2 (F)

**NCPH-137 Spoken Language Learning II/A
Registration #0860-137**

This course focuses on using spoken English correctly in the organization and expression of personal experiences. Practice is provided in some common complex sentence forms. Students who have grammatical errors that interfere with the intelligibility of their spoken message should take English for Speech I prior to this course. This course uses the self-instruction laboratory for speech and speechreading practice. (NCPH-136)

Class 2, Lab 1, Credit 2 (W)

**NCPH-138 Spoken Language Learning I/B
Registration #0860-138**

This course focuses on the use of spoken English to express information effectively. Students who have some intelligible speech practice basic patterns of English structures, including asking and answering questions and conveying basic information and brief descriptions. (Speech score higher than 3.0, California Reading Test score of 7.1-8.5)

Class 2, Lab 1, Credit 2 (F)

**NCPH-139 Spoken Language Learning II/B
Registration #0860-139**

This course focuses on using English correctly in the organization and expression of personal experiences. Practice is provided in some common complex sentence forms. Students who have grammatical errors that interfere with the intelligibility of their spoken message should take Spoken Language Learning **IB** prior to this course.

Class 2, Lab 1, Credit 2 (W)

**NCPH-140 Spoken Language Learning I/C
Registration #0860-140**

This course focuses on the use of spoken English to express information effectively. Students who have some intelligible speech practice basic patterns of English structures, including asking and answering questions and conveying basic information and brief descriptions. (Speech score higher than 3.0, California Reading Test score higher than 8.5)

Class 2, Lab 1, Credit 2 (S)

**NCPH-160 Interpersonal Communication
Registration #0860-160**

This course helps students become aware of the communication process and their role in it. Students examine their communication skills and evaluate how successfully they communicate expressively and receptively. Students develop strategies to help them take control and communicate effectively in social and employment situations. Some traditional interpersonal communication concepts are discussed, including first impressions, opinions, points of view, clarification of information, problem solving, anger, assertiveness, and consideration. Classes include lectures, discussions, laboratories, films and videos, and role playing. (Recommendation of speech pathologist)

Class 2, Lab 1, Credit 2 (F, W, S)

**NCPH-162 Building Relationships Through
Registration #0860-162 Communication/A**

This course helps students develop effective interpersonal communication skills and confidence. Students come to understand related concepts and develop skills in the following areas: first impressions, perception, self-disclosure, provision and use of feedback, listening, sharing opinions, conflict resolution, and assertiveness. An experiential approach is used, including structured experiences, role playing, and journal writing. (Speech score lower than 3.0)

Class 2, Credit 2 (F, W, S)

**NCPH-163 Building Relationships Through
Registration #0860-163 Communication/B**

This course helps students develop effective interpersonal communication skills and confidence. Students come to understand related concepts and develop skills in the following areas: first impressions, perception, self-disclosure, provision and use of feedback, listening, sharing opinions, conflict resolution, and assertiveness. An experiential approach is used, including structured experiences, role playing, and journal writing. (Speech score higher than 3.0)

Class 2, Credit 2 (F, W, S)

NCPH-170 **Group Presentation**
Registration #0860-170

This course helps students improve their ability to search for, organize, and present information to groups. It includes topic selection, library research, organizing, outlining written reports, and making presentations to an audience. Activities include a library tour, discussions, evaluations of speeches, and information regarding interpreting. (Speech score higher than 3.5, California Reading Test score higher than 7.0)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-171 **Public Speaking**
Registration #0860-171

This course is designed to refine and increase presentation ability by giving further experience in researching and organizing information for presentation to different audiences. Presentations focus on topics related to hearing impairment and its effect on communication, psychosocial development, and habilitation. Students can serve as presenters representing NTID. The course is highly recommended for students enrolled in social work and those preparing for managerial positions. Students should have some experience in public speaking before taking this course. (Speech score higher than 4.0, California Reading Test score higher than 10.0)

Class 2, Lab 1, Credit 2 (W, S)

NCPH-172 **Group Discussion Techniques**
Registration #0860-172

This course develops an awareness of group process and interaction. It introduces the principles and techniques necessary for successful communication in group discussions and other complex situations (e.g., interviewing). Group dynamics and leading and participating in groups are taught. Topics for group discussions include social and job-related situations. (Speech score higher than 4.0, speechreading score [with or without sound] higher than 65 percent, California Reading Test score higher than 9.0)

Class 2, Credit 2 (F, W, S)

NCPH-175 **Conversational Speech**
Registration #0860-175

Students develop skill and confidence functioning as both speakers and listeners in oral/aural conversations using appropriate discourse rules. Students develop an awareness of the characteristics of an effective conversationalist, improve their self-knowledge, and set goals toward becoming effective conversationalists. Students also develop vocabulary and pronunciation skills and refine speech skills. Current issues are used as conversational topics. The course is structured to promote learning and reliance on individual and peer feedback. (Speech score higher than 3.0, speechreading score [with or without sound] higher than 36 percent, Michigan Test score higher than 60)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-177 **Strategies to Aid**
Registration #0860-177 **Functional Communication**

This course is suitable for students who want to develop and practice receptive and expressive strategies to aid in oral/aural communication with a non-signing person. Students develop strategies for communicating in specific dialogue situations, such as renting an apartment and ordering food in a restaurant. Class activities focus on speaking, speechreading, and using strategies in specific functional situations. Laboratory work includes viewing videotapes and practicing speech. Students produce and critique videotapes of simulated situations. Journals are used to describe out-of-class conversational practice. (Speech score of 1.9-3.1, speechreading score [with or without sound] higher than 34 percent, Michigan Test score higher than 50. This course is not appropriate for students with severe voice disorders as noted by a speech-language pathologist)

Class 2, Lab 1, Credit 2 (F, W, S)

NCPH-178 **Communication for the**
Registration #0860-178 **Job Interview: Speaking**

This course focuses on improving the communication aspect of the job interview through a series of practice interviews. It is for students who have difficulty communicating during an interview. The focus of this course is on using speech effectively. Students with some speech skills and who prefer to use them during an interview are appropriate for this course. Communication for the Job Interview: Writing, offered through the audiology department, is available for students who prefer to use writing during an interview. (Completed one year in program, speech score higher than 3.0, NGGE-101)

Class 2, Lab 1, Credit 2 (W, S)

NCPH-399 **Independent Study**
Registration #0860-399

This course is designed for students with special needs that cannot be met by another communication course. Students are required to write a contract describing what the course will cover and their responsibilities. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should talk to their communication advisor.

Credit 1-4 (F, W, S)

Technical and Integrative Communication Studies

NCPT-101 **Video Resume Preparation**
Registration #0864-101

This course provides students with a state-of-the-art format in which to use functional communication skills to express personal and professional information. Students develop a three- to five-minute video resume that describes their job qualifications and communication strategies. Each student considers individual communication strengths and preferences to determine how to communicate in the video, using speech with captions or sign language with a voice interpreter. Students confer with their employment advisor to determine what information is appropriate and how the resume might be used in the job-search process. Students are able to borrow or copy their video for personal use. (Approval of employment advisor, completion of or enrollment in NGGE-101)

Class 1, Credit 1 (F, W, S)

**NCPT-118 Seminar in Adventitious Deafness
Registration #0864-118**

This course is intended to provide students who have an acquired hearing loss with an understanding of their deafness, educationally, socially, culturally, and communicatively. Communication strategies for social and classroom settings are discussed and discussion of feelings, attitudes, and issues related to the psychosocial and cultural implications of deafness are stressed. (NCPX-101 or interview with instructor)

Class 2, Discussion Group 1, Credit 3

Educational Support Service Programs

Center for Sign Language and Interpreting Education

Educational Interpreting

**NITP-200 Sign Vocabulary Development
Registration #0850-200**

This course allows students to develop, expand, and refine sign vocabulary skills that prepare them for future courses in interpreting. Vocabulary introduced includes at least 300 signs.

Class 1, Lab 1, Credit 1

**NITP-203 American Sign Language I
Registration #0850-203**

This required course concentrates on development of basic knowledge of and beginning skills in conversational use of American Sign Language (ASL). Students describe ASL as it fits into a general language model. Students learn to recognize and accurately produce ASL sentence types with appropriate non-manual behaviors and grammatical features.

Class 2, Lab 2, Credit 3

**NITP-204 American Sign Language Interpreting I
Registration #0850-204**

This required course uses skills and principles learned in American Sign Language I and II. Students practice interpreting from English to ASL using consecutive interpreting. Using the body of knowledge available from foreign language interpreting, students examine the theoretical aspects of the interpreting process. (NITP-206)

Class 1, Lab 4, Credit 3

**NITP-205 American Sign Language Interpreting II
Registration #0850-205**

This skills-development elective course provides experience in simultaneous and consecutive interpretation. Activities include simulated interpreting experiences, interpreting practice with the use of audio- and videotapes, and critiques. (NITP-204)

Class 1, Lab 4, Credit 3

**NITP-206 American Sign Language II
Registration #0850-206**

This required course develops conversational fluency in ASL. Students incorporate appropriate use of ASL classifiers, non-manual grammatical markers, and grammatical features of ASL in a conversational setting. (NITP-203)

Class 2, Lab 2, Credit 3

**NITP-210 Fingerspelling and Number
Registration #0850-210 Comprehension**

Students improve their ability to comprehend fingerspelled words and manually signed numbers within messages signed at a conversational rate of speed. Instructional activities include games, drills, and voice interpreting.

Lab 6, Credit 3 (F)

**NITP-211 Voice Interpreting I
Registration #0850-211**

This course increases students' ability to receive the spoken and signed messages of hearing-impaired people and refines students' ability to use vocal modulation to prepare for the voice interpreting task. This is a self-paced laboratory course. Students learn by viewing videotapes and completing a series of exercises. The videotapes contain hearing-impaired people communicating orally, in signed English, and in ASL. (NITP-210)

Class 2, Lab 2, Credit 3

**NITP-212 Voice Interpreting II
Registration #0850-212**

This course develops students' ability to generate a spoken English equivalent while viewing/listening to a hearing-impaired person's signed/spoken message. This is a self-paced laboratory course. (NITP-211, NITP-331)

Class 1, Lab 4, Credit 3

**NITP-213 Voice Interpreting III
Registration #0850-213**

This course continues development of the voicing task. More complex videotaped samples of signed/spoken messages of hearing-impaired people are delivered at a faster rate than those in Voice Interpreting I and II. This is a self-paced laboratory course. (NITP-212)

Class 1, Credit 3

**NITP-251,252 Aspects and Issues of Deafness I, II
Registration #0850-251,252**

Students learn the communication and psychosocial/cultural aspects of deafness through panel and class discussions, readings, and field trips. (NITP-251 for NITP-252)

Class 3, Credit 3

**NITP-261 Theory and Practice of Interpreting I
Registration #0850-261**

This course addresses the current theory and practices of the profession of interpreting. Topic areas include: general communication principles and their application to the interpreting task; the history of the profession of interpreting; different types of interpreting and related terminology; general skills required in interpreting and current applications by professional interpreters; overview of the professional code of ethics and its rationale; population serviced by interpreters, (e.g., hearing-impaired speechreaders, deaf-blind individuals, and multiply disabled individuals); resources related to interpreting and mainstreaming available to students; and current issues facing the professional (e.g., multiple roles and mainstreaming specialists).

Class 3, Credit 3

NITP-262 Theory and Practice of Interpreting II
Registration #0850-262

Students use a communication process model to acquire a theoretical base for the interpreting task. Topics addressed are linguistic principles associated with sign language and the interpreting task as well as skills in positioning and lighting. This course includes lectures and student participation in small and large group activities. (NITP-261)

Class 3, Credit 3

NITP-271 The Professional Interpreter I
Registration #0850-271

Students develop a broad understanding of interpreting as a profession, national standards for certification, and the concepts contained in the Registry of Interpreters for the Deaf code of ethics. Other areas of concentration are interpersonal skills, self-critique, professional development, and resume writing. Coursework includes panels, role playing, discussions, readings, and lectures.

Class 3, Credit 3 (S)

NITP-281 Interpreting Practicum I
Registration #0850-281

This course provides an opportunity to acquire knowledge about the profession of interpreting through observation of and discussion with professional interpreters. The practicum student is assigned a mentor who will supervise the practicum experience. (Corequisite: NITP-283) (NITP-211, NITP-251, NITP-262, NITP-271, NITP-331)

Class 10, Credit 5 (F, W, S)

NITP-283 Interpreting Seminar I
Registration #0850-283

This course is designed as part of the practicum experience. Students come together and share observations and experiences gained from the practicum placement. Class discussion focuses on analyzing ethical or situational problems, behavioral alternatives, and outcomes. (Corequisite: NITP-281)

Class 2, Credit 1 (F, W, S)

NITP-311,332 Expressive Transliterating I, II
Registration #0850-331,332

These two courses concentrate on expressive transliteration as it relates to conceptually accurate English. Students develop skills required to present a spoken message in a signed English mode. Emphasis is placed on conceptual accuracy, accuracy of fingerspelling, vocabulary development, facial expression and body movement, and self-critiquing skills. (NITP-205 for NITP-331; NITP-331 for NITP-332)

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

NITP-342 Deaf-Blind Interpreting
Registration #0850-342

Students are prepared to interpret for deaf-blind consumers. Topics concerning deaf-blindness include causes and effects, aspects and issues of deaf-blindness, information and resources, and interpreting modes and methods of communication. (NITP-212, NITP-271, NITP-331)

Class 3, Credit 3

NITP-343 Expressive Oral
Registration #0850-343 Interpreting/Transliterating

This course concentrates on the skill of expressive oral transliteration. Students develop the skill of receiving an auditory message and reproducing it in a highly visual modality by applying the principles of clear speech production and support techniques. Emphasis is placed on speech production principles, natural gestures, body language, facial expressions, and speed of transmission. (NITP-252)

Class 3, Credit 3

NITP-372 The Professional Interpreter II
Registration #0850-372

Students develop a broad understanding of interpreting as a profession, national standards for certification, and the concepts contained in the Registry of Interpreters for the Deaf code of ethics. Other areas of concentration are interpersonal skills, self-critique, professional development, and resume writing. Coursework includes panels, role playing, discussions, readings, and lectures. (NITP-271)

Class 3, Credit 3

NITP-382 Interpreting Practicum II
Registration #0850-382

This course provides the opportunity to integrate skills and knowledge through practicum situations. Experiences are gained by observation and actual interpreting in a variety of settings. Practicum students are assigned mentors who supervise the practicum experience. (Corequisite: NITP-384) (NITP-212, NITP-252, NITP-332, NITP-372, NITP-395)

Class 12, Credit 5 (F, W, S)

NITP-384 Interpreting Seminar II
Registration #0850-384

This course is designed as part of the practicum experience. Students come together and share observations and experiences gained from the practicum placement. Class discussion focuses on analyzing ethical or situational problems, behavioral alternatives, and outcomes. (Corequisite: NITP-382) (NITP-212, NITP-252, NITP-332, NITP-372, NITP-395)

Class 2, Credit 1 (F, W, S)

NITP-391 Principles of Tutoring/Notetaking
Registration #0850-391

This course prepares students to provide tutoring and notetaking support for hearing-impaired people in mainstream educational settings. The methodology is appropriate for elementary, secondary, and postsecondary education levels. (NITP-251)

Class 3, Credit 3

NITP-392 Tutoring/Notetaking Practicum
Registration #0850-392

Students provide tutoring and notetaking services to hearing-impaired students. A minimum of 10 hours per week is devoted to taking notes in class and tutoring outside of class. Practicum sites include the Rochester City School District, Monroe County Board of Cooperative Educational Services (BOCES) program, colleges of RIT, and other Rochester-area universities and colleges. Supervision is provided. (NITP-391)

Class 10, Credit 3 (F, W, S)

NITP-395 **Mainstreaming: Educational Programs and Alternatives**
Registration #0850-395
 This course explores the goals and processes of education of hearing-impaired people and covers current demographic, legal, economic, and social trends affecting education of hearing-impaired people. Students identify criteria and processes for the establishment of quality support services for hearing-impaired students. (NITP-251)

Class 3, Credit 3

NITP-396 **The Support Service Professional**
Registration #0850-396

This course addresses the knowledge and skills necessary for functioning in a variety of educational and non-educational settings where the support service provider has more than one major responsibility. Presentations by people with practical experience in the field enhance students' awareness of what it means to be a support service professional. (NITP-281, NITP-283, NITP-391, or permission of instructor)

Class 3, Credit 3

NITP-397 **Contemporary Studies in Support Services**
Registration #0850-397

This course addresses the dynamic nature of support services and special education. As changes and growth occur in the field, this course addresses "state-of-the-art" issues. Some examples are court decisions, state and federal legislation, research findings, development of new techniques or technology, in-service training programs for faculty members and service providers, and management of support services. The course is offered as new topics arise or if a lecturer with specific expertise in support services is available to conduct the course. (NITP-281, NITP-392, or permission of instructor)

Class 1-3, Credit 1-3 (S)

NITP-399 **Independent Study**
Registration #0850-399

NITP-205, NITP-252, NITP-262, NITP-331, NITP-391, or permission of instructor)

Credit 1-3

Other courses offered within NTID and RIT may be taken as electives-if students have interests outside the educational interpreting program and time available to take them. For information on these courses and the process for registering for them, students should see their educational interpreting academic advisor.

Sign Communication

NCPX-101 **Sign Communication I**
Registration #0863-101

This course is designed to assist students with no previous sign communication skills in developing both receptive and expressive skills in basic American Sign Language (ASL) and natural sign English for both academic and social environments. The course includes conversational vocabulary, fingerspelling, grammatical principles, and cultural aspects of the deaf community. Also, strategies for use of sign language and speech together are discussed and practiced. (Sign Instruction Placement Interview [SIPI] rating of 1 or Language Background Questionnaire [LBQ] rating of 1 or 2)

Class 2, Credit 2 (F, W, S)

NCPX-103 **Sign Communication II**
Registration #0863-103

This course is designed to assist students in continuing their development of both receptive and expressive skills in ASL and natural sign English for academic and social settings. The course strengthens students' skills and knowledge with additional conversational sign vocabulary, grammatical principles, and cultural aspects of the deaf community. The focus is on developing expressive and receptive skills in dialogues and short presentations. Practice in using sign language and speech together is included. (SIPI 2 or grade of C or better insNCPX-101)

Class 2, Credit 2 (F, W, S)

NCPX-105 **Sign Communication III**
Registration #0863-105

This course is designed to assist students in continuing their development of receptive, expressive, and conversational skills in advanced ASL and natural sign English for both academic and social settings. The course continues to strengthen students' skills and knowledge with advanced vocabulary, grammatical principles, and cultural aspects of the deaf community. The focus is on the development of receptive skills in dialogues and presentations. Continued practice with use of sign language and speech together is included. (SIPI 3 or grade of C or better in NCPX-103)

Class 2, Credit 2 (F, W, S)

NCPX-111 **American Sign Language**
Registration #0863-111 **for Sign English Users**

This course is designed to assist students who use sign English in developing expressive and receptive ASL skills. Study of ASL historical, cultural, and linguistic information is included. (SIPI 3 or 4 or grade of C or better in NCPX-105)

Class 2, Credit 2 (F, W, S)

NCPX-131 **Signing Basic English Idioms**
Registration #0863-131

This course is designed to assist students in developing their skills in using natural sign English and ASL to receive and express English idioms. Also, strategies for effective use of these sign skills to assist in reading and writing English idioms are discussed and practiced. (SIPI of 4 or 5 or LBQ 4 or 5, English status: Marginally Qualified [MQ] or Preparatory [PP])

Class 2, Credit 2 (F, W, S)

NCPX-133 **Signing Idiomatic English**
Registration #0863-133

This course is designed to assist students in developing their skills in using natural sign English and ASL to receive and express English idioms. Also, strategies for effective use of these sign skills to assist in reading and writing English idioms are discussed and practiced. (SIPI of 4 or 5 or LBQ 4 or 5, English status: Proficient [PF] or Provisionally Qualified [PQ])

Class 2, Credit 2 (F, W, S)

NCPX-135 **Public Presentations**
Registration #0863-135

Students learn to specify a topic; research, organize, and present ideas; write an outline; and present from an outline using sign language and simultaneous communication as appropriate. Students also learn to communicate with a variety of audiences through the use of media and interpreters. Students present speeches designed to inform, demonstrate, and persuade. (SIPI of 4 or 5 or LBQ 4 or 5, California Reading Test score higher than 7.5)

Class 2, Credit 2 (F, W, S)

**NCPX-141 Understanding American Sign Language
Registration #0863-141 as a Language**

This course is designed to assist students in developing basic knowledge about the linguistic structure of ASL. Also, basic information about the historical and cultural aspects of ASL is introduced and discussed. (SIPI of 5, Michigan Test score higher than 60)

Class 2, Credit 2 (F, W, S)

**NCPX-145 Linguistics of Sign
Registration #0863-145 Communications**

This course is designed to assist students in developing basic knowledge of the grammar and structure of the range of sign communications systems, from American Sign Language (ASL) to invented English sign systems. Also included is discussion of the developmental roots of these sign systems and their purposes and usual environments. (SIPI of 4 or 5, LBQ 4 or 5, or grade of C or better in NCPX-111)

Class 2, Credit 2 (F, W, S)

**NCPX-151 Sign Language Interpreting:
Registration #0863-151 Consumer Awareness**

This course is designed to assist students in becoming better educated consumers of interpreting services. Aspects of interpreting discussed include: history of the Registry of Interpreters for the Deaf (RID); RID Code of Ethics; roles, rights, and responsibilities of all people involved in interpreting situations; laws relating to interpreters and services; pay scales for interpreters; and types of interpreting (oral, manual, combined, simultaneous, and consecutive). Practicum experience is provided. (SIPI 3,4, or 5 or LBQ 4 or 5)

Class 2, Credit 2 (F, W, S)

**NCPX-161 Introduction to Sign Language Teaching
Registration #0863-161**

Students are given an overview of how languages traditionally have been taught as well as current methods and theories and their applications to the teaching of sign language. Students practice basic teaching techniques, selecting appropriate materials, designing curriculum and evaluations, teaching cultural information, and including grammatical features in lessons. Students learn about resources to support their efforts to teach sign language. (SIPI 4 or 5, NCPX-141 or NCPX-145)

Class 2, Credit 2 (F, W, S)

**NCPX-163 Practicum in Teaching
Registration #0863-163 Sign Language**

This course is designed to strengthen students' knowledge of sign language teaching skills. Students observe sign language classes taught by faculty members in the sign communication program and instructors from the Rochester community. Students participate in class planning, teaching, and evaluation activities as teaching assistants, sign language tutors to faculty and staff members, or as teachers in the RITSIGN program. (SIPI 4 or 5, completion of NCPX-161)

Class 2, Credit 2 (F, W, S)

**NCPX-399 Independent Study
Registration #0863-399**

This course is designed for students with special needs not met by other sign communication courses. Students are required to write a contract describing what the course will cover. The contract must be signed by the student, instructor, and chairperson. Students interested in this course should consult their communication advisor.

Credit 1-4 (F, W, S)

Division of General Education Programs

General Education

Required Courses

**NGGE-100 or NAPS-100 Freshman Seminar
Registration #0847-100 or #0853-100**

This course is designed to provide entering students with opportunities to enhance intellectual, academic, personal, social, and ethical decision-making skills in order to maximize their college experience. Students have opportunities to explore and negotiate the college environment, expand critical thinking skills, learn and use academic skills, confront questions of identity and social roles, and deal with ethical issues with faculty members and senior-level students who serve as mentors.

Class 3, Credit 2 (F, W)

**NGGE-101 Job Search Process
Registration #0847-101**

This course is designed for students who are preparing for their first co-op experience or permanent job. Students learn about resume writing, employment letters, sources of employment information, job applications, interviews, and ways to find a job. Learning activities include lectures and written assignments.

Class 2, Credit 1 (F, W)

**NGGE-102 Contemporary Life Issues
Registration #0847-102**

This course focuses on life issues and social problems. Students have an opportunity to broaden their understanding of themselves and society and develop survival skills to assist them in the transition from college to the wider community. One topic from each of the four content areas is covered from an individual and social perspective. This course is designed for students completing certificates, diplomas, and AOS degrees. AOS degree students who have completed the three Human Experience courses (NGGE-166, 167, and 168) may choose to take Contemporary Social Issues (NGGE-202) instead of this course.

Class 2, Credit 2 (F, W, S)

**NGGE-202 Contemporary Social Issues
Registration #0847-202**

This course focuses on social issues. Students apply the knowledge and skills learned in College of Liberal Arts courses to understanding current social issues and their impact on individuals and society. One topic from each of the eight content areas (personal/social problems, ethics, racial and other minority issues, peace and war, economic issues, political and public policy issues, environmental issues, and deaf community issues) are covered in class from individual, social, and political perspectives. This course is designed for AAS degree students who have completed three Liberal Arts courses. AOS degree students who have completed the three Human Experience courses (NGGE-166, 167, and 168) may choose to take this course instead of Contemporary Life Issues (NGGE-102).

Class 2, Credit 2 (F, W, S)

Elective Courses

Fine Arts and Humanities

History

NGGE-148

Registration #0847-148

This course examines many topics related to deafness. Students survey "the deaf experience" from ancient times to the present by tracing the social and cultural heritage of deaf people and by examining important events and developments. Deaf individuals who have made important and remarkable contributions and achievements also are studied.

Class 3, Credit 3 (F, W, S)

Deaf Heritage

NGGE-149

Registration #0847-149

This course gives students an understanding of American history, beginning in 1607 and continuing through the 20th century. It introduces students to a history of the country's past (heritage) and helps prepare them for the personal responsibilities of good citizenship in contemporary society.

Class 3, Credit 3 (F, W, S)

American Past

NGGE-201

Registration #0847-201

This course is an introduction to political, social, and cultural history from 1600 through the 20th century and serves as a bridge to Modern European History offered in the College of Liberal Arts. Emphasis is placed on the major historical developments that have influenced the development of modern Europe.

Class 3, Credit 3 (W)

European History

NGGE-202

Registration #0847-202

This course examines the major news events as they occur through identification of underlying issues and their historical foundations.

Class 3, Credit 3(F)

Current Events Seminar

Language and Literature

NGGE-215

Registration #0847-215

This course provides a basic introduction to dramatic literature as well as a bridge to the study of dramatic literature in the College of Liberal Arts. It introduces students to the play script as literature and to play script analysis, focusing on vocabulary and basic skills.

Class 3, Credit 3 (F, W)

Introduction to Dramatic Literature

NGGE-216

Registration #0847-216

This course serves as a survey course for students desiring a basic knowledge of prose fiction and nonfiction and as a bridge to the study of prose in the College of Liberal Arts. It introduces students to the genres of the short story, novel, autobiography, and essay.

Class 3, Credit 3 (W)

Introduction to Prose Literature

NGGE-218

Registration #0847-218

This course is designed for students who need to improve their reading and writing skills before entering Written Communication II. Using a variety of readings and topics, students develop the language and thinking skills needed to write effectively. Specifically, students learn the conventional structures of paragraphs and essays; generate ideas through a variety of invention strategies; use basic development techniques and order choices in writing; use a variety of analytic strategies for both reading and writing; and write paragraphs and essays using narration, exposition, and summary forms. (Appropriate score on NTID Liberal Arts Placement Test)

Class 3, Credit 4 (F, W, S, Su)

Written Communication I

NGGE-219

Registration #0847-219

This course is designed for students planning to take English Composition and who need an introduction to the basic concepts of good writing. Using a variety of readings and topics, students develop the language and thinking skills needed to write effectively. Specifically, students learn the conventional structures of documented reports; generate ideas through a variety of invention strategies; review basic development techniques and order choices and learn more complex forms; use a variety of analytic strategies for both reading and writing; enhance critical thinking skills by recognizing assumptions, overgeneralizations, oversimplifications, etc.; and write essays using exposition, summary, critique, persuasion, and argumentation forms. (NGGE-218 or appropriate score on the NTID Liberal Arts Placement Test)

Class 3, Credit 4 (F, W, S, Su)

Written Communication II

Religion

NGGE-145

Registration #0847-145

This course provides a basic understanding of the contents of the Bible. It presents some of the major events and themes, and focuses on the cultural and historical circumstances in which the biblical literature grew. Students with a variety of religious interests may take this course. The course does not approach the literature from any particular belief or lack thereof.

Class 2, Credit 2 (F)

The Bible as Literature: A Cultural and Historical Perspective

NGGE-150

Registration #0847-150

This course gives students an understanding of the historical and literary roots of two major religions of the world, Judaism and Christianity. The foundations of Western culture also are explored. A study of these roots begins with a geographical and sociological view of the Ancient Near East 6,000 years ago and continues with a study of factors that encouraged the later development of Jewish/Christian religious thought and understanding. Students have an opportunity to become more familiar with their own heritage so that they can better form values, opinions, and answers to religious questions in their own lives.

Class 2, Credit 2 (F, W, S)

Our Judeo-Christian Heritage

Interdisciplinary

NGGE-166

Registration #0847-166

The Human Experience: An Individual Life
This course introduces the major challenges faced by human beings throughout the life cycle. It explores the factors that affect healthy and unhealthy adjustments to the circumstances of an individual's life, including biological inheritance, thoughts, feelings, and environment. Students examine contemporary issues related to the challenges of adolescence, adulthood, and old age in order to understand how unconscious adjustment and conscious decision making help in attaining and maintaining psychological health. Selected contemporary issues are explored through self-reflection; group discussions; writing; examination of scientific, literary, and periodical materials; guest speakers; and campus and community activities. Alternative solutions to life's challenges are generated, shared, and evaluated by students. Through these experiences, students are introduced to the knowledge, communication skills, and critical-thinking skills important for making responsible decisions throughout their adult lives. This course is required for AOS degree students. (Permission of department chairperson or instructor)

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

NGGE-167

Registration #0847-167

The Human Experience: The Individual and Society
This course focuses on the individual's relationships with others, starting from a study of primary groups and moving through a study of secondary groups (peers, school, work, and citizenship groups) to a study of world awareness and responsibility. The course involves the perception and evaluation of values, morals, ethics, human rights, and responsibilities. The study of selected social issues is accomplished through self-reflection, group and panel discussions, reading of periodicals and teacher-created materials, and participation in campus and community activities. Students are introduced to the knowledge, communication skills, and critical thinking skills important for making responsible decisions throughout their lives. This course is required for AOS degree students. (NGGE-166)

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

NGGE-168

Registration #0847-168

The Human Experience: The Individual and Technology
This course explores the social, political, economic, and ethical dimensions of the relationship between the individual and technology in modern society. It provides a specific focus for the application of the general understanding of human development, society, and the possibilities for personal self-determination that students acquire in *The Human Experience: An Individual Life* and *The Human Experience: The Individual and Society*. Drawing on this knowledge and using the skills in communication and critical thinking that they have developed, students analyze selected current issues that affect their lives, present and future, and develop a course of responsible actions based on their analysis. This activity will be grounded in a consideration of the nature of science and technology, the role of human values in determining the course of scientific inquiry and the social uses of technology, and some major areas of controversy in this field. This course is required for AOS degree students. (NGGE-167)

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

Mathematics and Science

NGGE-220 or NAPS-220 Reading and Thinking in Science and Technology

This course is offered to cross-registered science and engineering students who are interested in raising their academic achievement level and to other students who wish to improve their skills and increase their knowledge in these areas. The course helps students evaluate their strengths and weaknesses in areas of thinking such as comparing, analyzing, reasoning, and problem solving. With an emphasis on making thinking overt, strategies are modeled and practiced. Expansion of both background knowledge and scientific vocabulary are additional benefits.

Class 3, Credit 3 (S)

Social Science

Economics and Political Science

NGGE-106

Registration #0847-106

Personal Finance
This course introduces students to basic money management. Topics for in-depth discussion are based on student interest and selected from the areas of income tax, banking, credit, budgeting, inflation, and shopping wisely to save money.

Class 2, Credit 2 (F, W, S)

NGGE-203

Registration #0847-203

Economic Basics
This course serves as a bridge to Introduction to Economics offered in the College of Liberal Arts. It is designed to introduce students to basic background knowledge in economic concepts and methods of analysis. Emphasis is placed on the application of basic methods of economic analysis, economic theories, and contemporary economic issues of the United States. (NTMM-142 or the equivalent is recommended)

Class 3, Credit 3 (S)

Psychology

NGGE-105 or NAPS-105

Registration #0847-105 or #0853-105

Learning Strategies
This course is designed to help students evaluate their strengths and weaknesses and to improve their learning efficiency and effectiveness through appropriate training. Students have the opportunity to improve their learning skills in areas such as reading, test taking, questioning, and general study habits. Activities include lectures, discussions, and individual conferences.

Class 2, Credit 2 (F, W, S)

NGGE-108

Registration #0847-108

Drug and Alcohol Usage
This course is designed to give a general overview of various drugs commonly used among college-age populations. Upon completion of this course, students should be able to identify and describe the effects on the body, both short- and long-term, from using each drug covered; classification; dependence; and tolerance. Students study the following drug-related topics: social impact, peer pressure, economy of drugs, and personal values related to drugs.

Class 2, Credit 2 (F, W, S)

NGGE-109 **Adjusting to Deafness**
Registration #0847-109

This course is designed to assist students who are postlingually deafened, individuals who prefer using an oral method of communication and have had little or no contact with other hearing-impaired people, and prelingually deaf people who have grown up in hearing environments. The course covers topics about deafness, including social issues, how deafness affects individuals and their families, and ways that an individual adjusts to deafness.

Class 2, Credit 2 (F, W, S)

NGGE-111 **Basic Human Sexuality**
Registration #0847-111

This course provides information and helps students understand human sexuality. Topics addressed include feelings and attitudes toward sexuality, values, and sensitivity to the feelings of others. Activities include lectures, discussions, and projects.

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

NGGE-113 **Psychology and Your Life**
Registration #0847-113

This course presents a life-stages model of human development that emphasizes psychological aspects of development, including emotional, self-concept, and interpersonal relationship development. Students use this model to identify important life issues for themselves and others and also to better understand their own behavior as well as that of children, teenagers, parents, and older people.

Class 3, Credit 3 (F, W, S)

NGGE-126 **Leadership Development**
Registration #0847-126

This course helps students develop managerial/leadership skills. A required project and class activities assist them in improving leadership skills. Course topics include one- and two-way communication, group leadership and followership, styles of leadership, delegating responsibility, planning skills, helping behaviors, establishing goals, and problem-solving techniques.

Class 2, Credit 2 (F, W, S)

NGGE-146 **Psychology of Religion**
Registration #0847-146

This course is designed to help students understand how religion may relate to their lives and how they can develop a mature, reflective, and critical view of religion as a life influence. Topics for study include religion as a type of human behavior, methods of studying religious experiences, the psychology of conversion, mysticism, and human development in religious understanding and practice.

Class 2, Credit 2 (S)

NGGE-161 **Career Decision Making**
Registration #0847-161

This course, designed for students who are not sure about their educational and career goals, teaches them how to plan careers and lives. Work is on an individual or small-group basis. Activities include independent study, field trips, role playing, lectures, and discussions.

Class 2, Credit 2 (F, W, S)

NGGE-163 **Interpersonal Relationships on the Job**
Registration #0847-163

This course teaches students the importance of good work relationships to careers. Topics include employer-employee relationships, co-worker relationships, and how work relationships affect job satisfaction. Activities include role playing, discussions, and presentations

Class 2, Credit 2 (F, W, S)

Sociology and Anthropology

NGGE-112 **Love, Marriage, and the Family**
Registration #0847-112

This course examines the potentials and problems of married life. Students are introduced to such relevant topics as love, sexuality, singlehood, marital roles, conflict resolution, and parenting. The course challenges students to recognize their rights and responsibilities in relationships and offers them opportunities to clarify their thinking with peers and faculty members.

Class 3, Credit 3 (F, W, S)

NGGE-127 **Community Service I**
Registration #0847-127

This course is designed to give students an opportunity to learn some basic helping skills and to use these skills in a supervised community service experience. Students explore different volunteer and professional helping roles and use this information to make personal and career choices. Activities include lectures, discussions, volunteer service, and individual conferences.

Class 2, Credit 2 (F, W, S)

NGGE-147 **Law and Society**
Registration #0847-147

This course is designed to assist students in understanding the basic rules and applications of practical law as it applies to personal rights and responsibilities. Topics covered are how laws affect a society, civil rights, legal rights, torts, marriage, family relations, and criminal law. Activities include lectures and field trips.

Class 2, Credit 2 (F, W, S)

Theater

NGGT-100 **Technical Theater I**
Registration #0848-100

This course covers the methods and materials used in technical theater. Topics include scenery construction, properties, and the responsibilities of different theater personnel. Activities include lectures, demonstrations, discussions, and involvement in theater productions.

Class 2, Credit 2 (F, W, S)

NGGT-101 **Technical Theater II**
Registration #0848-101

This is a course for students who want to learn more about technical theater. Activities include independent projects, supervision of crews, and shopwork. (NGGT-100)

Class 2, Credit 2 (F, W, S)

NGGT-102 **Stage Lighting**
Registration #0848-102

This course introduces students to theater lighting and teaches them how to use each piece of lighting equipment. Activities include hanging lights for plays, running the light board, and using color in lighting. (NGGT-100)

Class 2, Credit 2 (F, W, S)

NGGT-120 Acting I**Registration #0848-120**

This course explores communication by using pantomime, sign mime, body language, facial expression, character study, and role playing. Students learn to perform in front of an audience with confidence and skill.

Class 2, Credit 2 (F, W, S)

NGGT-121 Acting II**Registration #0848-121**

This course helps students perfect acting skills. Activities include advanced character development and preparation of scenes with a partner. (NGGT-120, permission of instructor)

Class 2, Credit 2 (F, W, S)

NGGT-130 Introduction to Theater**Registration #0848-130**

This course, designed to teach students about theater production, encourages them to take part in theatrical experiences while they learn about acting, writing, directing, and designing (lights, scenery, costumes, make-up). Activities include lectures, demonstrations, and discussions.

Class 2, Credit 2

NGGT-131 Creative Translation into Sign Language**Registration #0848-131**

This course covers translation forms used by the department of performing arts. Students learn to translate stories, poems, and plays into American Sign Language. They also learn to present their translated works in sign. Activities include lectures, discussions, drills, and group workouts.

Class 2, Credit 2

NGGT-132 Sign Mime**Registration #0848-132**

This course teaches students to translate plays, poems, and stories into sign mime. Topics include how to develop and use sign mime in theater and how to express original ideas in sign mime. Activities include lectures, demonstrations, and a laboratory.

Class 2, Credit 2

NGGT-133 Theater Practicum**Registration #0848-133**

This course is for students who are accepted for a role (performance or crew) in a faculty-directed theater production. Acting students analyze a script, develop a character, rehearse, memorize, and perform. Crew students build a specific scene or costume element and serve as members of the running crew. This course may be taken more than once.

Class 3-8, Credit 1-3

NGGT-140 Dance Performance I**Registration #0848-140**

This course teaches students the basic terminology and techniques of modern dance. Basic body structure and creative movement are studied by the class. Individuals and groups perform in the studio. Activities include lectures, demonstrations, exercises, and performances.

Class 2, Credit 2 (F, W, S)

NGGT-141 Dance Performance II**Registration #0848-141**

This intermediate-level modern dance course teaches technique, group work, and performance standards. Activities include lectures, discussions, exercises, and performances. (NGGT-140, dance experience, or permission of instructor)

Class 2, Credit 2 (F, W, S)

NGGT-142 Sign Dance**Registration #0848-142**

In this basic dance class that includes warm-up, barre, center, and cross-the-floor movement, sign language and modern dance become the basis from which students make compositions. Students do not need to know sign language to take the course. Activities include lectures, demonstrations, and performances.

Class 2, Credit 2

NGGT-143 Special Topics in Dance**Registration #0848-143**

This course teaches different styles of dance. Possible topics include Afro-Caribbean dance, ballet, jazz, and tap. This course may be taken more than once.

Class 2, Credit 2 (F, W, S)

NGGT-150 Music Introduction/ Instruction Practicum**Registration #0848-150**

This course helps students develop musical skills in one or more of the following areas: piano, guitar, electric bass, percussion, brass, woodwinds, strings, organ, and voice. Students may begin with basic instruction and progress to more advanced levels. Lessons are offered on an individual or small-group basis. This course may be taken more than once.

Class 2, Credit 2 (F, W, S)

NGGT-200 Play Production I**Registration #0848-200**

This course covers the areas of script analysis, acting for the stage, and stage direction. Through lectures, demonstrations, class discussions, projects, and films, students encounter a fundamental concern of all theater artists—how to transform the printed word into living theater. The topics presented not only acquaint students with stage practices, but through contrast and comparison, clarify those areas in which television and motion-picture production require different imaginative techniques than are used for stage production.

Class 4, Credit 4 (W)

NGGT-399 Independent Study**Registration #0848-399**

Class 3-9, Credit 1-3

SBIB-205,206,207 **General Biology Laboratory**
Registration #1001-205,206,207

Laboratory work complements the lecture material of General Biology (SBIB-201, 202, 203). The experiments are designed to illustrate concepts; develop laboratory skills and techniques; and improve ability to make, record, and interpret observations. (Corequisites: SBIB-201 for SBIB-205; SBIB-202 for SBIB-206; SBIB-203 for SBIB-207)

Lab 3, Credit 1 (SBIB-205, F; SBIB-206, W; SBIB-207, S)

Chemistry

SCHA-261 **Introduction to Chemical Analysis I**
Registration #1008-261

This course offers an introduction to quantitative analysis, solubility of ionic compounds and the equilibria involved, activity concepts, and statistical treatment of data. Laboratory experiments include gravimetric and precipitation methods. (Corequisite: SCHC-251)

Class 2, Lab 5, Credit 3 (F)

SCHA-262 **Introduction to Chemical**
Registration #1008-262 **Analysis II**

This course discusses systematic treatment of acid-based equilibria, titrations, analytical oxidation-reduction processes, and complex metric methods. (Corequisite: SCHC-252) (SCHA-261)

Class 2, Lab 5, Credit 3 (W)

SCHA-263 **Introduction to Chemical**
Registration #1008-263 **Analysis III**

This course introduces electrochemical and spectroscopic methods and potentiometric and spectrometric titrations. Electrodeposition and pH measurements are included in the laboratory. (Corequisite: SCHC-253) (SCHA-262)

Class 2, Lab 5, Credit 3 (S)

SCHC-251 **General Chemistry I**
Registration #1010-251

This course includes a detailed study of fundamental tools of chemistry, atomic theory and nuclear chemistry, stoichiometry (elements, compounds, reactions), and properties of gases and thermochemistry (first law). (Corequisite: SCHA-261)

Class 3, Credit 3 (F)

SCHC-252 **General Chemistry II**
Registration #1010-252

This course describes structure and properties of the atom; periodic relationships; basic concepts of chemical bonding, kinetics, and equilibrium; and thermodynamics (free energy, second and third laws). (Corequisite: SCHA-262) (SCHC-251)

Class 3, Credit 3 (W)

SCHC-253 **General Chemistry III**
Registration #1010-253

This course describes oxidation-reduction and electrochemistry; descriptive chemistry of selected elements; properties of liquids and solids; chemical bonding theories; transition elements and coordination chemistry; introduction to organic chemistry, biochemistry, and polymers; and introduction to the use of chemical literature. (Corequisite: SCHA-263) (SCHC-252)

Class 3, Credit 3 (S)

SCHG-208 **College Chemistry I**
Registration #1011-208

This course is primarily for, but not limited to, engineering students. Topics include an introduction to some basic concepts in chemistry, stoichiometry, first law of thermodynamics, thermochemistry, electronic theory of composition and structure, and chemical bonding.

Class 4, Credit 4 (F, W)

SCHG-209 **College Chemistry II**
Registration #1011-209

This course is a continuation of College Chemistry I. Topics include chemical equilibrium, properties of acids and bases, aqueous equilibria, free energy, entropy and equilibrium, electrochemistry, nuclear chemistry, and the chemistry of metals. (SCHG-208)

Class 4, Credit 4 (S)

Mathematics

SMAM-204 **College Algebra and Trigonometry**
Registration #1016-204

Topics in this course include a review of the fundamentals of algebra; solution of linear, fractional, and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic, and trigonometric functions; and systems of linear equations. (Two years of high school algebra)

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

SMAM-214 **Introduction to Calculus I**
Registration #1016-214

This course is a non-rigorous introduction to the study of differential calculus. The following topics will be covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, and maxima and minima. (SMAM-204 or equivalent)

Class 3, Credit 3 (F, W, S)

SMAM-215 **Introduction to Calculus II**
Registration #1016-215

This course, a continuation of Introduction to Calculus I, deals with an introduction to integral calculus. The following topics will be covered: definite integral, area, work and distance problems, volumes, fundamental theorem of calculus, approximation techniques, exponential and logarithmic functions, applications, and introduction to differential equations. (SMAM-214)

Class 3, Credit 3 (W, S)

SMAM-251 **Calculus I**
Registration #1016-251

This standard first course in calculus is intended for mathematics, science, and engineering students, with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter includes two-dimensional analytic geometry, functions, limits, continuity, the derivative and its formulas, and applications of the derivative. (Three years of high school mathematics)

Class 4, Credit 4 (F, W, S, Su)

SMAM-252 **Calculus II**
Registration #1016-252

This standard course in calculus is intended for mathematics, science, and engineering students, with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter includes anti-derivatives by various methods, the definite integral with applications to calculation of area, arc length, volumes of revolution, transcendental functions, and numerical integration. (SMAM-251)

Class 4, Credit 4 (F, W, S, Su)

SMAM-253 **Calculus III**
Registration #1016-253

This standard course in calculus is intended for mathematics, science, and engineering students, with the major emphasis on understanding the concepts and using them to solve a variety of physical problems. The subject matter includes improper integrals, formal limits of sequences, infinite series, Taylor series, polar coordinates, and conic sections. (SMAM-252)

Class 4, Credit 4 (F, W, S, Su)

Physics

SPSP-200 **Physics Orientation**
Registration #1017-200

This course is an introduction to the nature and scope of physics for freshmen interested in physics as a profession. Topics include what is physics, professional opportunities in physics, the physics profession, literature of physics, and communicating in physics. Laboratory includes safety instruction, measurement and recording techniques, graphics analysis, error analysis, and report writing. Each student presents a formal written or oral report on some topic of interest at the end of the course.

Class 1, Lab 2, Credit 2 (F)

SPSP-311 **University Physics I**
Registration #1017-311

This intensive course in general physics, using calculus, is for students in the sciences and engineering. Mechanics: kinematics and dynamics of a particle and rigid body; work and energy; momentum and impulse; rotational motion; oscillatory motion, and gravitation are studied. (Credit or co-registration in SPSP-251, co-registration in SPSP-371)

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

SPSP-312 **University Physics II**
Registration #1017-312

This course discusses fluids and elastic properties, heat and thermodynamics, wave motion, sound, and geometrical and physical optics. (SPSP-372, credit or co-registration in SPSP-252) (SPSP-311)

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

SPSP-313 **University Physics III**
Registration #1017-313

This course discusses electrostatics, Gauss' Law, electric field and potential, dielectrics, DC circuits, magnetic fields, Ampere's Law, Faraday's Law, inductance and capacitance, magnetism in matter, and AC series circuits. (SPSP-373, credit or co-registration in SPSP-253) (SPSP-312)

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

SPSP-371 **University Physics Lab I**
Registration #1017-371

This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-311)

Lab 3, Credit 1 (F, W, S)

SPSP-372 **University Physics Lab II**
Registration #1017-372

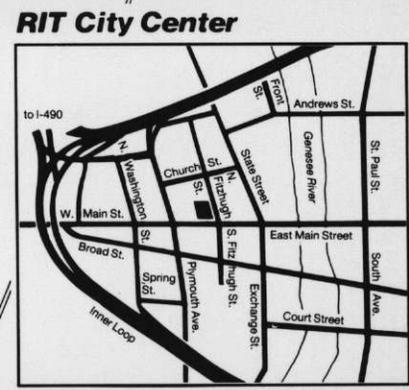
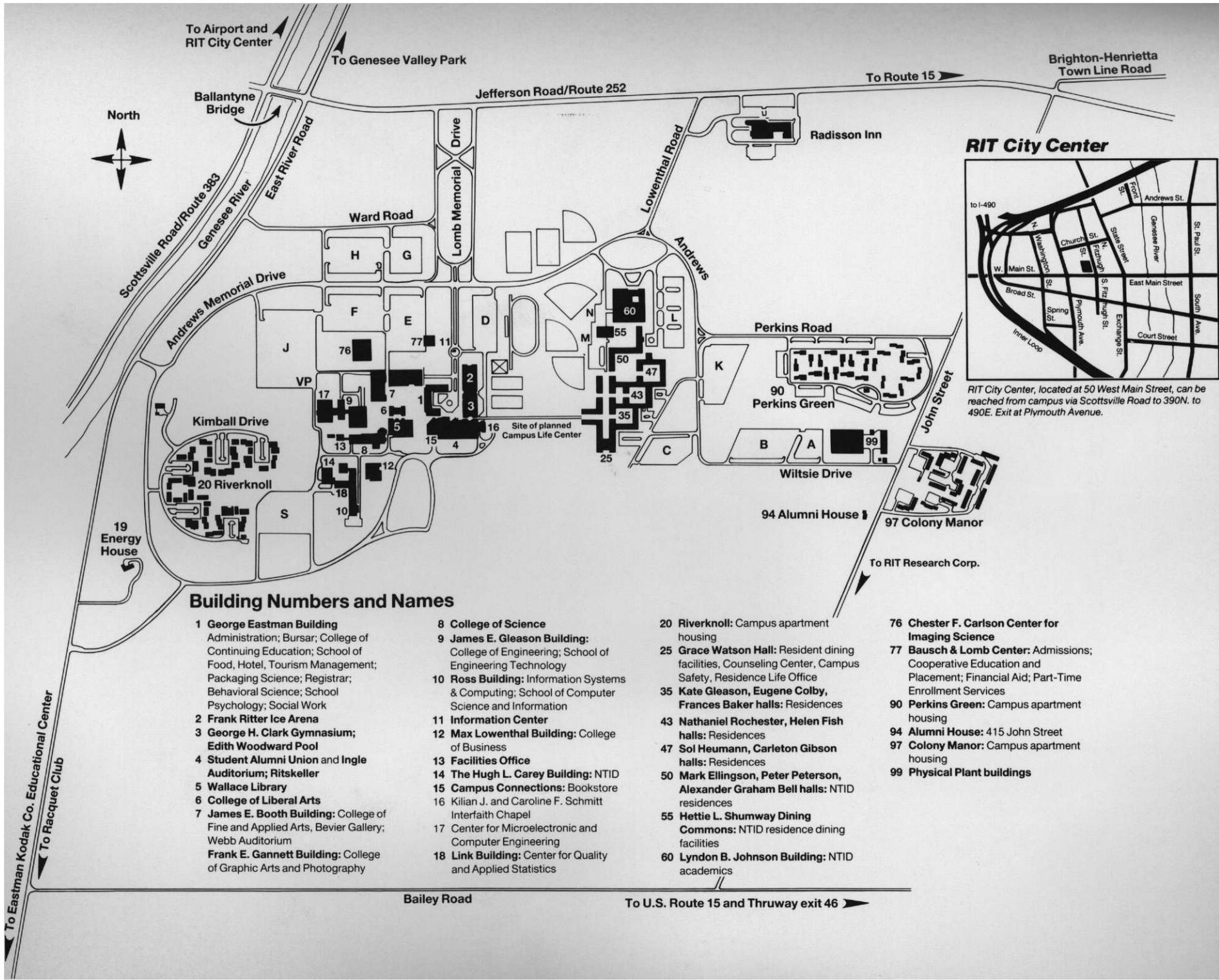
This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-312)

Lab 3, Credit 1 (F, W, S)

SPSP-373 **University Physics Lab III**
Registration #1017-373

This laboratory course includes experiments related to the principles and theories discussed in corresponding lectures. (Credit or co-registration in SPSP-313)

Lab 3, Credit 1 (F, W, S)



RIT City Center, located at 50 West Main Street, can be reached from campus via Scottsville Road to 390N. to 490E. Exit at Plymouth Avenue.

Building Numbers and Names

- | | | | |
|---|---|---|---|
| <p>1 George Eastman Building
Administration; Bursar; College of Continuing Education; School of Food, Hotel, Tourism Management; Packaging Science; Registrar; Behavioral Science; School Psychology; Social Work</p> <p>2 Frank Ritter Ice Arena</p> <p>3 George H. Clark Gymnasium; Edith Woodward Pool</p> <p>4 Student Alumni Union and Ingle Auditorium; Ritskeller</p> <p>5 Wallace Library</p> <p>6 College of Liberal Arts</p> <p>7 James E. Booth Building: College of Fine and Applied Arts, Bevier Gallery; Webb Auditorium
Frank E. Gannett Building: College of Graphic Arts and Photography</p> | <p>8 College of Science</p> <p>9 James E. Gleason Building: College of Engineering; School of Engineering Technology</p> <p>10 Ross Building: Information Systems & Computing; School of Computer Science and Information</p> <p>11 Information Center</p> <p>12 Max Lowenthal Building: College of Business</p> <p>13 Facilities Office</p> <p>14 The Hugh L. Carey Building: NTID</p> <p>15 Campus Connections: Bookstore</p> <p>16 Kilian J. and Caroline F. Schmitt Interfaith Chapel</p> <p>17 Center for Microelectronic and Computer Engineering</p> <p>18 Link Building: Center for Quality and Applied Statistics</p> | <p>20 Riverknoll: Campus apartment housing</p> <p>25 Grace Watson Hall: Resident dining facilities, Counseling Center, Campus Safety, Residence Life Office</p> <p>35 Kate Gleason, Eugene Colby, Frances Baker halls: Residences</p> <p>43 Nathaniel Rochester, Helen Fish halls: Residences</p> <p>47 Sol Heumann, Carleton Gibson halls: Residences</p> <p>50 Mark Ellingson, Peter Peterson, Alexander Graham Bell halls: NTID residences</p> <p>55 Hettie L. Shumway Dining Commons: NTID residence dining facilities</p> <p>60 Lyndon B. Johnson Building: NTID academics</p> | <p>76 Chester F. Carlson Center for Imaging Science</p> <p>77 Bausch & Lomb Center: Admissions; Cooperative Education and Placement; Financial Aid; Part-Time Enrollment Services</p> <p>90 Perkins Green: Campus apartment housing</p> <p>94 Alumni House: 415 John Street</p> <p>97 Colony Manor: Campus apartment housing</p> <p>99 Physical Plant buildings</p> |
|---|---|---|---|

To Eastman Kodak Co. Educational Center
To Racquet Club

Bailey Road To U.S. Route 15 and Thruway exit 46