COURSES
1980-81
Rochester Institute of Technology
Course Numbering

In addition to its title, each course is identified by two numbers.

The alpha-numeric course number directly to the left of the course title is the official Institute course number. This number will appear on grade reports, transcripts, and other official correspondence. This is what the alpha-numeric number 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 = Courses for graduate credit.
Second and Third numbers: Course differentiation and sequencing

Directly below the alpha-numeric number 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 number cannot be read by the computer system.

Course prerequisites are shown in parenthesis after course descriptions.

Courses of Study 1980-81

Produced by RIT Communications
Rochester Institute of Technology
Office of Admissions
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Rochester, NY 14623
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College of Business

School of Business Administration

**Accounting**

**BBUA-210** Financial Accounting
Registration #0101-210
Basic accounting principles and techniques within a framework of sound modern theory. Methods of accounting for revenues, costs, property and debt. Typical records for various types of business enterprise. Preparation and use of classified financial statements. Class 4, Credit 4

**BBUA-211** Managerial Accounting
Registration #0101-211
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-210) Class 4, Credit 4

**BBUA-215** Survey of Accounting Concepts
Registration #0101-215
A more advanced treatment of accounting theory and of accounting for proprietorships and corporations; determination of income realization and cost expiration; valuation of current and fixed assets and liabilities; funds and reserves; statement of changes in financial position. (BBUA-211) Class 4, Credit 4 (offered upon demand)

**BBUA-308, 309, 310** Intermediate Accounting I, II, III
Registration #0101-308, 309, 310
A more advanced treatment of accounting theory and of accounting for proprietorships and corporations; determination of income realization and cost expiration; valuation of current and fixed assets and liabilities; funds and reserves; statement of changes in financial position. (BBUA-211) Class 4, Credit 4

**BBUA-420** Cost Accounting
Registration #0101-420
Cost accounting with emphasis on uses of cost data and reports for managerial decision making. Includes problems and procedures relating to job order, process, and standard cost systems, with explanation of the techniques of overhead distribution. Special emphasis on the roles of controllers and their organization in finishing the accounting data and reports required for efficient managerial planning and control. (BBUA-211) Class 4, Credit 4

**BBUA-422** Tax Accounting I
Registration #0101-422
An introduction to federal income taxes for individuals. Includes study of the Internal Revenue Code definitions of revenue, expense, exemption, deduction, gross income, adjusted gross income, taxable income, business expenses, etc. Procedures of the Internal Revenue Service are discussed including filing and appeal processes. (BBUA-310) Class 4, Credit 4

**BBUA-423** CPA Problems
Registration #0101-423
A general view of accounting theory and practice designed both to assist students in preparation for the CPA examination and to review and improve their grasp of the various aspects and applications of accounting. Emphasis is on the analytical reasoning required in problem solving rather than on the solutions themselves. (Senior Standing) Class 4, Credit 4

**BBUA-424** Tax Accounting II
Registration #0101-424
An introduction to federal income taxes for corporations, partnerships, estates and trusts. Includes topics related to income tax filings for most forms of business and the related elections that taxpayers may make. Specific examples include the investment credit, Subchapter S corporations, distributions in corporate liquidations, corporate reorganizations, and the unified transfer (estate and gift) tax. (BBUA-422) Class 4, Credit 4

**BBUA-504** Auditing
Registration #0101-504
Auditing applied to both internal and professional practice; verification of original and final records; valuation of assets, liabilities, income and net worth; audit reports, credit investigations, duties and responsibilities of the auditor. (BBUA-310 and senior standing) Class 4, Credit 4

**BBUA-505, 506** Advanced Accounting I, II
Registration #0101-505, -506
The application of modern accounting theory to problems of advanced complexity. The student is made aware of the media for expression of current accounting thought. Topical coverage includes consolidated financial statements, partnerships, estates and trusts, government and not-for-profit entities and an introduction to alternate accounting theories. (BBUA-310 and senior standing) Class 4, Credit 4

**BBUB-201** Management Concepts
Registration #0102-201
A basic course in management theory and practice. The student is introduced to organizational structure and to the application of the behavioral sciences. Particular attention is paid to management’s roles in its relations with employees, ownership, government and community. Class 4, Credit 4

**BBUB-245** Business Management
Registration #0102-245
An introductory survey business course for the non-business major. Designed to familiarize the student with the nature and functions of the business organization and approaches to managerial decision making. Class 4, Credit 4 (offered upon demand)

**BBUB-300** Career Seminar
Registration #0102-300
Seminar designed to assist the business student in assessing and defining career objectives. Executives and career specialists from a variety of industries will participate. Class 1, Credit 1

**BBUB-301, 302** Business Law I, II
Registration #0102-301, -302
Business Law I, II
BBUB-401 Behavioral Science in Management
Registration #0102-401
Application of the behavioral sciences to management's problems in human relations. Emphasis on developing the student's understanding of the relationships existing among employees. (BBUB-201 or permission of instructor)
Class 4, Credit 4

BBUB-404 Administrative Policy
Registration #0102-404
Applications of management principles and processes to problem solving. An integrated viewpoint on business operations by analysis and evaluation of actual cases. Course is intended to develop the student's competence in decision making. (BBUB-401, BBUB-441, BBUF-441, BBUM-203 and Senior Standing)
Class 4, Credit 4

BBUB-407 Environment of Business Activity
Registration #0102-407
The impact and effect of law and social responsibilities on business activity and the managerial response to those environmental factors.
Class 4, Credit 4

BBUB-434 Operations Management
Registration #0102-434
Theory and practice of operations management utilizing quantitative methods and computer techniques as applied to business problems. (BBUE-352 or BBUE-411, ICSS-200)
Class 4, Credit 4

BBUB-450 Multinational Management
Registration #0102-450
Acquaints the student with the characteristics and impact of the multi-national enterprise. It explores leadership, motivation and performance appraisal in a cross-cultural setting. (BBUB-201 and BBUB-401)
Class 4, Credit 5 (offered upon demand)

BBUB-531 Labor Relations
Registration #0102-531
The past and present of the American labor movement are discussed, including union philosophy and objectives, issues and approaches. (BBUB-201)
Class 4, Credit 4

BBUB-534 Purchasing
Registration #0102-534
Industrial purchasing, the organization of the function, the methods of procurement, purchasing policies, sources of supply, and legal aspects of purchasing are covered.
Class 4, Credit 4

BBUB-535 Planning and Decision Making
Registration #0102-535
This course acquaints the student with the most important task of the executive: decision making. Emphasis is placed on quantitative, logical methods.
Class 4, Credit 4

BBUB-536 Organization Theory
Registration #0102-536
Modern methods of organization including the task, structure, and behavior of organizations are presented. Current concerns such as centralization vs. decentralization, and the effects of automation are analyzed. (BBUB-201)
Class 4, Credit 4

BBUB-547 Small Business Administration
Registration #0102-547
A course dealing with management problems of the small business enterprise. Student teams assigned to examine, analyze and prepare reports on specific problems encountered by existing business firms in the local area. (Permission of the instructor).
Class Variable, Credit 4

BBUB-554 Seminar in Management
Registration #0102-554
A seminar series covering selected topics in current management problems. Specific course topics to be announced when seminar is offered. (Permission of instructor)

BBUE-381 Money and Banking
Registration #0103-381
Analysis of money, credit, and financial system. Banking operations and the money supply process. The business of commercial banking and the act of central banking. Central bank activities in relation to national and international monetary policies. (BBUA-210, GSSE-302)
Class 4, Credit 4

BBUE-405 Microeconomics
Registration #0103-405
A course in economic theory at an intermediate level dealing with the contemporary analysis of price and distribution under conditions of free competition and various degrees of monopoly control. Business applications are given along with the exposition of the theory itself. (GSSE-302, BBUB-292 or BBUB-411)
Class 4, Credit 4

BBUE-406 Macroeconomics
Registration #0104-406
Analysis of the overall performance of the economy. It deals with the aggregate analysis of saving and investment, the level of income, the level of employment, and the level of prices. Governmental monetary and fiscal policies will also be evaluated. (GSSE-302, BBUB-292 or BBUB-411)
Class 4, 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)
Class 4, Credit 4 (offered upon demand)

BBUE-408 Business Cycles and Forecasting
Registration #0103-408
Analysis of economic conditions affecting the firm. Theory of business fluctuations. Forecasting techniques and services available to the firm. (BBUE-381)
Class 4, Credit 4 (offered upon demand)

BBUE-443 Recent Economic Policies
Registration #0103-443
A seminar type course on recent monetary and fiscal policies in the United States. Topics will cover the economic background, nature and effects of the policies during the most recent 10-year period. (BBUE-381)
Class 4, Credit 4

BBUE-509 Advanced Money and Banking
Registration #0103-509
Development of monetary theory. Money and income: theories of interest, liquidity preference and loanable funds; theories of income and employment, Keynesian and neo-Keynesian approach. Money and prices: quantity theory, velocity and cash-balance approach, inflationary process; and money wage rates and prices. (BBUE-381)
Class 4, Credit 4

BBUE-530 Labor Economics
Registration #0103-530
A course in applied economics, using economic theory and analysis for the study of labor institutions and their relation to the economy as a whole. Topics include wages theory, supply and demand, forces of labor, wages and unions, unemployment, inflation and public policy. (BBUE-405)
Class 4, Credit 4 (offered upon demand)
BBUF-441 Financial Management
Registration #0104-441
A management oriented approach to the finance functions of a corporation. The application of decision making techniques and the analysis of existing legal and economic constraints on the financial manager. An introduction to the basic models and concepts relative to working capital management, capital budgeting, cost of capital and risk analysis. (GSSE-301, 302 and BBQA-210)
Class 4, 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. (BBUE-381)
Class 4, Credit 4

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

BBUF-510 Financial Institutions
Registration #0104-510
Analysis of the different kinds of financial institutions such as commercial banks, savings institutions, insurance companies, pension funds, and others. It will cover their operations and relationships with the economic system (BBUE-381)
Class 4, Credit 4

BBUF-554 Seminar in Finance
Registration #0104-554
A seminar covering current policies and problems in financial management, and/or securities and security markets. (Permission of instructor)
Class 4, Credit 4 (maximum 12 hours credit)
### Quantitative Methods

**BBUQ-290**  
**Algebra**  
Registration #0106-290  
A review of the fundamental concepts and operations of algebra that are necessary for BBUQ-291 and other quantitative courses. Topics include relations and functions, rational expressions and equations, special products and factoring, linear and quadratic equations, systems of linear equations, powers and roots, and logarithms.  
Class Variable, Credit 4  

**BBUQ-351, 352**  
**Statistics I, II**  
Registration #0106-351, -352  
Interpretation and application of statistical techniques in business, to develop the ability to evaluate the results of statistical research. Introduces student to basic techniques of summarizing and representing data, probability theory, hypothesis testing, regressions and correlation and non-parametric statistics as applied to management decision making. (BBUQ-291)  
Class 4, Credit 4  

**BBUQ-353**  
**Statistics III**  
Registration #0106-353  
Introduces the student to the techniques of rational decision making under conditions of uncertainty and variability. The problem of determining the optimal amount of sampling is also considered. (BBUQ-352 or permission of instructor)  
Class 4, Credit 4  

**BBUQ-410**  
**Quantitative Methods I**  
Registration #0106-410  
Fundamental mathematical principles and techniques used in management decision making. Topics include Cartesian coordinates and graphs; algebraic, exponential and logarithmic analysis; partial derivatives and applications; introduction to integral calculus.  
Class 4, Credit 4  

**BBUQ-411**  
**Quantitative Methods II**  
Registration #0106-411  
Statistics for transfer students. A review of statistics covering descriptive statistics, probability, probability distribution, sampling, estimation, significance testing, and regression and correlation analysis. (BBUQ-410)  
Class 4, Credit 4  

### Food Administration and Tourist Industries Management

#### Dietetics

**BFAD-213**  
**Nutrition Principles**  
Registration #0107-213  
The study of specific nutrients and their functions; physiological, psychological and sociological needs of humans for food; development of dietary standards and guidelines; application of nutritional principles in planning and analyzing menus for individuals of all ages; survey of current health nutrition problems and food misinformation.  
Class 4, Credit 4  

**BFAD-314**  
**Sanitation & Safety in Hospital**  
Registration #0107-314  
Food Service Operation (Coordinated Dietetics Program)  
Survey of micro-organisms of importance to the food industry; emphasis on causes and prevention of food spoilage and poisoning. Responsibilities of administrative dietitians to provide and establish safe working conditions and policies; discussion of current problems confronting the hospitals as a result of recent legislative developments as they relate to safety and health.  
(BFAM-215)  
Class 2, Credit 4  
Practicum in hospital by arrangement.  

**BFAD-402**  
**Dietetics Environment**  
Registration #0107-402 (Coordinated Dietetics Program)  
Introductory dietetics course for students to interact and communicate with a representative sampling of the various categories of personnel in the general field of dietetics to study all major components of a total system in which a registered dietitian might function. (BFAM-215, BFAD-213)  
Class 1, Credit 4  
Clinical hours by arrangement.  

**BFAD-519**  
**Educational Principles and Methods**  
Registration #0107-519  
Principles of learning: behavioral objectives, motivation, perception, evaluation, guidance, teaching methods and audiovisual techniques; development of a teaching/learning unit for a specific group.  
Class 4, Credit 4  

**IJCIG-704**  
**Communication & Instructional Techniques**  
Registration #0064-704 (Coordinated Dietetics Program)  
Principles of communication and learning applied to educational programs; study of individual differences, perception, motivation, guidance and evaluation in basic concepts of education; use of television, visual equipment, and teaching materials for training programs for hospital employees.  
Class 2, Credit 4  
Practicum in hospital by arrangement.  

**BFAD-525, 526**  
**Advanced Nutrition and Diet Therapy I & II**  
Registration #0107-525, -526  
Biological metabolism and interrelationships of nutrients, enzymes, and other biochemical substances in humans. Etiology, symptoms, treatment and prevention of nutritional diseases; evaluation of nutritional diseases; evaluation of nutritional status. Role of the diet and dietetics in metabolic gastro-intestinal, renal, musculoskeletal, cardiac, endocrine, febrile, and other diseases.  
(BFAD-213, SCHG-203, SB0-306)  
BFAD-525 Class 5, Credit 5  
BFAD-526 Class 4, Credit 4  

**BFAD-535**  
**Nutrition Seminar**  
Registration #0107-535  
Study of nutrition research; reading in scientific literature; evaluation of nutrition information and education in the local community, the nation, and the world; development of a research project; written and oral presentation of report. (BFAD-213, BFAD-520 and senior standing)  
Credit Variable
The development, marketing and management of marinas.

Class 1, Credit 1

BFAH-400
Registration #0111-400
The development, marketing and management of golf courses.
(BFAH-400)
Class 1, Credit 1

BFAH-404
Registration #0111-404
The development, marketing and management of campgrounds.
(BFAH-400)
Class 1, Credit 1

BFAH-405
Theme Park Management
Registration #0111-405
The development, marketing and management of theme park management.
(BFAH-400)
Class 1, Credit 1

BFAH-406
Resorts, Clubs and Vacation Communities
Registration #0111-406
The development, marketing and management of resorts, clubs, and vacation communities.
Class 1, Credit 1

BFAH-410
Tourist Consumption Analysis
Registration #0111-410
A course designed to analyze the consumption of tourist goods and services. The analysis will include economic, recreation and personality theory in order to fully understand tourism consumption.
Class 4, Credit 4

BFAH-411
Problem Analysis & Decision-Making for the Tourist Industries
Registration #0111-411
The course is designed to assist the student in constructing a problem-solving framework for the analysis of tourist industry management problems.
Class 4, Credit 4

BFAH-412
Maintenance and Operation of Tourist Registration #0111-412
Resort Properties
A course designed to expose the student to various problems of maintaining a resort property. Maintenance practices, equipment, record keeping, and specific needs of recreational surfaces will be discussed as to the proper maintenance for quality resort development.
Class 5, Credit 5

BFAH-420
Introduction to Food Management and Registration #0108-210
Tourist Industries
An orientation course designed to trace the history, organizational structure, problems, opportunities and the place of the industry in the national and world economy. Trends and developments in the industry today are stressed.
Class 3, Credit 3

BFAH-425
Food Principles
Registration #0108-215
Introduction of foods and basic preparation of high quality food products. Topics include history, kinds, varieties, seasonal availability, sources, and composition of foods and ingredients; essential vocabulary; organization and management of work area; techniques and methods used for menu planning.
Class 3, Lab. 6, Credit 5

BFAM-220
Career Seminar
Registration #0108-220
Seminar designed to define career opportunities in the food, hotel and tourist industries. Students will be aided in developing career objectives. Leading industry executives will participate.
Class 1, Credit 1
BFAM-310 Mankind in Search of Food
Survey of foods including composition of foods, basic principles of nutrition, food spoilage, food poisoning, modern food processing, "health foods," world food problems and their possible solutions, with emphasis on practical application to daily food selection and composition. (Not open to those who have completed BFAD-213)
Class 4, Credit 4 (offered upon demand)

BFAM-311 Food Systems Design & Registration #0108-311 Equipment Layout
Recognizing, analyzing and solving equipment and space problems in layouts of existing institutions and in designing new food service plans. Consideration of food service equipment, determination of needs; development of specifications; procedures of maintenance, sanitation, and safety. (BFAM-215)
Class 3, Lab. 2, Credit 4

BFAM-314 Sanitation and Safety in Registration #0108-314 Food Operations
Survey of micro-organisms of importance to the food industry; emphasis on causes and prevention of food spoilage and poisoning. Responsibilities of management to provide and establish safe working conditions and policies; discussion of current problems confronting the industry as a result of recent legislative developments as they relate to safety and health. (BFAM-215, SBIG-210)
Class 2, Credit 2

BFAM-321 Food and Beverage Merchandising Registration #0108-321
Recognizing, analyzing, researching and solving fundamental merchandising techniques including menus for food and beverages found in the food service industry. (BFAM-215)
Class 2, Credit 2

BFAM-331, 332 Food Production Management I & II Registration #0108-331, 332
Application of standards, specifications, principles and techniques of equipment selection, purchasing and preparation in quantity and service of high quality food. Recognizing, analyzing, solving and evaluating problems related to all aspects of quantity food production and management based upon scientific, technological, economic, and social factors. Emphasis on operation and maintenance of food service equipment. Application of purchasing principles and cash control; work simplification; planning and scheduling. Students in Coordinated Dietetics Program will have hospital practicum arranged in BFAM-331, 332 (BFAM-215, 321)
BFAM-331 Class 3, Lab. 6, Credit 5
BFAM-332 Class 4, Credit 4

BFAM-333 Operational Analyses in Food Systems Registration #0108-333
This course will deal with industry related problems which will combine classroom study of the fundamental principles of cost controls, as applied by management, with on-location application of financial practices and specialized accounting procedures in solving cost and management problems in the food and beverage operations. (BFAM-332, 423; BBUB-434) Offered in even years.
Class 4, Credit 4

BFAM-415 Food Science I
Registration #0108-415
Consideration of fundamental chemical and physical reactions, the influence of kind and proportion of ingredients; evaluation of food products by sensory and objective methods. Open only to junior and senior students. (BFAM-215, SCHG-202)
Class 2, Lab. 6, Credit 4

BFAM-416 Food Science II
Registration #0108-416
Individual study concerning chemical and physical reactions in foods; the influence of kind and proportion of ingredients, with special emphasis on experimental design for problem solving and on written and oral communication skills. (BFAM-415)
Class 1, Lab. 8, Credit 4

BFAM-422 Hotel/Motel Management Registration #0108-422
A study of methods, techniques, and tools of management used in the development and operation of hotels and motels, including ethics and policies.
Class 4, Credit 4

BFAM-423 Management Systems for the Registration #0108-423 Lodging and Tourism Industry
Analysis and evaluation of systems and operations, franchising feasibility planning, development, financing and organization of facilities; rate structure determination, front office procedures, guest room salesmanship and analysis of demand; reservation systems, ethics, security and on-the-job application of operational problems. (BFAM-210, BBUB-201 - Junior Standing)
Class 4, Credit 4

BFAM-450 Marketing for Hotel and Registration #0108-450 Tourism Industries
A study of tourism development, marketing and the interaction between the broad areas of the travel industry and its relationship to hotels, motels, restaurants, community economy, trade associations, competitive and non-competitive markets. (BFAM-423; BBUM-263, BBUB-434)
Class 4, Credit 4

BFAM-499 Cooperative Education Registration #0108-499
Career-related work experience. Employment within the food, hotel, tourism industry monitored by the Division of Career Education and the Department of Food Administration and Tourist Industries Management. Designed for the student to experience progressive training on the job as related to the academic option. Junior & Senior year. Graduation Requirement.

BFAM-511 Advanced Food Service Operation Registration #0108-511 Management experience in planning, organizing, supervising preparation and service of foods for special functions. Emphasis is placed on experiences in organizational behavior, the responsibilities of management in marketing, promotion, sales production, personnel and customer relations and attitudes. Evaluation of management experience by preparation of operations reports. (BFAM-331, 332) Seniors only
Class 1, Lab. 8, Credit 4

BFAM-554 Seminar in Food and Hotel/Tourist Industries Registration #0108-554
Selected topics associated with food, hotel, resort and travel systems. The focus will be on current management problems to develop analytical and decision-making ability.
Class 4, Credit 4 (offered upon demand)

BFAM-555 Research Problems Registration #0108-555
Independent study of research problems in food and hospitality management. Open to senior students only.
Class and Credit Variable

School of Retailing

BRER-211 Retail Organization and Management Registration #0109-211
This course provides an introduction to the management concepts applicable to a retail operation or store. Areas of emphasis include store location, store design and layout, store organization, merchandise management (buying, assortments, classification, and control), and customer relations. The functions of retailing in society are introduced and a perspective laid for all additional courses.
Class 4, Credit 4
BRER-212 Retail Merchandising
Registration #0109-212
A study of the concepts and techniques of merchandise management. Specific emphasis is placed on the quantitative tools and skills utilized in operating statement analysis, allocation of merchandising investment, inventory control, stock turn, markup and pricing, and the planning of sales, stocks, and open-to-buy.
Class 4, Credit 4

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

BRER-410 Retail Sales Promotion
Registration #0109*410
The study of the overall sales promotion functions in a retail environment. Includes the planning, analysis, and evaluation of alternative promotional activities in terms of media selection, budgeting, copy writing, layout. The full promotional mix employed by typical retailers including newspapers, broadcast, display, specialty advertising, and in store promotions is analysed and evaluated. (BRER-211)
Class 4, Credit 4

BRER-415 Junior Retail Seminar
Registration #0109-415
A core seminar which integrates and builds on the first co-op experiences. Topics are designed to address entry level and first level management problems and situations. The emphasis is on the interpersonal and organizational situations typically encountered in co-operative placements for retailers. Should be taken immediately after a co-op experience.
Class 4, Credit 4

BRER-416 Senior Retail Seminar
Registration #0109-416
A required seminar designed to follow the senior year co-op experience. The perspective is that of the store manager or middle level manager. Emphasizes contemporary readings and cases to analyse management strategies and the relationship of the individual to the larger organization objectives.
Class 4, Credit 4

BRER-435 Advanced Merchandising
Registration #0109-435
An extension of basic merchandising dealing with advanced topics and complex merchandising applications. The emphasis is on merchandising as a control and management tool. The course will enable the student to develop and evaluate the impact of alternative merchandising decisions on the performance of the retail operation. (Senior standing; BRER-212)
Class 4, Credit 4

BRER-511 Textiles
Registration #0109-511
Analysis of textile fibers, weaves, and fabrics; methods of printing, dyeing and finishing; evaluation of fabrics and materials commonly used in home furnishing.
Class 4, Credit 4

BRER-512 Fashion Fabrics
Registration #0109-512
Evaluation of fashion fabrics for selection of suitable fabrics for men’s, women’s, and children’s clothing. Knowledge necessary for merchandising of fashion goods.
Class 4, Credit 4

BRER-521 Fashion History
Registration #0109-521
Survey of the apparel arts from ancient times to the present. Study is made of the social, political, and economic factors influencing styles and merchandising of apparel throughout the ages and how history influences fashion today.
Class 4, Credit 4

BRER-523 Current Fashion
Registration #0109-523
A study of the present-day fashion industry including development of the production of fashion goods. European designers and the operation of the Parisian couture are surveyed in addition to the American fashion industry and American designers.
Class 4, Credit 4

BRER-524 Fashion Accessories
Registration #0109-524
Determination of quality, value, and selling points. Government regulations for leather goods, shoes, gloves, handbags, furs, luggage, jewelry, cosmetics, umbrellas, wigs, and other accessories; information necessary for selection and merchandising.
Class 4, Credit 4 (offered upon demand)

BRER-531 Basic Interior Design
Registration #0109-531
A study of the basic elements and principles of design. A variety of art and design techniques are explored as applied to interior design.
Class 2, Lab. 4, Credit 4

BRER-532 Interior Design I
Registration #0109-532
Planning the home and its furnishings, with special attention to functional space arrangement; application of concepts of abstract design to the utilitarian object; presentation of plan showing selection of furnishings and colors.
Class 2, Lab. 4, Credit 4

BRER-533 Interior Design II
Registration #0109-533
Development of a functional plan for the interior, selection of merchandise and architectural materials; presentation of plan by means of elevations, perspective, renderings, or model; exploration of media for presentation; field trips. (BRER-532)
Class 2, Lab. 4, Credit 4

BRER-534 Interior Design History
Registration #0109-534
A study of architecture and furnishings as expressive of social, economic, political, and technological developments. Emphasis on significant and lasting design developments from each period. This course covers the history of interior design from antiquity through the present. (BRER-533)
Class 4, Credit 4

BRER-535 Advanced Interior Design
Registration #0109-535
Continuation of Basic Interior Design, BRER-531.
Lab 8, Credit 4

BRER-545 Color and Design
Registration #0109-545
Basic principles of design, color harmonies, associations and color schemes as they apply to both apparel and home furnishings. Practical application of these principles to determine the level of good taste.
Class 4, Credit 4 (offered upon demand)

BRER-554 Seminar in Retailing
Registration #0109-554
Selected topics associated with various aspects of retailing. Course content and structure will differ according to faculty assigned and quarter when offered. (Permission of instructor)
Class 4, Credit 4/Qtr. (maximum 12 credits allowed)
Graduate Business Courses

Business Administration Courses

Accounting Group

BBUA-701 Financial Accounting
Registration #0101-701
An introduction to financial accounting. Topics covered will include: financial statements, transaction analysis, accounting for revenues, costs, and expenses; accounting for assets, liabilities and owner’s equity; measurement; and the use of financial statements.
Credit 4

BBUA-702 Cost and Managerial Accounting
Registration #0101-702
Emphasizes the uses of cost data and reports for managerial decision making. Includes problems and procedures relating to job order, process, and standard cost systems with special attention to problems of overhead distribution. The planning process, the control process, and analytical processes are considered in detail. (Foundation courses)
Credit 4

BBUA-704 Accounting Theory I
Registration #0202-704
Theory and practice of accounting for assets based on latest pronouncements of the APB and FASB. Study of valuation systems and their impact on income is the central focus of each asset detail. (Foundation courses)
Credit 4

BBUA-705 Continuation of Accounting Theory
Registration #0101-705
Continuation of Accounting Theory. The emphasis will be on equity, long-term debt and purchase, the Statement of Change of Shareholders’ Equity, leases, and accounting for changes in ownership. (Foundation courses)
Credit 4

BBUA-707 Advanced Accounting
Registration #0101-707
Analysis and evaluation of current accounting concepts and methods in the nature, measurement and reporting of assets. Focus on principles of accounting of consolidated statements and Income from installation sales. (BBUA-705 or access)
Credit 4

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

BBUA-709 Basic Taxation Accounting
Registration #0101-709
A study of the basic field of federal income taxation is undertaken emphasizing its importance in business decisions and policies; application of income taxation to individuals, partnerships, and corporations is examined; income tax and accounting concepts affecting revenues and deductions are compared, including concepts of gross income, basis, recognition of gain and loss, capital asset transactions, exemptions and deductions. (Foundation courses or admission to MS program)
Credit 4

BBUA-710 Advanced Taxation Accounting
Registration #0101-710
A study of federal income taxes with special emphasis on corporate tax problems affecting business decisions and policies, including corporate reorganizations, personal holding companies, dividends, liquidations, capital gains transactions, federal gifts and estate taxes; tax planning and management. (BBUA-709 or admission to MS in accountancy)
Credit 4 (offered upon demand)

BBUA-712 Seminar in Accounting
Registration #0101-712
Course content will differ by instructor and quarter. Topics covered: taxation, international accounting and accounting for non-profit organizations. (Permission of director of graduate programs)
Credit 4 (offered upon demand)

Business group

BBUB-741 Management and Organization
Registration #0102-741
Analysis and description of management principles and processes from the classical and behavioral viewpoints. Study of organizations and their environment; alternation from the structural, systems, and behavioral perspectives. Text and reading of original case analysis and/or research paper.
Credit 4

BBUB-744 Behavioral Science in Management
Registration #0102-744
The implications of studies from the fields of psychology are discussed; problems in perception, motivation, social interaction, group dynamics, attitudes and values are stressed. Lecture, discussion, case studies and emphasis on critical analysis and interpretation of original research readings.
Credit 4

BBUB-746 Seminar in Management Development
Registration #0102-746
General systems theory applied to the management of business systems. Topics covered include philosophy of systems, design, analysis and control of systems, cybernetics, project management, reliability, and human factors. (Foundation courses)
Credit 4 (offered upon demand)
BBUF-745 Economic Environment Registration #0104-745
This course involves a study of the current literature and most recent developments relating to the theories of investment and valuation, cost of capital, risk and dividend policy. Also considered are specific areas of application and the policy implications of the theories studied. (BBUF-722)
Credit 4

BBUF-748 Labor/Management Problems Registration #0102-748
Problems in labor/management relations as they influence managerial decision making. Topics may include collective bargaining, conflicts and agreements between labor and management, and contemporary issues. From the perspective of labor/management structure, concepts are developed concerning market forces, unionism and labor law as they influence wage levels and wage structure. (Foundation courses)
Credit 4

BBUF-750 Personnel Systems Registration #0102-750
This course introduces the concept of personnel systems and allows a detailed examination of the systems' different elements. The student will become acquainted with current theory and research in behavioral sciences. The course also allows the student to integrate theory with practical application through exercises and class projects dealing with problems in personnel selection, placement, training and evaluation. (Foundation courses)
Credit 4

BBUF-751 Legal Environment of Business Registration #0102-751
An introduction to legal principles and their relationship to business practices including the background and sources of law, law enforcement agencies and procedures. Typical cases and examples are used as a guide to the observation of legal requirements and the legal forces which influence business and accounting decisions. (Foundation courses)
Credit 4

BBUF-758 Registration #0102-758
This course will take on the structure and quarter when management theory and behavioral aspects of particular quarter will be an (Permission of director of group)
Credit 4

BBUF-759 Registration #0102-759
A course intended to give expe practice gained in other course w achieved by solving complex problems that cut across the seve ing, production, finance and perso formulating and implementation by top management. The case met! other core courses)
Credit 4

BBUF-770 Business Research Methods Registration #0102-770
Research as a basis for policy building, planning, control and operation of the business enterprise. Concepts, tools, sources, methods, and applications are covered. Procurement and evaluation of data for business use from government and private sources. (Foundation courses)
Credit 4

BBUF-771,772 Research Option Registration #0102-771, -772
A thesis course requiring the student to confront a real business problem. Requirements include steps from design to completed management report. (Core courses and one of the following: BBUF-770, BBUA-718, BBUF-723, BBUQ-784)
Credit 8 (offered upon demand)

BBUF-790 Information Systems Registration #0102-790
The concepts and techniques for the design and implementation of a computer-based management information system are studied. Topics include systems theory, the generation and collection of data, the transformation and dissemination of information, and the economics of information. (BBUB-743)
Credit 4 (offered upon demand)
BBUM-767 Advanced Microeconomic Theory
Registration #0104-767
An advanced study of the fundamental economic principles underlying the nature of a business firm. Topics include: theories of demand and revenue; theory of costs and production analysis in both the short-run and the long-run; equilibrium of demand and supply and efficiency of competition; market structures and their characteristics; pricing and output under perfect competition, pure monopoly, imperfect competition, and oligopoly; resource allocation and product distribution. Business applications are given along with the exposition of the theory. (Foundation courses)
Credit 4

BBUM-768 Advanced Macroeconomic Theory
Registration #0104-768
An advanced study of the fluctuations and growth of economic activity in a modern complex society. Topics include measuring macroeconomic activity, modeling economic activity, microeconomic foundations of macroeconomic theory (the labor, the commodity, the money, and the bond markets); a parallel discussion of the complete Classical and Keynesian macroeconomic models, recent criticism of the two models; the general equilibrium; the phenomena of inflation and unemployment and the way business can forecast them; the impact of fiscal and monetary policies in promoting and maintaining economic stability and growth; reality and macroeconomic disequilibrium; and wage-price policies. (Foundation courses)
Credit 4

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

Quantitative group

BBUQ-778 Probability Theory
Registration #0106-778
A calculus-based introduction to probability theory. The course includes set theory, theorems, axioms, and concepts of probability, discontinuous and continuous distributions, moment generating functions and probability generating functions. (Differential and Integral Calculus and Foundation courses)
Credit 4 (offered upon demand)

BBUQ-781 Statistical Analysis I
Registration #0106-781
A study of probability and classical statistics including set theory, discrete and continuous probability distributions, sampling distributions, polynomial and hypothesis testing. Applications are made to decision making situations.
Credit 4 (offered upon demand)

BBUQ-784 Decision Theory
Registration #0106-784
The decision theory approach to decisions under uncertainty is examined. The modeling of business decision situations, the utilization of utility theory, and the application of various principles of choice are considered. The Bayesian approach to decision theory is primarily emphasized. (BBUQ-778)
Credit 4 (offered upon demand)

BBUQ-786 Operations Research—Mathematical Programming
Registration #0106-786
An introduction to the application of operations research techniques to business decision making. Specific topics covered are linear programming, algebraic and geometric concepts, simplex method, sensitivity testing and duality, optimization, dynamic programming and integer programming. (BBUB-743)
Credit 4 (offered upon demand)

BBUQ-787 Operations Research—Probabilistic Models
Registration #0106-787
An introduction to the use of probability in operations research models. Probabilistic techniques are applied to the problems of forecasting, capital budgeting, PERT, inventory, queuing and Markov processes. (BBUB-778)
Credit 4 (offered upon demand)
College of Continuing Education

Graduate Courses in Applied and Mathematical Statistics

CTAM-711 Fundamentals of Statistics I
Registration #0240-711
For those taking statistics for the first time. Covers the statistical methods used most in industry, business and research. Essential for all scientists, engineers, and administrators.
Topics: organizing observed data for analysis and insight; learning to understand probability as the science of the uncertain; concepts of practical use of the Central Limit Theorem. (Consent of the department)
Credit 3 (offered each quarter)

CTAM-712 Fundamentals of Statistics II
Registration #0240-712
Continuation of CTAM-711.
Topics: concepts and strategies of statistical inference for making decisions about a population on the basis of sample evidence; tests for independence and for adequacy of a proposed probability model; learning how to separate total variability of a system into identifiable components through analysis of variance; regression and correlation models for studying the relationship of a response variable to one or more predictor variables. (All standard statistical tests) (CTAM-711 or equivalent)
Credit 3 (offered each quarter)

CTAM-721 Quality Control: Control Charts
Registration #0240-721
A practical course designed to give depth to practicing quality control personnel.
Topics: statistical measures; theory, construction, and application of control charts for variables and for attributes; computerization procedures for control charts; tolerances, specifications, and process capability studies; basic concepts of total quality control, and management of the quality control function. (Consent of the department)
Credit 3 (offered in Fall and Spring Quarters)

CTAM-731 Quality Control: Acceptance Sampling
Registration #0240-731
Investigation of modern acceptance sampling techniques with emphasis on industrial application.
Topics: single, double, multiple, and sequential techniques for attributes sampling; variables sampling; techniques for sampling continuous production. The course highlights Dodge-Romig plans, Military Standard plans, and recent contributions from the literature. (Consent of the department)
Credit 3 (offered in Winter and Summer Quarters)

CTAM-751 Introduction to Decision Processes
Registration #0240-751
A first course in statistical decision theory featuring concrete situations and realistic problems.
Topics: basic statistical ideas; how to make the best decision prior to sampling, after sampling, sequentially; optimum management strategies, practical applications. (Consent of the department)
Credit 3 (offered in Fall Quarter)
CTAM-761 Reliability
Registration #0240-761
A methods course in reliability practices: What a reliability engi-
neer must know about reliability prediction, estimation, analysis,
demonstration, and other reliability activities. Covers most meth-
ods presently being used in industry.
Topics: applications of normal, binomial, exponential, and Wei-
bull graphs to reliability problems; hazard plotting; reliability con-
fidence limits and risks; strength and stress models; reliability
safety margins; truncated and censored life tests; sequential test
plans; Bayesian test programs. (CTAM-712 or equivalent)
Credit 3 (offered in Spring Quarter)

CTAM-801 Design of Experiments I
Registration #0240-801
How you design and analyze experiments in any subject matter
area; What you do and why.
Topics: basic statistical concepts, scientific experimentation, cor-
related, as univariate analysis should not be applied to each
characteristic is measured on each sample element. Usually the several
measurements made on each individual experimental item are
analyzed. (CTAM-801, 802)
Credit 3 (offered in Winter, Spring, and Summer Quarters)

CTAM-802 Design of Experiments II
Registration #0240-802
Continuation of CTAM-801.
Topics: factorial experiments: fractional, three level, mixed; re-
sponse surface exploration. Practical applications to: medical
areas, alloys, highway engineering, plastics, metallurgy, animal
nutrition, sociology, industrial and electrical engineering. (CTAM-
801)
Credit 3 (offered in Fall, Spring, and Summer Quarters)

CTAM-812 Theory of Statistics I
Registration #0240-812
Provides a sound theoretical basis for continuing study and reading
in statistics.
Topics: constructs and applications of mathematical probabil-
ity; discrete and continuous distribution functions for a single vari-
able and for the multivariate case; expected value and moment
generating functions; special continuous distributions. (Consent
of the department)
Credit 3 (offered in Fall Quarter)

CTAM-822 Theory of Statistics II
Registration #0240-822
Continuation of CTAM-812.
Topics: estimation theory and applications, the multivariate nor-
mal probability model, its properties and applications; interval
estimation theory and applications. (CTAM-822 or equivalent)
Credit 3 (offered in Spring Quarter)

CTAM-830 Multivariate Analysis
Registration #0240-830
Deals with the summarization, representation, and interpretation
of data sampled from populations where more than one charac-
teristic is measured on each sample element. Usually the several
measurements made on each individual experimental item are
correlated, as univariate analysis should not be applied to each
measurement separately. This course covers the use of the basic
multivariate techniques. Computer problem solving will be em-
phazised. Topics will include multivariate, t-test, ANOVA, regres-
sion analysis, repeated measures, quality control and profile
analysis. (CTAM-801, 802)
Credit 3 (offered in Fall and Spring Quarters)

CT AM-831 Multivariate Analysis II
Registration #0240-831
A continuation of CTAM-830, this course covers the use of ad-
vanced multivariate techniques. Topics include principal compo-
nent analysis, cluster analysis, multidimensional contingency
tables, discrete discriminant analysis, multi-dimensional scaling and
regression with errors in the independent variables. Practical
applications will be emphasized. (CTAM-830)
Credit 3 (offered Summer Quarter only)

CTAM-841 Regression Analysis I
Registration #0240-841
A methods course dealing with the general relationship problem.
Topics: the matrix approach to simple and multiple linear re-
gression; analysis of residuals; dummy variables; orthogonal
models; computational techniques. (CTAM-802 or equivalent)
Credit 3 (offered in Winter Quarter)

CTAM-842 Regression Analysis II
Registration #0240-842
A continuation of CTAM-841.
Topics: selection of best linear models; regression applied to
analysis of variance problems; nonlinear estimation and model
building. (CTAM-841 or equivalent)
Credit 3 (offered in Spring Quarter)

CTAM-851 Nonparametric Statistics
Registration #0240-851
Distribution-free testing and estimation techniques with empha-
sis on applications.
Topics: sign tests; Kolmogorov-Smirnov statistics; run tests;
Wilcoxin-Mann-Whitney test; Chi-Square tests; rank correlation;
rank order tests; quick tests. (CTAM-712 or equivalent)
Credit 3 (offered in Fall, Spring, and Summer Quarters)

CTAM-853 Managerial Decision Making
Registration #0240-853
Continuation of CTAM-751, statistical decision analysis for man-
agement.
Topics: utilities; how to make the best decision (but not neces-
sarily the right one); many action problems; optimal sample size;
decision diagrams. Applications to marketing; oil drilling, port-
folio selection; quality control; production; and research pro-
grams. (CTAM-751 or equivalent)
Credit 3 (offered in Winter Quarter)

CT AM-861, 862 Reliability Certification
Registration #0240-861, -862
The American Society for Quality Control (ASQC) offers Certifica-
tion as a Reliability Engineer by written examination. These two-
quarter courses prepare students for this examination. Purpose is
to increase reliability expertise. Offered are lectures, handouts,
workshops, and practice examinations.
Topics: reliability management, prediction, estimation, analy-
sis, apportionment, test and demonstration, math models growth;
maintainability, parts selection, design review, human factors;
and other selected reliability activities. (Consent of the depart-
ment)
Credit 3/Qtr. (offered in Fall and Winter Quarters)

CT AM-871 Sampling Theory and Application
Registration #0240-871
An introduction to sample surveys in many fields of applications
with emphasis on practical aspects.
Topics: review of basic concepts, sampling problem elements;
sampling; random, stratified, ratio, cluster, systematic, two-stage
cluster; wild life populations, questionnaires, sample sizes.
(CTAM-712 or equivalent)
Credit 3 (offered in Winter and Summer Quarters)

CTAM-881 Bayesian Statistics
Registration #0240-881
Probability as a degree of belief; how we learn; the applications
of Bayesian principles to: estimation of failure rates, revising odds,
testing precise hypotheses, finding credible regions, tests of sig-
nificance and goodness of fit from Bayesian point of view; hand-
ling several variables; straightline analysis. A potpourri of applica-
tions; reliability, acceptance sampling, decision-making, etc.
(CTAM-712 or equivalent)
Credit 3 (offered in Fall Quarter)
The question most often asked of an industrial statistician is "What size sample should I take?" This course answers that question for a wide variety of practical investigational projects. Techniques for the full use of the optimal sample evidence are also offered. (CTAM-712 or equivalent)

Credit 3 (offered in Summer Quarter)

CTAM-891, 892, 893 Special Topics in Applied Statistics
Registration #0240-891, -892, -893

This course provides for the presentation of subject matter of important specialized value in the field of applied and mathematical statistics not offered as a regular part of the statistics program. (Consent of the department)

Credit 3/Qtr. (offered upon sufficient demand; usually in Fall Quarter)

CTAM-895, 896, 897, 898 Thesis
Registration #0240-895, -896, -897, -898

For students working for the M.S. degree in applied and mathematical statistics who use a research project and thesis for three, six or nine credits. (Consent of the department)

Credit 3 (offered each quarter)

College of Engineering

Electrical Engineering

Required Courses and Scheduled Technical Electives

The following courses are required of electrical engineering students and are offered at least once a year.

EEEE-201 Introduction to Electrical Engineering
Registration #0301-201

This course is actually divided into two parts. The first part is an introduction to electrical engineering. It consists of a 3 hr./week lecture-laboratory dealing with various facets of electrical engineering. Each week a topic is discussed with a section of students followed immediately by "hands on" experience in the laboratory.

The second part consists of a 2 hr./week graphics laboratory which stresses elementary graphic communication techniques. The accent here is on the graphical description rather than on drafting methods.

Class 3, Lab. 2, Credit 4

EEEE-340 Introduction to Digital Systems
Registration #0301-340

This course will survey the components used in the construction of digital systems. These will include MSI and LSI components, as well as digital analog and analog digital conversion. The circuits will be described in terms of logical interaction between commercially available circuit packages. Analytical and design techniques used in creating subsystems will be discussed. (SPSP-207 concurrently)

Class 4, Credit 4

EEEE-351, 352, 353 Circuit Analysis I, II, III
Registration #0301-351, -352, -353

Basic circuit laws, network theorems, RLC circuits and their responses, sinusoidal analysis, complex notation, phasors and power. The concept of complex frequency. Special topics including magnetically coupled circuits, two-port networks, and network topology. (SMAM-253, SPSP-207 and concurrent with SMAM-305, 306)

Class 3, Lab. 3, Credit 4

EEEE-430 Linear Systems
Registration #0301-430

An introductory course in linear systems stressing applications of the Fourier and Laplace transforms, input-output characteristics of linear networks will be emphasized through the treatment of transfer functions and convolution integrals. The interdependence between time and frequency response will be treated extensively. The notions of system realizability and stability will be considered. (EEEE-353 concurrently)

Class 4, Credit 4

EEEE-441, 442 Electronics I, II
Registration #0301-441, -442

Solid-state electronic devices, their external characteristics and models. Analysis of electronic circuits for rectification, amplification, instrumentation and control. Introduction to electronic circuit design (EEEE-392 concurrently)

Class 3, Lab. 3, Credit 4

EEEE-461, 462 Electrical Engineering I, II
Registration #0301-461, 462

A course for non-electrical engineering majors. Circuit analysis, electronics, machines, switching circuits, logic and the elements of communication. (SPSP-207, SMAM-306)

EEEE-461 Class 3, Lab. 3, Credit 4
EEEE-462 Class 3, Lab. 3, Credit 4
EEE 471, 472 Electromagnetic Fields I, II
Registration #0301-471, -472
EEE 471 Class 4, Credit 4
EEE 472 Class 3, Lab. 3, Credit 4

EEE 531 Electromechanical Energy Conversion
Registration #0301-531
A development of the basic relationships of field energy, magnetic force, torque and generated voltage in an electromechanical device. An expansion of these fundamentals into an understanding of the operational characteristics of the electrical machine. (EEE 352)
Class 3, Lab. 3, Credit 4

EEE 590 Thesis Registration #0301-590
A creative or research project will be carried out under the general supervision of a staff member. The project need not be of the "state of the art" type. A reasonable problem of theoretical and/or experimental investigation will be acceptable as a thesis topic.
Credit 4

EEE 613 Introduction to Automatic Controls Registration #0301-613
A one-quarter study of linear control systems and their physical behavior including stability and transient response. This is approached through the classical methods of the Laplace domain; Routh's Criterion, Nyquist, Bode and Nichols charts and root locus. Lead and lag compensators are introduced using these tools. Analog computation techniques are studied and used, in laboratory, as a means of verifying the analysis and design of complex systems. (EEE 430, SMAM-420)
Class 3, Lab. 3, Credit 4

EEE 634 Introduction to Communications Registration #0301-634
Review of linear systems as applied to communication signal processing. Non-linear devices in communication systems. Introduction to the Fourier transform and its role in spectral analysis of signals and systems. Introduction to amplitude modulation - DBS, SSB, AM, SSB and their applications. Introduction to frequency and phase modulation techniques. Noise theory and the role of noise in communications systems. (SMAM-351, EEEE-430)
Class 4, Credit 4

EEE 643 Digital Electronics Registration #0301-643
The objective of this course is to teach students how to analyze digital electronic circuits. Topics include: transistors in the saturation, active, and cutoff regions; normal and inverse modes; and JFETs in the saturation and triode regions. The following logic families are covered in considerable detail: TTL, PL, DTL, ECL, CMOS, NMOS, and PMOS. A discussion of the applications and characteristics of analog switches concludes the course. This course is a prerequisite for EEEE-655. (EEE 340, 353, 430, 442, SMAM-306)
Class 3, Lab. 3, Credit 4

EEE 645 Special Semiconductors Registration #0301-645
The study of a variety of semiconductors generally used for purposes other than signal processing. Included are thyristors and their control devices, various optoelectronic elements, voltage regulator ICs and special MOS devices. Applications are stressed and a comprehensive design exercise is included. (EEE 643)
Class 3, Lab. 3, Credit 4

EEE 660 Interfacing Electronics and Logic Registration #0301-660
Topics include: brief review of translators between ECL, MOS, PL and CMOS logic families. Detailed presentation of digitally controlled analog switches, multiplexers and sample/hold circuits. Latch driver and receiver applications including impedance matching, reflection suppression, interfaces for teletype, audio tape recorder, telephone and acoustic coupler; and EIA-RS-232C. Presentation of some important microprocessor oriented interface chips: PIA (6820), UARTs, and MODEMS. Topics in sequential logic including a brief review of counters and conventional logic, then considerations of unlocked logic and race conditions, hang-up states, initializing logic, programmed logic and state space concepts. Microprocessor controllers and sequencers will be discussed as time permits. Individual student projects required.
Class 3, Lab. 3, Credit 4

EEE 665 Microcomputer Systems I Registration #0301-665
This is the introductory course dealing with the structure and operation of microcomputers. It includes descriptions of computer number systems and computer architecture and analyzes the major parts of a computer including the CPU, memory and I/O structure. Computer instruction sets and addressing methods are discussed and then applied to the machine language programming of computers. Software and hardware aspects of input/output are discussed along with consideration of special I/O chips. The course concludes with discussions of subroutine and stack operations. Most discussions are based upon the Motorola 6800 and Intel 8085 microprocessors. Lab sessions are an integral part of the course. (EEE 643, ICSP-220)
Class 3, Lab. 3, Credit 4

EEE 666 Microcomputer Systems II Registration #0301-666
This course will cover the effective application of microprocessors in the design of digital systems. It will develop an understanding of assembly language programming and hardware design techniques. The role of macro-assemblers, editors, linking loaders, and other software aids used in microcomputer development systems to produce efficient modular code will be covered. Several aspects of hardware/software organization of input/output programs will be considered including interrupts and direct memory access. The use of special LSI interface devices to connect a microcomputer with peripheral devices such as AID and DIA converters, CRT terminals, floppy disks, etc. will be studied. Laboratory sessions will be used to provide experience in the use of software development systems, in-circuit emulators, and logic analyzers in developing and testing a microcomputer design. (EEE 665)
Class 3, Lab. 3, Credit 4

EEE 670 Introduction to Microelectronics Registration #0301-670
Hybrid and monolithic microelectronic technology; processes in thick film and thin film circuits; description and advantage of the nature of monolithic and film circuits; impact of fabrication, testing and quality control on microcircuit design. (EEE 442)
Class 4, Credit 4

EEE 671 Hybrid Microelectronic Design Registration #0301-671
An electronic design course utilizing the medium of thick film hybrid technology. Functional electronic modules will be designed, produced and tested, from original specifications to finished package, with students performing all steps. (EEE 670)
Class 3, Lab. 3, Credit 4

EEE 679 Active and Passive Filters Registration #0301-679
The first half of this course deals with the filter transfer functions, poles and zeros and the concepts of filter amplitude and phase response. Butterworth, Chebyshev and elliptic filters are considered as well as low-pass/high-pass and low-pass/band-pass transformations. The second half of the course deals with methods of practical filter design with emphasis placed on active, operational amplifier filters. (EEE 430)
Class 4, Credit 4

EEE 680 Active and Passive Filters Registration #0301-680
The first half of this course deals with the filter transfer functions, poles and zeros and the concepts of filter amplitude and phase response. Butterworth, Chebyshev and elliptic filters are considered as well as low-pass/high-pass and low-pass/band-pass transformations. The second half of the course deals with methods of practical filter design with emphasis placed on active, operational amplifier filters. (EEE 430)
Class 4, Credit 4

EEE 687 Active and Passive Filters Registration #0301-687
The first half of this course deals with the filter transfer functions, poles and zeros and the concepts of filter amplitude and phase response. Butterworth, Chebyshev and elliptic filters are considered as well as low-pass/high-pass and low-pass/band-pass transformations. The second half of the course deals with methods of practical filter design with emphasis placed on active, operational amplifier filters. (EEE 430)
Class 4, Credit 4

EEE 689 Active and Passive Filters Registration #0301-689
EEE-634, SMAM-351)
EEE-695 Introduction to Audio Engineering

Registration #0301-695

A course based on topics from dynamics, acoustics and audio systems. Topics include: electro-mechanical equivalents, plane and spherical acoustic waves, radiators and resonators, loudspeaker systems, equalization in recording and playback, and an introduction to the application of digital techniques to audio. (EEE-430, EEEE-442, EEEE-472 or suitable equivalents)

Class 4, Credit 4

Graduate Courses in Electrical Engineering

The courses listed below are normally open to students who have been formally admitted into the graduate electrical engineering program. Students with a baccalaureate degree in engineering or science may be permitted to enroll in any of these courses as non-matriculated students if they have already completed the standard undergraduate curriculum for a particular course. Undergraduate students may be permitted to take some of these courses as under-graduate technical electives provided they are fourth or fifth year students and have already completed the prerequisites. The permission of the director of Graduate Programs is required for enrolling in these courses except in the case of matriculated graduate students.

Whenever a prerequisite is stated in the form of a specific course number, the words “or equivalent” are always implied. Prerequisites, if any, are shown in parentheses following the description of the course.

EEE-700, 701 Linear Systems I, II

Registration #0301-700, -701

These two courses are required of all graduate students in Electrical Engineering (except those who we readmitted before September 1977). Topics in the first course (700) include differential equations, linear algebra, linearity and superposition convolution, Fourier series and Fourier Transforms. Topics in the second course include Laplace Transforms, complex variables, inverse Laplace transformation, transfer functions of networks, state variables, Z transform and difference equations. Many of above topics might be familiar to the graduate student because they are covered in undergraduate EE courses in some form or other. However, these topics will be covered in these two courses in greater depth and the student will be expected to develop a higher level of understanding.

Credits 4/Quarter (EEE-700 offered every fall)

(EEE-701 offered every winter)

EEE-702 Introduction to Random Variables and Signals

Registration #0301-702

Random events, random variables, histograms; probability density functions; functions of a random variable, moments; multivariate topics; statistical decision theory, parameter estimation. This course is a prerequisite for the sequence 755, 736, 737.

Credit 4 (Winter 82 and every other winter)

EEE-704 Electromagnetic Fields

Registration #0301-704

Vector analysis; electrostatic fields in vacuum and in dielectrics; energy and forces; analytical methods of solution of electrostatic problems; approximate methods; magnetic field of steady currents; magnetic materials; electromagnetic induction; Maxwell’s equations. (EEE-471, 472)

Credit 4 (offered upon sufficient demand*)

EEE-705 Electromagnetic Waves

Registration #0301 -705

Maxwell’s equations; propagation of plane waves in unbounded regions; reflection and refraction of waves; total reflection, polarization, multiple dielectric boundaries; guided electromagnetic waves; characteristics of common waveguides; circular waveguides; resonant cavities; radiation and antennas. (EEE-471, 472)

Credit 4 (offered upon sufficient demand*)

EEE-706 Special Topics in Electromagnetics

Registration #0301-706

Selection of one or more of the following topics depending upon the interest of the students: interaction of fields and matter; wave propagation in anisotropic media; theory of antenna arrays; microwave networks; field computation by method of moments; generation of microwaves. (EEE-704, 705)

Credit 4 (offered upon sufficient demand*)

EEE-708 Passive and Active Filter Design

Registration #0301-708

Network analysis (review); classical frequency domain filters and passive filter design; filter transformations: low pass to high pass and bandpass; active filter design using single Op amps and RC networks; filter design using multiple Op amps for two-pole and two-zero sections; realization of n-pole filters using two-pole sections; sensitivity analysis; tuning of filters; effect of non-ideal Op amp characteristics on filter performance; design examples and demonstrations. (EEE-700, 701)

Credit 4 (Spring 82 and every other spring)

EEE-709 Active Network Synthesis

Registration #0301-709

Fundamentals of network synthesis; energy functions, P.R. functions; properties of network functions; synthesis of RC one-port and two-port networks; approximation, normalization and frequency scaling; active network analysis; active network elements; tunnel diodes, gyrators, impedance converter, impedance inverter; realizability, stability and sensitivity of active networks; synthesis of one-port and two-port active networks using negative resistances; synthesis of one-port and two-port active networks using controlled sources. (EEE-700, 701)

Credit 4 (offered upon sufficient demand)

EEE-711 Integrated Circuit Operational Amplifiers

Registration #0301-711

Analysis of operational amplifier circuits using the ideal op amp; development of circuit models to predict non-ideal op amp characteristics; study of feedback systems; stability (using Bode plots); and compensation; direct-coupled amplifiers and operational amplifier design; interpretation of manufacturers’ specifications and basic applications with emphasis on practical aspects. (EEE-442, 700, 701)

Credit 4 (Fall 80 and every other fall)

EEE-712 Control System Fundamentals

Registration #0301-712

This course is intended for graduate students who have not had a formal course in control systems in their undergraduate program. It is not open to those who have already had an introductory control systems course.

It is a study of linear control systems, their physical behavior, dynamical analysis and stability using mathematical models. This involves the use of root locus, Bode, and Nyquist techniques for the analysis of single and multiple-loop systems. (Elementary knowledge of Laplace transforms)

Credit 4 (Fall 80 and every other fall)

EEE-713 Modern Control Theory

Registration #0301-713

The development of the analytical techniques of modern theory as applied to linear control systems. Topics include vector spaces, state space, state variables, matrices and matrix functions, controllability, observability and stability theory. (EEE-613 or EEEE-700 and either 613, or 712)

Credit 4 (Spring 81 and every other spring)

EEE-714 Nonlinear Control Systems

Registration #0301-714

An introduction to the physical nature and mathematical theory of nonlinear control systems’ behavior using phase plane techniques, Liapunov theory, (including Aizerman’s method, variable gradient methods and the Lure Forms), perturbation methods, describing function techniques and Popov’s criterion; analysis of switching and relays. These are applied to both piecewise-linear and analytical nonlinear systems. (EEE-713)

Credit 4 (offered upon sufficient demand)

EEE-716 Digital Signal Processing

Registration #0301-716

A course in sampled data methods aimed at the development and study of discrete signal processing techniques. Elementary sampling theory and the one-sided Z transform are the principal tools used. Emphasis is placed on the design of digital filters and the use of fast Fourier transform methods. (EEE-700, 701)

Credit 4 (Spring 81 and every other spring)

*“Sufficient demand” normally is interpreted as a minimum of 10 students expressing interest in the course.
EEE-718 Stochastic Estimation and Control
Registration #0301-718
Review of random process theory; stochastic control and optimi-
ization; estimation and filtering techniques such as Wiener filter-
ing and Kalman filtering; stochastic stability; applications. (EEE-
713 or equivalent)
Credit 4 (Fall 81 and every other fall)

EEE-719 Digital Control Systems
Registration #0301-719
An introduction to the analysis and design of systems in which the
minimicro digital computer plays a central role. Topics include:
mathematics of discrete-time systems, control algorithms, analy-
tics, design of digital systems, computer word length require-
ments, engineering characteristics of computer control systems.
(EEE-701, 702, 713)
Credit 4 (Winter 82 and every other winter)

EEE-720 Optimum Control Systems
Registration #0301-720
Introduction to calculus of variations; conditions of optimality;
optimizing transient performance by statistical and variational
procedures, dynamic programming and by Pontryagin's maxi-

EEE-721 Thyristor Power Control and Conversion
Registration #0301-721
Thyristor family of semiconductors is becoming increasingly im-
portant in the area of power control and conversion. The objective
of this course is to provide an adequate, application-oriented
knowledge to those interested in the areas of control, power and
power electronics. Topics to be discussed: preliminaries: basic
principles of static switching, thyristor triggering, commu-
tinations; rectifiers; principles of controlled rectification, analysis of
single-and three-phase controlled rectifiers; inverters; series and
parallel SCR inverters, design of inverters, sinewave filters, forced
commutated inverter, McMurray inverter; DC systems: principles
of DC-DC conversion, choppers, DC motor control, single-phase
DC motor drives, three-phase DC motor drives, dual converter;
cyclo converter: frequency conversion using SCK's phase-
controlled cycloconverters, cycloconverter controls.
Modeling and simulation of thyristor circuits; thyristor models,
approximate, digital simulation of choppers, inverters and
cycl-converters, areas for further research.
Demonstration experiments will be set up. Also, individual pro-
jects by interested students will be encouraged.
Credit 4 (Spring 82 and every other spring)

EEE-722 Control System Design
Registration #0301-722
Evaluation of feedback control system performance; design using
root locus and frequency response plots; compensating net-
works; realization of transfer functions-cascade and feedback
compensation; applications: analysis and design of AC control
systems; intro to nonlinear system representation and design. (EEE-
613 or EEE-712)
Credit 4 (Winter 82 and every other winter)

EEE-734 Communication Techniques
Registration #0301-734
Study of different modulation schemes; linear modulation; angle
modulation; Hurler discussion of noise in linear modulation and
FM systems; noise figure; brief discussion of pulse modulation.
(EEE-700)
Credit 4 (Winter 81 and every other winter)

EEE-735 Digital Data Transmission
Registration #0301-735
Pulse code modulation and pulse amplitude modulation; carrier
systems, FSK and PSK systems; DOPSK system; signal space rep-
resentation of data signals and discussion of signal space. (EEE-
702, 734)
Credit 4 (Spring 81 and every other spring)

EEE-736 Information Theory
Registration #0301-736
An introduction to the fundamental concepts of information
theory; entropy, equivocation, transformation and redundancy;
coding for binary channels; measurement of signal parameters in
the presence of noise; bandwidth vs. accuracy. (EEE-702)
Credit 4 (Fall 81 and every other fall)

EEE-737 Random Signals and Noise
Registration #0301-737
Random processes; correlation functions; spectrum of periodic
functions and periodic random processes; orthogonal series for
random process; spectral densities; the Gaussian random pro-
cess; noise through a linear system; physical sources of noise;
noise figure; statistical decision theory. (EEE-700, 702)
Credit 4 (Spring 82 and every other spring)

EEE-738 Physics of Semiconductor Devices
Registration #0301-738
A basic course dealing with the physics of semiconductor de-

EEE-739 Integrated Circuit Design
Registration #0301-739
An introductory course in integrated circuit design and fabrica-
tion. Topics include: evaporation, sputtering, epitaxial growth,
diffusion, ion implantation, oxidation of silicon, photolithography,
layer generation, layout of silicon integrated circuits, resistors,
MOS capacitors, isolation techniques, bipolar transistors, MOS
transistors, assembly techniques, and in-process measurement and
testing. (EEE-738)
Credit 4 (Spring 81 and every other spring)

EEE-742 Computer Methods in Electrical
Registration #0301-742
Engineering
A study of numerical methods for the solution of problems in elec-
trical engineering with special emphasis on approximation tech-
niques. The method of moments and computer solutions of prob-
lems in antennas and microwave networks are studied. (SMAM-
611)
Credit 4 (offered upon sufficient demand)

NOTE: The microcomputer course sequence has been reorga-
nized effective fall 1980, as reflected in the new titles for 743 and
744. The material covered in the new two-course sequence 743,
744 includes the material originally covered in the old two-course
sequence, as well as some additional topics that were not taught
before. Students who had taken the old 743,744 sequence will not
be permitted to take the new 743. They may be permitted, how-
ever, to take the new 744.

EEE-743 Microcomputer Fundamentals
Registration #0301-743
This course provides an understanding of the operation and use of
micro computers. It begins with discussions of computer archi-
tecture and computer number systems. It then analyzes the major
components of a computer including the CPU, memory and I/O
structures. Computer instruction sets and addressing modes as
well as machine language programming are studied in detail. The
software and hardware aspects of input/output operations are
considered including discussions of some special purpose I/O
chips. The course concludes with an introduction to subroutines
and stack operations. Most of the discussion is based on Motorola
6800 and Intel 8085 microprocessors. Laboratory exercises are an
integral part of the course.
Credit 4 (offered every fall)
EEE-744 Advanced Microcomputer Systems Design Registration 00301-744
The effective application of microprocessors in the design of digital systems requires a knowledge of both hardware and software. This course will develop an understanding of assembly language programming and hardware design techniques. The role of micro-assemblers, editors, linking loaders, and other software aids used in microcomputer development systems to produce efficient modular code will be covered. Several aspects of hardware/software organization of input/output programs will be considered including interrupts and direct memory access. The use of special LSI interface devices to allow a microcomputer to operate with peripheral devices such as A/D and D/A converters, CRT terminals, floppy disks, etc., will be studied. Concepts relating to the use of multiprocessor systems will also be discussed. Laboratory sessions will be used to provide experience in the use of software development systems, in-circuit emulators, and logic analyzers in developing and testing a microcomputer system design. (EEE-743)
Credit 4 (Offered every winter)

EEE-750 Logic Design of Digital Systems I Registration 00301-750
This is the first in a sequence of three courses dealing with the logical design of digital systems. The student is assumed to be already familiar with the fundamental concepts of logic, logic gates, logic networks, truth tables, as well as having some knowledge of Karnaugh maps and their applications. The topics that will be covered in this course are as follows.

Boolean algebra and applications: A formal development of Boolean algebra and its theorems. Emphasis will be placed on algebraic proofs of theorems, their applications to the manipulation and simplification of switching functions. Karnaugh maps will be reviewed and discussed in a formal manner. II. Number Systems and Arithmetic: Binary, octal, and hexadecimal number systems; addition and subtraction in the different number systems; adders, subtractors, and high-speed addition of numbers; subtraction using 1’s complement and 2’s complement representation of negative numbers; arithmetic units. III. Asynchronous Sequential Circuits: Flip-flops and their application to sequential circuits. Fundamental mode asynchronous sequential circuits will be studied in detail covering their analysis, design, equivalence of states and state minimization, races and the elimination of critical races. Pulse mode sequential circuits.
Credit 4 (Offered fall 81 and every other fall)

EEE-751 Logic Design of Digital Systems II Registration 00301-751
The objective of this course is to study the switching characteristics of transistors (BJT, JFET, MOSFET) and to teach the students how to analyze digital electronic circuits. Topics include: transistors in the saturation, active and cutoff modes-normal and inverse modes; JFETs and MOSFETs as switches. Logic families: RTL, DTL, ECL, CMOS, NMOS, PMOS, Analog switches. (EEE-441, 442 or equivalent background in electronic circuit analysis)
Credit 4 (Offered winter 82 and every other winter)

EEE-752 Logic Design of Digital Systems III Registration 00301-752
This course will discuss a selected list of topics that follows those covered in 750 and 751. The exact list of topics and the outline of the course is in the process of being developed and will be available by fall 1981.
Credit 4 (Offered spring 82 and every other spring)

EEE-760 Practical R & D Management Registration 00301-760
The course is intended to help engineers currently in industrial R&D or engineering and students interested in R&D management careers, understand the concepts and practical aspects of project and organizational management and planning in R&D environment. Topics to be discussed will include: objectives of industrial R&D, types of R&D organizations, selection of new products for development, long and short range planning, methods of project scheduling and control, communication within R&D and with other organizations, task assignment, problem solving in R&D, financial controls and budget preparation, proposal and report writing. The participants will be expected to carry out planning, organization and control of a simulated R&D project.
Credit 4 (offered upon sufficient demand)

EEE-772, 773, 774 Special Topics in Electrical Engineering Registration 00301-772, -773, -774
Topics and subject areas that are not among the courses listed above are frequently offered under the title of Special Topics. Such courses are offered in the normal course format (regularly scheduled class sessions taught by an instructor). The number of credits may vary from course to course, but usually it is 4 credits per course. (No regular schedule)
Credit variable (maximum 4 per course number)

EEE-780 Independent Study Registration 00301-780
This course number should be used by students wishing to study a topic on an independent study basis. The student must obtain the permission of the faculty member prior to registration.
Credit 4

EEE-800, 801 Graduate Paper Registration 00301-800, -801
This course number is used to fulfill the graduate paper requirement under the non-thesis option for the master of science degree in electrical engineering. The graduate paper is an extensive term paper on a topic of professional interest. The student must obtain the consent of a faculty member to supervise the paper before registering for these course numbers.
Credit 4 for EEEE-800; variable (maximum 4) for EEEE-801

EEE-890 Research and Thesis Guidance Registration 00301-890
An independent engineering project or research problem to demonstrate professional maturity, preferably involving the reduction of theory to practice. An oral examination and a written thesis are required.
Credit variable (maximum of 12 credits total)

EENG-790 Engineering Internship Registration 00302-790
This course number is used by the students in the master of engineering degree program for earning internship credits. The actual number of credits is to be determined by the student’s faculty advisor and subject to approval of the Graduate Committee of the College of Engineering.
Credit variable

Industrial Engineering

The following courses are required of Industrial Engineering students and are offered at least once a year.
EIEI-201 Introduction to Industrial Engineering Registration 00303-201
A first course in industrial engineering for freshmen. The course describes what engineering is, what current and projected opportunities exist for engineers. The course material is concerned with the general principals of engineering design.
Class 3, Lab. 1, Credit 4

EIEI-202 Computing for Industrial Engineers Registration 00303-202
A first course in computer programming for engineers and in particular industrial engineers. The course involves extensive development of programming skills required in the engineering disciplines.
Class 4, Credit 4

EIEI-401 Introduction to Operations Research I Registration 00304-401
An introduction to the methodology of mathematical problem formulation. Investigation of mathematical programming techniques including linear programming and special types of linear programming such as the transportation and assignment algorithms. (SMAM-308 or consent of instructor)
Class 4, Credit 4

EIEI-402 Introduction to Operations Research II Registration 00304-402
A survey of elementary mathematical models within the field of systems and industrial engineering. Areas of study include queueing theory, network analyzers, and inventory theory. (SMAM-351, SMAM-306)
Class 4, Credit 4
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 psychomotor skills ability of the human. Emphasis is placed on practical applications of each area. (SMAM-352 or consent of instructor)
Class 3, Lab. 2, Credit 4

EIEI-420 Work Measurement and Analysis I
Registration #0303-420
Methods of measuring and analyzing work, human capabilities, micromotion, memomotion study, process and operation analysis. Emphasis placed on methods of operation analysis as applied to the design and evaluation of man-machine systems.
Class 3, Lab. 2, Credit 4

EIEI-422 Systems & Facilities Planning
Registration #0303-422
A basic course in plant layout. Topics covered include product-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 consent of instructor)
Class 3, Lab. 2, Credit 4

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

EIEI-503 Simulation
Registration #0303-503
A first course in simulation emphasizing the role of the computer in developing simulation models. The GASP IV simulation language is emphasized. (EIEI-202, SMAM-351 or equivalent)
Class 4, Credit 4

EIEI-510, 511 Applied Statistical Analysis
Registration #0303-510, -511 for Engineers I, II
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

EIEI-520 Engineering Economy
Registration #0303-520
Time value of money, methods of comparing alternatives, depreciation and depletion, income tax consideration, replacement, retirement and obsolescence, and capital budgeting.
Class 4, Credit 4

EIEI-530 Engineering Design
Registration #0303-530
A case study approach of ten real world experiences in engineering design. (consent of instructor)
Class 4, Credit 4

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.
Class 4, 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 Design of Experiments
Registration #0303-450
An applied approach to the problem of how one goes about running a study or experiment in human factors. (EIEI-511 or consent 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, mathematical inventory models, material requirements planning and scheduling including PERT. (EIEI-510 or consent of instructor)
Class 4, Credit 4

EIEI-483 Production Control II
Registration #0303-483
A design course in production control. Each student is asked to design, test, and implement a complete production control system for an operating plant. (EIEI-482)
Class 4, Credit 4

EIEI-504 Introduction to Operations Research III
Registration #0303-504
A course intended to provide an integrated view of advanced programming techniques and their applications to industrial problems. Selected topics might include a working knowledge of PGERT, QGERT, etc. (EIEI-401, 402 or consent of instructor)
Class 4, Credit 4

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

EIEI-540 Introduction to Operations Research IV
Registration #0303-540
An introduction to some advanced topics in operations research and industrial engineering. Areas of study may include game theory, Markov chains and their applications, decision analysis, network analysis. (5th year I.E. standing or consent of instructor)
Class 4, Credit 4

EIEI-545 Techniques of Systems Engineering
Registration #0303-545
LaPlace, Fourier and Z transforms; transform methods for solving differential, difference and differential-difference equations; feedback networks; classical optimization techniques; search techniques; theory of graphs. (5th year I.E. standing or consent of instructor)
Class 4, Credit 4

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

EIEI-599 Independent Study
Registration #0303-599
A supervised investigation within an industrial engineering area of student interest. (Consent)
Class variable, Credit variable

Graduate Courses

The following courses are recommended as part of the Master of Engineering program in Industrial Engineering and Engineering Management. They are offered on sufficient demand.
A systems approach to the design of production control operations, investigation of forecasting, operations planning, inventory control, and scheduling. Case studies and the design of actual production systems is encouraged.

Credit 4
Mechanical Engineering

Required and elective courses that are offered at least once a year.

EMEM-201 Introduction to Mechanical Engineering Graphics
This course is designed to introduce the student to the graphics profession in general and also to develop skills in engineering graphics sufficient to meet industrial standards. The course is intended for students with little or no background in engineering drawing. Students having two years of engineering graphics or drawing in school or the equivalent may take a qualifying examination to exempt this course.

EMEM-331 Mechanics I
Registration #0304-331
For students majoring in computer, electrical and industrial engineering. Statics and introduction to strength of materials, vector algebra, Newton’s laws, the principle of transmissibility of forces, couples, centroids, trusses, frames, machines, internal force and moment diagrams for beams, and friction. Axial stresses and strains, statically indeterminate problems, thin-walled pressure vessels, direct shear, and torsion. (SMAM-263, SPSP-205)

EMEM-332 Mechanics II
Registration #0304-332
Additional topics in strength of materials and dynamics; stresses and deflections associated with beams in bending, kinematics and kinetics of particles and rigid bodies in one and two dimensions, work-energy methods, and principles of impulse and momentum. (EMEM-331)

EMEM-333 Statics
Registration #0304-333
This basic course treats the equilibrium of 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 Newton's laws. (SMAM-253, SPSP-205)

EMEM-334 Strength of Materials I
Registration #0304-334
This basic course in statics of deformable bodies integrates the mathematical subjects of calculus and differential equations with the fundamental physical considerations which govern the mechanics of deformable solids in equilibrium. Topics covered include stress and strain, Hooke’s Law, axial loading, torsion, and bending stresses and deflections. (EMEM-336)

EMEM-335 Strength of Materials II
Registration #0304-335
A continuation of Strength of Materials I to include pressure vessels, superposition of stresses, transformation of stress, Mohr’s Circle, failure theories, energy techniques, and column theory. (EMEM-337)

EMEM-340 Engineering Communications I
Registration #0304-340
The objective of this course is to study advanced engineering graphics. The laboratory sessions are devoted to working drawings, shop processes, mechanical elements, tolerances and fits, assembly and detail drawings, and an introduction to computer graphics. (Second year standing) (EMEM-201 or equivalent)

EMEM-341 Engineering Communications II
Registration #0304-341
The objective of this course is to provide an introduction to Fortran programming. Topics covered include terminal and batch processing, input-output statements, arithmetic and logical IF statements, implicit and explicit DO loops and subroutines.

EMEM-344 Materials Science
Registration #0304-344
A study of the 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 of materials and to study the behavior of materials in service environments. (SCHE-208)

EMEM-413 Thermodynamics I
Registration #0304-413
A basic course that introduces the mathematical theory of thermodynamics via a series of classical experiments. After the complete first law analysis of air standard engines and refrigerators ( Carnot, Otto, Diesel, etc.), the Clausius and Kelvin 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. (SMAM-304, EMEM-331)

EMEM-414 Thermodynamics II
Registration #0304-414
The second thermodynamics course begins with a study of phase space and the properties of real gases, liquids and solids. Using a control volume analysis, we use the basic fluid properties, the first and second law of thermodynamics to study and design gas turbine power plants, steam power, steam power plants, and vapor compression refrigeration systems. The properties of gaseous mixtures and combustion shall also be considered. (EMEM-413)

EMEM-415 Fluid Mechanics I
Registration #0304-415
Physical characteristics of a fluid: density, stress, pressure viscosity, temperature, vapor pressure, compressibility. Fluid statics: hydrostatic pressure at a point, pressure field in a static liquid, manometry, forces on submerged surfaces, buoyancy, the model atmosphere. Flow fields and fundamental laws: the flux vector, systems, control volumes, conservation of mass in integral form, one-dimensional channel flow, the continuity equation, integral forms of the first law of thermodynamics and Newton’s second law, some applications. Flow of a real fluid and dimensional analysis: real fluid behavior, laminar and turbulent flow, dimensionless products, similarity, model studies, incompressible flow in pipes: friction factor and the Moody diagram, pressure drop in fully developed pipe flow, minor losses, single path line problems. (SMAM-308, EMEM-414)

EMEM-431 Thermodynamics
Registration #0304-431
A basic course in thermodynamics for electrical engineering students. Applications of the first and second law to closed and open systems; elementary heat transfer considerations.

EMEM-437 Introduction to Machine Design
Registration #0304-437
The analysis and theory of machine design and applications to systems design problems; particular emphasis is placed on the design and analysis of machine elements. (EMEM-338)
EMEM-439 Dynamics I
Registration #0304-439
A basic course in the fundamentals of kinematics and kinetics of single-particle motion in one, two, and three dimensions. Vector algebra is reviewed and vector calculus is used to define the derivative of a unit vector in rotating coordinate systems. Newton's second law of motion is introduced, along with the review of "the free body diagram," to generate the differential equations of motion of particles. The differential equations of motion are solved using classical methods. Variations of Newton's second law of motion, such as the work and energy technique and the impulse and momentum technique, are introduced and applied to various two- and three-dimensional problems. Two-body collisions (impacts) are defined, and the equations relating the velocities of the two particles before and after impact are derived. Kepler's three laws of planetary motion are used to derive Newton's Universal Law of Gravitation. The central force-field problem is thus defined, and problems involving satellite motion of satellites about the Earth are solved. (EMEM-336, SMAM-308)
Class 4, Credit 4

EMEM-440 Numerical Modeling for Engineers
Registration #0304-440
The solution of engineering problems requiring numerical solution. Included are the formulation of mathematical models of the problems, a study of numerical procedures suitable for their solution, the development of computer programs to carry out the procedures, and the analysis of the results. Problems will be taken from the student's background in solid body mechanics and thermodynamics. Extensive use of the computer is required. (EMEM-341, or equivalent computer experience, and third year standing.)
Class 4, Credit 4

EMEM-501 Mechanical Engineering Laboratory
Registration #0304-501
A course in experimental methods, with laboratory experiments and associated theoretical work to gain a deeper understanding of the material covered in the classroom. Topics considered are design of experiments, experimental error and error analysis including some statistical analysis of data, calibration of equipment, presentation of results in engineering reports. The theory and use of measuring devices for the determination of strain, pressure, temperature, flow rate, vibration, etc., and transient response of transducers. In addition to standard laboratory exercises and experiments, an original experiment to measure a particular physical phenomenon is to be designed and implemented by the student either individually or in a small group. (Fourth-year standing)
Class 2, Lab 4, Credit 4

EMEM-514 Heat Transfer
Registration #0304-514
A basic course in the fundamentals of heat transfer by conduction, convection, and radiation together with application to typical engineering systems. Topics covered include steady and unsteady conduction, combined modes, fans, heat exchangers, and numerical and graphical techniques. (EMEM-413, EMEM-415)
Class 4, Credit 4

EMEM-516 Fluid Mechanics II
Registration #0304-516
A continuation of incompressible flow through pipes and ducts as first considered in Fluid Mechanics I, including an analytical treatment of Poiseuille and Couette flow. Flow measurement using obstruction meters. Boundary layer concepts, von Karman momentum integral equation and the special case of laminar and turbulent boundary layer for a flat plate. Flow about immersed bodies, concepts of lift and drag, circulation. One-dimensional compressible flow: topics include review of thermodynamic fundamentals, isentropic stagnation quantities, converging-diverging nozzles and normal shock waves. (EMEM-415)
Class 3, Lab/Rec 2, Credit 4

EMEM-543 Dynamics II
Registration #0304-543
The equations of motion for a single particle are applied to systems of particles to define Euler's first and second laws of motion relative to the motion of a system of particles. Then a very special system of particles is defined, the rigid system (rigid body), and Euler's first and second laws of motion are derived for the rigid body. The mass moment of inertia for the rigid body is defined with respect to Cartesian coordinates. The kinematics and kinetics of rigid body motion are developed for two and three-dimensional motion. Rotating coordinate systems are used. Vector algebra and vector calculus are used. SI units are used throughout the course.
One laboratory period per week is devoted to the introduction and use of the analog computer. The analog flow diagram using the dimensionless computer variable is defined and used in all problems. Lumped parameter systems made up of masses, springs, and dashpots are analyzed by classical methods and by using the analog computer. The laboratory introduces the vibrations of single particle systems. (EMEM-439)
Class 3, Lab/Rec 2, Credit 4

EMEM-544 Dynamics of Physical Systems I
Registration #0304-544
A basic course in the dynamics of physical systems (vibrations). Singularity functions are defined and introduced in detail. The unit doublet, the unit impulse, the unit step, the unit ramp, and the unit parabolic functions are used to force various second order systems. The sinusoidal function is also used. The response to these inputs of various systems with various degrees of damping are drawn in detail in the classroom as well as in the accompanying laboratory. The root locus method is introduced by using phasors, and the Bode plots are introduced and drawn. The block diagram is used as a means of describing system elements. Classical analogs are used to show the analogous properties of lumped parameter electrical, mechanical, thermal, and fluid systems.
One laboratory per week is devoted to the extend the use of the analog computer as a tool in the design of systems. The problems placed on the analog computer are those discussed in the lecture or recitation periods.
This course completes the required core of courses in the Mechanics Option of the Mechanical Engineering Curriculum. (EMEM-543)
Class 3, Lab 2, Credit 4

EMEM-599 Independent Study
Registration #0304-599
An assigned project encompassing both analytical and experimental work integrating the student's education in mechanical engineering.
Class variable, Credit variable

EMEM-632 Advanced Mechanical Systems Design
Registration #0304-632
Structural dynamics considerations in the design of advanced mechanical systems. Principles of modal analysis. Finite element analysis procedures, including concepts, modeling, and problem coding. Experience in the application of a large finite element program to a complex mechanical system. Fracture mechanics procedures and their use in the design process. A design project based on practical engineering situations is required. (EMEM-437, EMEM-685)
Class 4, Credit 4

EMEM-635 Industrial Heat Transfer
Registration #0304-635
This course involves a detailed study of numerical methods in heat conduction, analytical methods in forced and free convection, design correlations for convection, an introduction to mass transfer and change of phase. Each student is required to submit an individual or group project on a practical heat transfer problem to reinforce his or her classroom experiences. (EMEM-514, EMEM-440)
Class 4, Credit 4
EMEM-514 Stress Analysis
Registration #0304-694
Experiments and lectures on topics in stress analysis; non-symmetric bending, composite beams, curved beams, thick-walled cylinders, torsion, stress concentrations, plastic behavior, composite materials; complex stresses, experimental verification of the theories of failure; energy methods; experiments with strain gages, photoelasticity applications, and brittle coatings. (EMEM-338)
Class 4, Credit 4

EMEM-644 Engineering Acoustics and Noise Control
Registration #0304-664
A basic course in the principles of acoustics and the application of sound measurements and noise control in industry and the community. Topics to be covered will include an introduction to wave theory; properties of sound waves such as the various classifications of sound levels, pressure characteristics, sound combinations, and loudness levels; instrumentation and measurement; sound fields; noise sources; sound control; and noise control criteria. (Fourth-year standing)
Class 4, Credit 4

EMEM-667 Kinematic Analysis of Mechanisms
Registration #0304-676
A course in mechanisms: motion, velocity, acceleration analysis; the design of linkages, cams, special gearing, variable speed drives. (EMEM-543)
Class 4, Credit 4

EMEM-677 Modern Energy Conversion
Registration #0304-677
Principles of energy conversion, introduction to semiconductors, thermoelectric generators, photovoltaic generators, thermionic generators, magnetohydrodynamic power generators. (EMEM-414)
Class 4, Credit 4

EMEM-679 Dynamics of Physical Systems II
Registration #0304-679
A continuation of EMEM-544. Review of systems analyses and block diagrams. Introduction to the Laplace transform (one-sided negative transform) and its use in stating transfer functions. Stability criteria using Bode plots. Design of systems using root-locus method. Some real control systems will be discussed and analyzed.
One laboratory every other week is devoted to using the analog computer as a tool in the stability criteria of real systems. Each student will be required to undertake a project involving the design, analysis, and fabrication of a device incorporating control and feedback principles. (EMEM-544)
Class 3, Lab 2, Credit 4

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

EMEM-685 Advanced Strength of Materials
Registration #0304-685
Statically indeterminate problems for beams; frames; continuous beams; beams of variable cross section, reinforced-concrete beams; beams on elastic foundation; stability of columns; plastic deformation in bending and torsion; limit analysis; energy methods with applications to beams, curved bars, and frames; rotating disks; introduction to bending of plates. (EMEM-338)
Class 4, Credit 4

EMEM-689 Patent Law and Protection
Registration #0304-689
A study of protection of intellectual property including study of patent rights, inventions, procedures for obtaining patents as well as a study of the law and drafting techniques of patents and their claims. Insights to invention protection and legal ramifications of inventor’s and attorney’s activities will be included.
Class 4, Credit 4

EMEM-696 Nuclear Power
Registration #0304-696
A first course in nuclear engineering: brief review of nuclear physics related to fission, fusion, and radiation emission; use of radioisotopes; biological effects of radiation and shielding; radiation detection, steady state reactor theory and reactor control. (Fourth-year standing)
Class 4, Credit 4

Advanced and special courses offered upon sufficient demand (at least 12 students registered):

- EMEM-652 Fluid Mechanics of Turbomachinery
  Registration #0304-652
  The conservation laws, Newton’s second law, the second law of thermodynamics and appropriate equations of state are used to study water turbines, gas turbines, steam turbines, compressors, and centrifugal pumps. Dimensional analysis and empirical data are also used and studied. The student is expected to write a design-oriented term paper. (EMEM-415)
  Class 4, Credit 4

- EMEM-660 Refrigeration and Air Conditioning
  Registration #0304-660
  A basic course in the principles and the applications of refrigeration and air conditioning involving mechanical vapor compression and absorption refrigeration cycles, associated hardware, psychrometrics, solar radiation, heat transmission in buildings, and thermodynamic design of air conditioning systems. Students are expected to do a design project. (EMEM-574)
  Class 4, Credit 4

- EMEM-672 Selected Machine Elements
  Registration #0304-672
  The course treats static design of advanced machine elements and discusses the fundamentals of dynamic design of machinery. Topics include complete cycle dynamic analysis of mechanisms, the method of virtual work applied to dynamical systems, cam design, and balancing. The digital computer and the ZETA plotter are used. (EMEM-439)
  Class 4, Credit 4

- EMEM-694 Stress Analysis
  Registration #0304-694
  Experiments and lectures on topics in stress analysis; non-symmetric bending, composite beams, curved beams, thick-walled cylinders, torsion, stress concentrations, plastic behavior, composite materials; complex stresses, experimental verification of the theories of failure; energy methods; experiments with strain gages, photoelasticity applications, and brittle coatings. (EMEM-338)
  Class 4, Credit 4

Selective courses that are offered at least once every three years:

- EMEM-601 Alternative Energy Sources
  Registration #0304-601
  Emphasis on the technical aspects of solar and wind energy. Wind characteristics and site analysis, aerodynamics of horizontal and vertical axis rotors, and the economics of wind power. Fundamentals of solar radiation, solar hot water heating and solar space heating, and the economics of solar utilization. Included, but to a lesser extent, are tidal power, wave power, geothermal energy, ocean thermal gradient, and energy from waste. Individual term projects are required. (EMEM-574 or permission of instructor)
  Class 4, Credit 4

- EMEM-664 Engineering Acoustics and Noise Control
  Registration #0304-664
  A basic course in the principles of acoustics and the application of sound measurements and noise control in industry and the community. Topics to be covered will include an introduction to wave theory; properties of sound waves such as the various classifications of sound levels, pressure characteristics, sound combinations, and loudness levels; instrumentation and measurement; sound fields; noise sources; sound control; and noise control criteria. (Fourth-year standing)
  Class 4, Credit 4

- EMEM-676 Kinematic Analysis of Mechanisms
  Registration #0304-676
  A course in mechanisms: motion, velocity, acceleration analysis; the design of linkages, cams, special gearing, variable speed drives. (EMEM-543)
  Class 4, Credit 4

- EMEM-677 Modern Energy Conversion
  Registration #0304-677
  Principles of energy conversion, introduction to semiconductors, thermoelectric generators, photovoltaic generators, thermionic generators, magnetohydrodynamic power generators. (EMEM-414)
  Class 4, Credit 4
Graduate course offerings:

**EMEM-692** Analysis for Engineers
Registration #0304-692*
Partial differentiation; chain rule, and total differential; multiple integration and manipulation of multiple integrals; linear constant coefficient ordinary differential equations; vector algebra and differentiation of vectors or complex variables.
Credit 4

**EMEM-693** Thermo Fluid System Analysis
Registration #0304-693*
Thermodynamic properties and processes, ideal and real gas, vapors and gases; laws of thermodynamics and selected power cycles; fluid statics; control volume and conservation of mass, momentum and energy; Bernoulli’s equation; viscosity, loss of heat due to friction (flow through pipes), concept of boundary layer; basic law of conduction; convection; radiation.
Credit 4

**EMEM-816** Finite Elements
Registration #0304-816
Development of theory from variational principles. Two-dimensional applications to elastic continua, considering plane stress, plane strain, and axisymmetric loading examples. Problem-solving sessions using RIT computer. Applications in structural mechanics, considering beam elements, plate elements, and shell elements. Utilization of these elements in solving specific structural problems. Introduction to three-dimensional stress analysis. Features of large general-purpose computer programs.
Credit 4

**EMEM-821** Vibration Theory and Applications
Registration #0304-821
Credit 4

**EMEM-828, 829** Special Topics in Applied Mechanics
Registration #0304-828, 829
An opportunity for the advanced student to undertake an independent investigation in the area of applied mechanics. Assistance will be given only when the student requests it. The project may be a comprehensive literature investigation, theoretical study, or an investigation involving laboratory experiment.
Credit variable (maximum of 4 credits/quarter)

**EMEM-833** Heat Exchanger Design
Registration #0304-833
The course covers analytical models for forced convection through tubes and over surfaces, experimental correlations for the Nusselt number and pressure drop; design of single and multiple pass shell and tube heat exchangers; compact, baffled, direct contact, plate, and fluidized bed heat exchangers; radiators, recuperators, and regenerators. (EMEM-514)
Credit 4

**EMEM-845** Turbomachinery
Registration #0304-845
One-dimensional analysis of centrifugal pumps, water turbines, and axial flow turbines and compressors. Emphasis on blending the application of physical principles, dimensional analysis, and empirical data to design turbomachines. (EMEM-516)
Credit 4

**EMEM-848, 849** Special Topics in Thermo Fluid Systems
Registration #0304-848, 849
An opportunity for the advanced student to undertake an independent investigation in the area of thermo fluid systems. Assistance will be given only when the student requests it. The project may be a comprehensive literature investigation, a theoretical study, or an investigation involving laboratory experiment.
Credit variable (maximum of 4 credits/quarter)

**EMEM-858, 859** Special Topics in Systems Analysis
Registration #0304-858, 859
An opportunity for the advanced student to undertake an independent investigation in the area of systems analysis. Assistance will be given only when the student requests it. The project may be a comprehensive literature investigation, a theoretical study, or an investigation involving laboratory experiment.
Credit variable (maximum of 4 credits/quarter)

**EMEM-862** Solid Wastes Engineering
Registration #0304-862
A study of the collection, processing, disposal and reuse of solid wastes of municipal, industrial, and agricultural origin. A discussion of the basic design parameters of landfilling, burning, and processing solid wastes. A presentation of considerations of importance to the development of workable regional and municipal management systems.
Credit 4

*These courses are provided for students who have been out of school for a number of years and feel it necessary to review or update their educational background.
EMEM-871 Mathematics for Engineers
Registration #0304-871
Vector calculus review, solutions to ordinary differential equations using the method of Frobenius, and Laplace transforms, phase plane analysis of linear and nonlinear differential equations, and an introduction to functions of complex variables. (SMAM-308, EMEM-692, or equivalent)
Credit 4

EMEM-872 Mechanics
Registration #0304-872
Advanced dynamics and vibrations are emphasized. Newtonian vector mechanics and energy formulations are applied to two- and three-dimensional problems of single and multi-degree of freedom. The concepts of Virtual Work, Hamilton's Principle, and Lagrange's equations are covered. The vibration of discrete multi-mass systems includes the formulation and eigenvalue solutions by computer, and the method of finite elements are included. The vibration of continuous systems and discrete modeling is introduced. (SMAM-308 or EMEM-692 and EMEM-543)
Credit 4

EMEM-873 Heat Transfer
Registration #0304-873
Formulation of the heat conduction equation, solution of the one-dimensional, unsteady heat conduction equation by separation of variables: Sturm-Liouville system, orthogonal functions, generalized Fourier series, Bessel functions. Solution of the two-dimensional, steady heat conduction equation; Cartesian and cylindrical geometry. (SMAM-308, EMEM-514)
Credit 4

EMEM-874 Numerical Methods
Registration #0304-874
The course emphasizes the use of digital computers for obtaining solutions to practical engineering problems through numerical techniques. Algebraic and transcendental equations, systems of linear algebraic equations using matrix manipulations and iterative methods, numerical integration and differentiation, ordinary differential equations including initial value and boundary value problems, partial differential equations including elliptic, parabolic, and hyperbolic with stability analysis. Extensive use of the computer will be required. (Graduate standing and experience in the use of digital computers)
Credit 4

EMEM-875 Instrumentation and Experimental Analysis
Registration #0304-875
Various displacement, strain, velocity, acceleration, pressure transducers will be discussed along with the associated electronic equipment and recorders to measure and record the variables. A laboratory session will be substituted in place of class when experiments are assigned. The static and dynamic characteristics of the instruments will be obtained as these instruments are mathematically modeled and subjected to impulse, step and ramp frequency functions of time. (Graduate standing)
Credit 4

EMEM-876 Engineering Materials
Registration #0304-876
Review of physical metallurgy, effects of alloying elements in steel, corrosion, fatigue, fracture, high and low temperature behavior, plastics, welding (EMEM-344)
Credit 4

EMEM-890 Research and Thesis Guidance
Registration #0304-890
In conference with a thesis advisor, a topic is decided on, and either a theoretical or laboratory type research program is carried out. Periodic progress reports and final written thesis with oral examination.
Credit variable (maximum 12 credits total)

Courses will be offered in the following areas if there is sufficient demand.

Introduction to Continuum Mechanics
Theory of Elasticity
Energy Methods in Mechanics
Advanced Finite Elements
Analytical Mechanics
Advanced Vibration Theory
Lubrication
Advanced Heat Transfer
Thermodynamics
Statistical Thermodynamics
Fluid Dynamics
Gas Dynamics
Automatic Control Systems
Optimal Control Systems Design
Thermal Stresses
Solid Waste Management
College of Fine and Applied Arts

School of Art and Design

FADD-301, 302, 303 Introduction to Registration #0402-301, -302, -303 Communication Design
An introduction to the complex field of communication 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 communication design is included (Foundation program or equivalent).

Recommended co-related courses include introductory photography, introductory typography, photomechanics, motion picture, and television. No special sequence required.
Lab. 9, Credit 3 (offered each year)

FADD-303 Environmental Design—Exhibit
Registration #0403-303
Introduction to the planning of interior space for a particular activity. (Foundation program or equivalent)
Lab. 6, Credit 3 (offered each year)

FADD-311, 312, 313 Environmental Design—Interior
Registration #0403-311, -312, -313
Introductory instruction and specified projects in environmental design.
311 - Industrial design
312 - Interior design
313 - Exhibit design
Lab. 6, Credit 3 (offered each year)

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

FADD-401 Environmental Design—Furniture
Registration #0403-401
Elements of design for the furniture industry including anthropometric considerations, methods and materials of manufacture, performance criteria, and marketing requirements. (Foundation program or equivalent)
Lab. 12, Credit 6 (offered each year)

FADD-402 Environmental Design—Product Design
Registration #0403-402
The design of products for manufacture emphasizing human factors, consumer safety, production procedures, and appropriateness of materials and form. (Foundation program or equivalent)
Lab. 12, Credit 6 (offered each year)

FADD-403 Environmental Design—Interior
Registration #0403-403
Design elements of the interior environment including the organization and function of space, acoustics, lighting, color, thermal control, safety and security. (FADD-301, 302, 303 or equivalent)
Lab. 12, Credit 6 (offered each year)

FADD-411, 412, 413 Communication Design
Registration #0402-411, -412, -413
An elective providing the opportunity to carry on problem solving in the communications area. Each quarter concentrates on specific design topics of study: design for reproduction, computer graphics, silk screen printing.
Lab. 6, Credit 3

FADD-420 Environmental Design—Exhibit
Registration #0403-420
Directed design project allowing individual program emphasis.
Lab. 6, Credit 3 (offered each year)

FADD-501, 502, 503 Environmental Design—Product
Registration #0403-501, -502, -503
Professional Design Business Practices
Registration #0402-501, -502, -503 (Senior Major)
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. Assignments oriented to building a working knowledge of communication media areas such as print, television, film, photography, multimedia presentation, etc. Media Center facility available for extension and application of studio experiences. (FADD-301, 302, 303 or equivalent)
Lab. 18, Credit 9 (offered each year)

FADD-502 Environmental Design—Exhibit
Registration #0403-502
Packaging, Graphics
Registration #0402-502, -503
Design of component interior and product systems for particular environments or facilities.
Lab. 18, Credit 9 (offered each year)

FADD-503 Environmental Design—Thesis
Registration #0403-503
Directed design project allowing individual program emphasis. (FADD-401, 402, 403)
Lab. 18, Credit 9 (offered each year)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration Numbers</th>
<th>Lab.</th>
<th>Credit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FADD-511, 512, 513</td>
<td>Design Applications</td>
<td>#0403-511, -512, -513</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-201, 202, 203</td>
<td>Design (Crafts Majors)</td>
<td>#0404-201, 202, 203</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-205, 206, 207</td>
<td>Creative Sources</td>
<td>#0404-205, -206, -207</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-210, 211, 212</td>
<td>Drawing</td>
<td>#0404-210, -211, -212</td>
<td>Lab. 6</td>
<td>Credit 2</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-231, 232, 233</td>
<td>2-D Design</td>
<td>#0404-231, 232, 233</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-241, 242, 243</td>
<td>3-D Design</td>
<td>#0404-241, 242, 243</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-261, 262, 263</td>
<td>Drawing (Crafts Majors)</td>
<td>#0404-261, 262, 263</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-301, 302, 303</td>
<td>Advanced Drawing</td>
<td>#0405-301, -302, -303</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-313</td>
<td>Medical Illustration Carbon Dust Technique</td>
<td>#0404-313-3</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-320</td>
<td>Color</td>
<td>#0405-320</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-322, 323</td>
<td>Illustration</td>
<td>#0405-322, -323</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-411, 412, 413</td>
<td>Painting</td>
<td>#0405-411, -412, -413</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-421, 422, 423</td>
<td>Medical Illustration Applications</td>
<td>#0405-421, -422, -423</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-501, 502, 503</td>
<td>Painting</td>
<td>#0405-501, -502, -503</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-511, 512, 513</td>
<td>Painting</td>
<td>#0405-511, -512, -513</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADF-531, 532, 533</td>
<td>Advanced Medical Illustration</td>
<td>#0405-531, 532, 533</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
<tr>
<td>FADR-401, 402, 403</td>
<td>Printmaking</td>
<td>#0406-401, -402, -403</td>
<td>Lab. 6</td>
<td>Credit 3</td>
<td>Offered each year</td>
</tr>
</tbody>
</table>
### School for American Craftsmen

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Major Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>FADR-441, 412, 413</td>
<td>Printmaking</td>
<td>An elective providing the opportunity to explore personal statements through lithography, etching and relief (one per quarter)</td>
</tr>
<tr>
<td>Registration #0406-411, -412, -413</td>
<td></td>
<td>Lab. 6, Credit 3 (offered each year)</td>
</tr>
<tr>
<td>FADR-501, 502, 503</td>
<td>Printmaking</td>
<td>Continuation of third-year practices. Opportunity is presented for a major concentration of a particular medium. (FADR-401, 402, 403)</td>
</tr>
<tr>
<td>Registration #0406-501, -502, -503</td>
<td></td>
<td>Lab. 18, Credit 9 (offered each year)</td>
</tr>
<tr>
<td>FADS-411, 412, 413</td>
<td>Sculpture</td>
<td>The course develops formal sculptural concepts through a variety of processes and materials. Studio practice involving work in paper, wood, fabrics, metal, stone, clay, and plastics. This course is offered to the sophomore, junior, and senior level.</td>
</tr>
<tr>
<td>Registration #0407-411, -412, -413</td>
<td></td>
<td>Lab. 6, Credit 3 (offered each year)</td>
</tr>
</tbody>
</table>

### Ceramics Materials and Processes

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Major Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSCC-200</td>
<td>Ceramics Materials and Processes</td>
<td>Sequential course for three quarters providing fundamentals of the preparation and use of clay. Methods of fabrication from hand building to wheel-thrown wares. Mold-making, slip casting, and jiggering; ceramic sculpture and decorative techniques. Chemistry and application of glazes. Stacking and firing of kilns. The organization of the ceramic shop, with planning for efficient production and organization of the ceramic shop, with planning for efficient production of pottery.</td>
</tr>
<tr>
<td>Registration #0409-200</td>
<td></td>
<td>Lab. 15, Credit 5 (offered each year)</td>
</tr>
<tr>
<td>FSCC-251, 252, 253</td>
<td>Ceramics Craft Elective I</td>
<td>An elementary course in design and techniques in ceramics. Wheel and hand built pottery, along with glaze information, will be studied.</td>
</tr>
<tr>
<td>Registration #0409-251, -252, -253</td>
<td></td>
<td>Lab. 6, Credit 3 (offered each year)</td>
</tr>
<tr>
<td>FSCC-300</td>
<td>Ceramics Materials and Processes</td>
<td>Sequential course for three quarters providing intensive work on individual clay and glaze problems. Designing for production and production problems. Ceramic raw materials, sources of supply, use and maintenance of equipment. Independent study, papers, reports.</td>
</tr>
<tr>
<td>Registration #0409-300</td>
<td></td>
<td>Lab. 15, Credit 5 (offered each year)</td>
</tr>
<tr>
<td>FSCC-351, 352, 353</td>
<td>Ceramics Craft Elective II</td>
<td>An elective course providing an opportunity for more advanced study in ceramics. Wheel and hand built pottery, along with glaze information, will be studied.</td>
</tr>
<tr>
<td>Registration #0409-351, -352, -353</td>
<td></td>
<td>Lab. 6, Credit 3 (offered each year)</td>
</tr>
<tr>
<td>Registration #0409-400</td>
<td></td>
<td>Lab. 15, Credit 5 (offered each year)</td>
</tr>
<tr>
<td>FSCC-500</td>
<td>Ceramics Techniques and Thesis</td>
<td>Sequential course for three quarters, treating problems related to ceramic production culminating in a research and thesis project.</td>
</tr>
<tr>
<td>Registration #0409-500</td>
<td></td>
<td>Lab. 24, Credit 8 (offered each quarter)</td>
</tr>
<tr>
<td>FSCF-225, 226, 227</td>
<td>Art and Civilization</td>
<td>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.</td>
</tr>
<tr>
<td>Registration #0410-225, -226, -227</td>
<td></td>
<td>Class 3, Credit 3 (offered each year)</td>
</tr>
<tr>
<td>FSCF-310</td>
<td>History of Crafts</td>
<td>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.</td>
</tr>
<tr>
<td>Registration #0410-310</td>
<td></td>
<td>Class 3, Credit 3 (offered each quarter)</td>
</tr>
<tr>
<td>FSCF-320</td>
<td>History of Art Criticism</td>
<td>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.</td>
</tr>
<tr>
<td>Registration #0410-320</td>
<td></td>
<td>Class 3, Credit 3 (offered each quarter)</td>
</tr>
<tr>
<td>FSCF-330</td>
<td>Philosophy in Art</td>
<td>A study of what makes art &quot;good.&quot; (philosophic 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.</td>
</tr>
<tr>
<td>Registration #0410-330</td>
<td></td>
<td>Class 3, Credit 3 (offered each quarter)</td>
</tr>
<tr>
<td>FSCF-340</td>
<td>Man and His Symbols</td>
<td>A concentration study of symbols, legends, and myths in the visual arts with emphasis on symbol making for communication.</td>
</tr>
<tr>
<td>Registration #0410-340</td>
<td></td>
<td>Class 3, Credit 3 (offered each quarter)</td>
</tr>
<tr>
<td>FSCF-350</td>
<td>Asian Art</td>
<td>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/designer and craftsmen.</td>
</tr>
<tr>
<td>Registration #0410-350</td>
<td></td>
<td>Class 3, Credit 3 (offered each quarter)</td>
</tr>
<tr>
<td>FSCF-360</td>
<td>18th &amp; 19th Century Art</td>
<td>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.</td>
</tr>
<tr>
<td>Registration #0410-360</td>
<td></td>
<td>Class 3, Credit 3 (offered each quarter)</td>
</tr>
<tr>
<td>FSCF-370</td>
<td>20th Century Art</td>
<td>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.</td>
</tr>
<tr>
<td>Registration #0410-370</td>
<td></td>
<td>Class 3, Credit 3 (offered each quarter)</td>
</tr>
</tbody>
</table>
FSCG-380 Contemporary Art
Registration #0410-380
A study of the painting, printmaking, sculpture, architecture and crafts from the present year to the 1960's with focus on the current American scene.
Class 3, Credit 3 (offered each year)

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

FSCG-200 Glass Materials and Processes
Registration #0411-200
Sequential course for three quarters, treating the organization and construction of the glass studio, including the design and fabrication of furnaces, annealing ovens, burners, tools, and grinding equipment. The function and care of hand and machine glassworking tools. An analysis of glass as a material: its history, chemical makeup, intrinsic qualities, and potential. Fundamental techniques of glass fabrication, including gathering, marvering, and blowing the bubble; blocking; jacking; and puntiting the piece.
Lab. 15, Credit 5 (offered each year)

FSCG-251, 252, 253 Glass Craft Elective I
Registration #0411-251, -252, -253
An elementary course in design and techniques in cold glass. Study of sandblasting, grinding, flexible shaft drawing, cutting and epoxy painting will assist in concepts.
Lab. 6, Credit 3 (offered each year)

FSCG-300 Glass Materials and Processes
Registration #0411-300
Sequential course for three quarters, providing an analysis and discussion of glass design and problems of fabrication. Intensive work on assigned production problems. An introduction to the use of cold working techniques: slump molds, lamination, non-glass surface decoration, etching, sand blasting, grinding, etc. The use of and maintenance of equipment, research projects, papers, and reports.
Lab. 15, Credit 5 (offered each year)

FSCG-351, 352, 353 Glass Elective II
Registration #0411-351, -352, -353
An elective course providing an opportunity for more advanced study in metal either hollow ware or jewelry.
Lab. 6, Credit 3 (offered each year)

FSCM-200 Metalcrafts Materials and Processes
Registration #0412-200
Sequential course for three quarters, introducing basic exercises in the use of equipment and metalcrafts techniques. Fundamental techniques in hollow ware; raising, forming, and planishing in copper, bronze, brass, and pewter. Enameling techniques. Discussion of design, materials, processes, and equipment.
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 more advanced study in metals either hollow ware or jewelry.
Lab. 6, Credit 3 (offered each year)

FSCM-300 Metalcrafts Materials and Processes
Registration #0412-300
Sequential course for three quarters, introducing study of jewelry, hollow ware, and flat ware design, with production work in these areas. Analysis and discussion of design and production problems. Independent study, papers, reports.
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 hollow ware or jewelry.
Lab. 6, Credit 3 (offered each year)

FSCM-400 Metalcrafts Materials and Processes
Registration #0412-400
Sequential course for three quarters, providing individual projects based on techniques presented in the second year. The survey of contemporary practice, including field trips. Lectures and research on decorative techniques. Independent study, papers, reports.
Lab. 15, Credit 5 (offered each year)

FSCM-500 Metalcrafts Techniques and Thesis
Registration #0412-500
Sequential course for three quarters, providing individual research in technical problems including a summarizing thesis.
Lab. 24, Credit 8 (offered each year)

FSCT-200 Textile Materials and Processes
Registration #0413-200
Lab. 15, Credit 5 (offered each year)

FSCT-251, 252, 253 Textile Craft Elective I
Registration #0413-251, -252, -253
An elementary course in design and techniques in textiles. Each quarter a different area of study is undertaken in printing, basketry, non-loom, stitchery or tapestry.
Lab. 6, Credit 3 (offered each year)

FSCT-300 Textile Materials and Processes
Registration #0413-300
Sequential course for three quarters, providing an analysis of fabrics. Advanced pattern drafting. Study and analysis of fibers. Advanced techniques of weaving, with related problems in design. Continued experience in sample warps and yardage weaving. Practice in the use of various types of eight- to ten-harness looms. Experiments and research with novelty fibers. Independent study, papers, reports.
Lab. 15, Credit 5 (offered each year)
FSCT-351, 352, 353  Textile Craft Elective II
Registration #0413-351, 352, 353
An elective course providing an opportunity for more advanced study in textiles. Each quarter a different area of study is undertaken in printing, basketry, non-loom, stitchery or tapestry.
Lab. 6, Credit 3 (offered each year)

FSCT-400  Textile Materials and Processes
Registration #0414-400
Sequential course for three quarters, providing an analysis of new developments in fabrics both handwoven and power-loomed, and their appropriate use. The design of fabrics within specific price ranges, and for specific uses. Independent study, papers, reports.
Lab. 15, Credit 5 (offered each year)

FSCT-500  Textile Techniques and Thesis
Registration #0413-500
Sequential course for three quarters, covering the design of fabrics in selected fields such as household fabrics, fashion fabrics or accessories, with concentration on items having production merit. A thesis is included.
Lab. 24, Credit 8 (offered each year)

FSCW-200  Woodworking Materials and Processes
Registration #0414-200
Sequential course for three quarters, covering function and care of hand and machine woodworking tools. Wood as a material: history, kinds, qualities, sources. Fundamental techniques of wood fabrication, including basic joinery, turning, and finishing.
Lab. 15, Credit 5 (offered each year)

FSCW-251, 252, 253  Wood Craft Elective I
Registration #0414-251, 252, 253
An elementary course in design and techniques in woodworking. Hand and power tools will assist in the small scale making of wood objects.
Lab. 6, Credit 3 (offered each year)

FSCW-300  Woodworking Materials and Processes
Registration #0414-300
Sequential course for three quarters, covering advanced design, layout and construction. Advanced veneering and finishing. Estimating and production techniques. Flexibility of machine tools, use of jigs and templates and studies of small shop capacity and layout. Historical development of furniture and interiors. Independent study, papers, reports.
Lab. 15, Credit 5 (offered each year)

FSCW-351, 352, 353  Wood Craft 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 each year)

FSCW-400  Woodworking Materials and Processes
Registration #0414-400
Sequential course for three quarters, covering advanced construction in veneering, involving at least one marquetry project. Alternative methods of joinery and the flexible use of equipment. Analysis of construction problems in both traditional and contemporary furniture. Research of techniques of wood and the industry. Independent study. Paper reports.
Lab. 15, Credit 5 (offered each year)

FSCW-500  Woodworking Techniques and Thesis
Registration #0414-500
Sequential course for three quarters, allowing each student, with the approval of the instructor, to specialize in one branch of woodworking or to develop a particular design trend. This culminates during the final quarter in the completion of a thesis project.
Lab. 24, Credit 8 (offered each year)

Graduate Courses

School of Art and Design

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

Art Education

FADA-701, 702  Methods and Materials I
Registration #0401-701, 702
Intensive study of curriculum in terms of teaching materials for both studio and appreciation aspects of elementary, early secondary and high school art education. Includes studio and elementary school teaching experience.
Class 2, Lab. 9, Credit 5 (offered every year-Fall, Winter)

FADA-820  Seminar in Art Education
Registration #0401-820
Evaluation and study of the practice teaching experience. Discussion of the professional role of the art teacher in terms of professional associations, supervision, teacher training, and research. A final project on some intensively studied aspect of art education is required.
Lab. 25, Credit 3 (offered every year-Spring)

FADA-860  Practice Teaching in Art Education
Registration #0401-860
A seven-week full-time practice teaching experience in secondary school, including professional duties of the art teacher in humanities courses, publication advising, audiovisual work, and supervision. Supplements the studio-theoretical education. Meets the state education requirements.
Credit 9 (offered every year-Spring)

Communication Design

FADC-750 (MST, elective, minor)  Communication Design
Registration #0402-750
Advanced creative problem solving experiences in communication design imagery. Professional problems in graphic design and related visual techniques for communication media such as print, television, film, computer and business practices. Media Center facility available for extension of studio problems.
Lab. 6, Credit 3 (offered every quarter)

FADC-780 (MFA)  Communication Design
Registration #0402-780
Advanced creative problem-solving experiences relating to visual communications imagery. Formal design values are emphasized and utilized in communications applications. Studio involvement is directed toward the solution of individual, group and assigned graphic design problems. Specification of the program is developed in accordance with the professional goal of the individual student and work leading toward the master's thesis. Media Center facilities are available for application of studio imagery.
Lab. 9-27, Credit 3-9 (offered every quarter)

Environmental Design

FADD-750 (MST, elective, minor)  Design Applications
Registration #0403-750
Various problems will emerge from the study of products and interiors. The reasoned application of theoretical three-dimensionality of design world will be probed by considering the importance of the decision making role of the designer in an industrialized world.
Lab. 6, Credit 3 (offered every quarter)
Graduate Courses

School for American Craftsmen

Ceramics and Ceramic Sculpture

FSCC-750 (MST, elective, minor) Ceramics and Registration #0409-750 Ceramic Sculpture
Basic instruction and experience in ceramic design, fabrication and production of ceramic forms is undertaken. This study provides ceramic technology and terminology and gives experience with clays and glazes along with fundamental forming techniques. The development of design awareness is encouraged through lectures and critiques.
Lab. 6, Credit 3 (offered every quarter)

FSCC-780 (MFA) Ceramics and Registration #0409-780 Ceramic Sculpture
A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. There will be a strengthening of ceramic techniques, design fundamentals and encouragement of personal ceramic expression. The student will be encouraged to evaluate new techniques, materials and concepts through clay into its uses in pottery, murals, lights, fountains, space dividers and other forms. This sequence leads to the master’s thesis, suggested by the student and approved by the faculty.
Lab. 9-27, (offered every quarter)

Glass

Monumental Stained Glass

FSCG-720 Monumental Stained Glass Registration #0411-720
This elective teaches the basics to stained glass designing, cutting, soldering, leading, glazing, and other fabrication techniques.
Lab. 6, Credit 3 (offered each year)

FSCG-750 (MST, elective, minor) Glass Registration #0411-750
This will expand the appreciation of glass and add cold glass techniques to the student’s understanding. Sandblasting, grinding, belt sanding, flexible shaft drawing, cutting and epoxy painting are techniques presented for student to apply toward design concepts.
Lab. 6, Credit 3 (offered every quarter)

FSCG-780 (MFA) Glass Registration #0411-780
The study and manipulation of hot glass, including refinement of traditional and innovation of new techniques will be undertaken: design, cold glass, sagging, slumping, casting, industrial and studio glass lines, copper wheel and stone engraving along with glass technology and history. The program is structured on individual needs, interests and background preparation as they may be determined through faculty counseling. This sequence leads to the master’s thesis, suggested by the student and approved by the faculty.
Lab. 9-27, Credit 3-9 (offered every quarter)

Design Applications

FADD-780 (MFA) Design Applications Registration #0403-780
The reasoned application of theoretical three-dimensional design, to responsible practical solutions that are valid in our complex and dynamic world environment by considering the importance of the decision making role of the individual designer in a mass industrialized society. Studio involvement is directed toward the solution of individual, group and assigned product, industrial to interior problems. The individualized solutions lead toward a master’s thesis.
Lab 9-27, Credit 3-9 (offered every quarter)

Painting

FADP-750 (MST, elective, minor) Painting Registration #0405-750
The pursuit and comprehension of the pertinent, the ecstatic and the beautiful, by a small group of those who intend to both paint and teach the young to understand and appreciate painting.
Lab. 6, Credit 3 (offered every quarter)

FADP-780 (MFA) Painting Registration #0405-780
The pursuit of the pertinent, the ecstatic, the beautiful, by a small group of those dedicated to the art. The student will become familiar with the trends and questions of modern painting, and by strengthening both his intellectual and technical facilities, be prepared for a career as a professional painter. The work leads toward the master’s thesis.
Lab. 9-27, Credit 3-9 (offered every quarter)

Printmaking

FADR-750 (MST, elective, minor) Printmaking Registration #0406-750
Advanced techniques in etching, lithography and woodcutting, as well as many experimental areas including color processes, photo-etching, photo-lithography, vacuum-forming and combination printing. Students are expected to develop along independent lines, and direction is offered in contemporary thought and concept. The emphasis is toward developing a complete respect for the printmaking craft and profession.
Lab. 6, Credit 3 (offered every quarter)

FADR-780 (MFA) Printmaking Registration #0406-780
Contemporary and historical print making concepts are presented as stimulant and provocation for the development of an individual approach to expression. Advanced techniques are demonstrated in intaglio, relief and lithography with resources available in non-silver photo processes, paper making and combinations. A complete understanding of the development and maintenance of the print studio is supportive for the professional artist. The work leads toward the master’s thesis.
Lab. 9-27, Credit 3-9 (offered every quarter)

Sculpture

FADS-750 Sculpture Registration #0407-750
Sculptural concepts are approached through a variety of processes and materials. The studio work is executed in paper, wood, fabrics, metal, stone, clay and plastics.
Lab. 6, Credit 3 (offered each year)

Thesis

FAD (C, D, P, or R)-890 Research and Thesis Guidance Registration #040 (2, 3, 5 or 6)-890
The development of a thesis project instigated by the student and approved by a faculty committee and the Graduate Academic Council representative. Primarily creative production, the thesis must also include a written report.
Credit 12 (offered every quarter)
Metalcrafts and Jewelry  
FSCM-750 (MST, elective, minor)  
Metalcrafts and Jewelry  
Registration #0412-750  
This is the study and manipulation of metals for hollow ware/jewelry. Design sensitivity and concepts are approached through the raising, forming and planishing or casting, forging, and fabricating techniques.  
Lab. 6, Credit 3 (offered every quarter)  
FSCM-780 (MFA)  
Metalcrafts and Jewelry  
Registration #0412-780  
A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. Both hollow ware and jewelry areas will be explored. It is designed to give the student a broad exposure to metalworking techniques, expand the student's knowledge of applied design, strengthen perceptual and philosophical concepts and develop an individual mode of expression. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.  
Lab. 9-27, Credit 3-9 (offered every quarter)  
Weaving and Textile Design  
FSCT-750 (MST, elective, minor)  
Weaving and Textile Design  
Registration #0413-750  
This is the study and appreciation of weaving and textile techniques, soft sculpture, off loom weaving and printing. Design approaches are stressed.  
Lab. 6, Credit 3 (offered every quarter)  
FSCT-780 (MFA)  
Weaving and Textile Design  
Registration #0413-780  
A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. Techniques offered are combination weaves and pattern design, double weave, embroidery and stitchery, filament weave, ikat, multiple layer, dyeing, non-loom, pile rug, printed surface, silkscreen, tapestry, and soft sculpture. Design concepts are compliments to the techniques. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.  
Lab. 9-27, Credit 3-9 (offered every quarter)  
Woodworking and Furniture Design  
FSCW-750 (MST, elective, minor)  
Woodworking and Furniture Design  
Registration #0414-750  
This is a course in woodworking techniques and procedures. It enables the student to gain design competency through wood and an individual solution to wood projects based on suggested needs. The MST student selects a chair, table or cabinet for design execution.  
Lab. 6, Credit 3 (offered every quarter)  
FSCW-780 (MFA)  
Woodworking and Furniture Design  
Registration #0414-780  
A program structured on the basis of individual needs, interests and background preparation as they may be determined through faculty counseling. This provides an opportunity for technical, aesthetic and design competency to grow through the exploration of hand and machine tools; solid wood theory, joinery and practice; veneer theory, joinery and practice; production theory; chair, table, cabinet design and construction. This sequence leads to the master's thesis, suggested by the student and approved by the faculty.  
Lab. 9-27, Credit 3-9 (offered every quarter)  
Thesis  
FSC (C, G, M, T or W)-890  
Research and Thesis Guidance  
Registration #04 (09,11,12,13 or 14)  
Research and presentation of an acceptable thesis with a focus on technique, design, production, or a combination of these approved by the faculty. The thesis subject will be chosen by the candidates with the approval of the faculty advisor. The thesis will include a written summation or report of the research and presentation program.  
Lab. 27, Credit 12 (offered every quarter)
College of General Studies

Criminal Justice

GCJC-201 Fundamentals of the Criminal Justice System
Registration #0501-201
The principles of the criminal justice system; administration and management within various agencies, including the relationship of the police to the courts; the courts to the probation, correction and parole functions. Consideration will be given to specific problems within the branches of the criminal justice system.
Class 3, Credit 4 (offered annually)

GCJC-203 Criminology
Registration #0501-203
A survey of the field of criminology with emphasis on major forms of contemporary crime, definition of crimes and criminality, theories of criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime.
Class 3, Credit 4 (offered annually)

GCJC-204 Introduction to Public Administration
Registration #0501-204
This course presents the principles of management and organizational theory as they relate to public agencies in general, and criminal justice agencies in particular. Case studies, as well as descriptive information concerning the classic issues involved in the administering of public institutions, will be offered to the student.
Class 3, Credit 4 (offered annually)

GCJC-206 Administrative Concepts in Law Enforcement
Registration #0501-206
The course is intended to provide the student with an overview of the fundamental concepts of organization and administration, and to provide also the criteria and/or standards by which municipal police agencies may be evaluated or improved administratively.
Class 3, Credit 4 (offered annually)

GCJC-207 Corrections
Registration #0501-207
The course is designed to introduce the student to the basic organizations of the correctional system, their functions and performance. Prisons and jails, as well as probation and parole agencies, will be discussed within the context of historical and contemporary philosophy. Attention will also be focused on decision making functions, the role of various personnel within the correctional system and the population of offenders within it. Strategies for rehabilitation and their effectiveness will be surveyed.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-301 Fundamental Concepts of Criminal Law
Registration #0501-301
The subject matter of this course consists of an introduction to the fundamental principles upon which substantive criminal law is based. The basic characteristics and requirements of criminal conduct are examined. Included in the scope of this course are the following topics: nature of criminal conduct, the meaning of criminal mental state, the requirement of concurrence between action and intent, and the requirement of legal causation. The elements of the principal defenses to criminal liability, such as insanity, entrapment, and self-defense, are also discussed.
Class 3, Credit 4 (offered annually)

GCJC-302 History of Organized Crime in America
Registration #0501-302
Historical analysis of criminal associations in their various manifestations, informal types of cliques and mobs and formal organizations of industry and area-wide rackets; with special emphasis upon organized crime as it developed historically in America. (GCJC-201, 203)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-303 Law Enforcement in Society
Registration #0501-303
The social and historical origins of the various police systems, police culture, role and career, police in the legal system; social and legal restraints on police practices, police discretion in practice; police and the community, police organization and community control mechanisms. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-304 The Judicial Process
Registration #0501-304
This course is designed to provide the student with a fundamental understanding of the various procedural steps involved from the time a person is charged with a crime until the matter is resolved by conviction or acquittal. This course examines both federal and state criminal judicial systems, their functions and operations, their similarities and differences, and their impact upon the accused and the victim. (GCJC-201)
Class 3, Credit 4 (offered annually)

GCJC-306 Introduction to 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.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-307 Criminal Investigation
Registration #0501-307
The course is an introduction to the criminal investigative function and process 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.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-309 Juvenile Justice
Registration #0501-309
The philosophical, historical and operational aspects of the juvenile justice system; evaluation of the social and personal factors related to juvenile delinquency; the role of police, the courts, corrections and community programs in delinquency prevention, control and treatment.
Class 3, Credit 4 (offered annually)

GCJC-401 Scientific Methodology
Registration #0501-401
A survey and analysis of the uses of statistics and social research methods, with special reference to utilization of data from the field of criminal justice. The first part examines the basic techniques in social research. Attention is given to methods of collecting, analyzing and interpreting statistical data, and to the use of statistics in the development of research designs; the second part of the course covers descriptive statistics, as well as discussion of the probabilistic nature of all such systems and the elements of data evaluation employed.
Class 3, Credit 4 (offered annually)

GCJC-403, GCJC-404 Field Experience (2)
Under the guidance of an instructor, during the junior or senior year, the student is placed in a participating criminal justice agency in order that he or she may gain firsthand experience with its organization, programs, and methods of work. Closely supervised work at the agency is supplemented by communication with the student’s field placement instructor to discuss experiences encountered on the job.
Class variable, Credit 9 each (offered annually)
and the theoretical positions which may affect the future correction system. (GCJC-201, 207)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-407
Behavior Modification in Criminal Justice System

This course surveys present and future methods of modifying human behavior with a goal of individual change. Included will be a survey of control technologies, utilized and proposed as methods of individual behavior modification. Discussion will center on techniques as well as social and ethical implications. Emphasis will be on utilization oriented models. (GCJC-201, 207)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-408
Constitutional Law and Criminal Justice

This course has been designed to provide the student with a basic understanding of the constitutional principles frequently encountered in the criminal justice profession. Landmark court decisions, relating to due process, equal protection, unlawful arrest, unreasonable search and seizure, compulsory self-incrimination, the assignment of counsel and fair trial guarantees are discussed and critically evaluated. (GCJC-201, 301)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-409
Legal Rights of Convicted Offenders

This course is designed to present an in-depth study of the substantive and procedural law as it affects convicted offenders. Court procedure is devoted to the study of constitutional rights and privileges, how they apply to convicted offenders, and the methods employed to secure these rights. Conviction and its consequences are explored, as is the sentencing process. The rights of prisoners, probationers, and parolees are reviewed. In addition, the various remedies for enforcement of these rights are discussed, including direct appeals, collateral attacks, and a variety of post-conviction remedies. The course is intended for students who wish to pursue a career in law enforcement, correction, probation, parole, or law. However, students interested in some other aspect of criminal justice, which deals with convicted offenders, may find this course useful. (GCJC-201, 207)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-410
Correctional Administration

This course presents the history and development of the principles of management and organizational theory as they developed in the field of corrections. This developmental evaluation is followed by a presentation of certain principles and philosophies concerning agency administration which have proved effective in business, industry, and many elements of government, with the intention of discussing their applicability to prisons, probation, parole, and other community correctional programs. (GCJC-201, 207)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-411
Issues in Corrections

This course is a sequel to Corrections. It presents a critical evaluation of the contemporary correctional programs in the United States. Program discussions include: jails, prisons, probation, parole, halfway houses, study release, work release, prison furloughs and various community-based correctional techniques. Emphasis is placed upon the theories of penology and rehabilitation, which provide direction to the correction system today, and the theoretical positions which may affect the future corrections. (GCJC-201, 207)

Class 3, Credit 4 (offered annually)

GCJC-505
White Collar Crime

An examination of the extent and character of white collar crime, with special emphasis upon business and professional deviancy. (GCJC-201, 203)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-510
Counseling in the Criminal Justice System

This course is designed to instruct the student in the various, accepted contemporary dynamics of interviewing and counseling generic to criminal justice and related human service agencies. Issues to be discussed will revolve around counseling and supervision strategies and conflicts among agencies, between administrators and staff, and between staff and clients. This course will present both the practical and theoretical aspects of these issues as well as devote attention to surveying prospective counseling strategies for accomplishing desired behavioral change. (GCJC-201)

Class 3, Credit 4 (offered on sufficient demand)

GCJC-511
Alternatives to Incarceration

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.

Class 3, Credit 4 (offered on sufficient demand)

GCJC-512
Minority Groups and the Criminal Justice System

The course will examine the role traditionally attributed to the members of minority groups as criminals and analyze the interaction with the criminal justice system. Heavily relying on the conflict perspective, the course will review the literature on the creation of laws, the breaking of laws, and the processing of minority members in the criminal justice system. (GCJC-201, 203)

Class 3, Credit 4 (offered on sufficient demand)
GCJC-514 Planning and Changes in the Criminal Justice System
It is the objective of this offering to expose the student to issues of "change" 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 both organizational and individual issues. In addition, attention will be given to surveying various strategies for accomplishing change. This course is designed to give the advanced student the opportunity to intensively scrutinize the prospective shape of the criminal justice system. (GCJC-203)
Class 3, Credit 4 (offered annually)

GCJC-516 Court Administration
Registration #0501-516
A course designed to explore the management aspects of the court and court process. There is a focus on the structure of the several levels of court that typically exist in modern urban America. Related to this structure are the various other criminal justice agencies that interact with the court at various stages of the process. In addition, operational problems, such as the bail process, record keeping, jury service and selection methods, and calendar management will receive significant attention.
Class 3, Credit 4 (offered on sufficient demand)

GCJC-517 Comparative Criminal Law
Registration #0501-517
The course examines, in a comparative analysis, the criminal systems and the penal methods of Europe and the United States. Major emphasis will be given to the issues of intent, criminal responsibility, individual and public interests, purposes and modes of prevention, repression and punishment, methods of trial, punishment and pardon. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-518 Police/Community Relations
Registration #0501-518
Police-public contact; uses of the communications media in projecting the police image; responsibilities of police in dealing effectively with minority groups, civil rights, civil disorder, and public protection. An exploration of the role and function of the police in intergroup relations. (GCJC-303)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-520 Sentencing Process
Registration #0501-520
This course is intended to provide the student with a broad overview of the law of sentencing and the alternatives presently available in this area. Emphasis will be placed on the traditional methods of punishment now available in the courts, including, but not necessarily restricted to: fines, imprisonment, probation and suspended sentences. The course will also look to the power of the court in exercising its discretion in the sentencing process. (GCJC-201, 207, 304)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-522 Victimless Crime and the Law
Registration #0501-522
The course is designed to familiarize the student with many of the implications and ramifications of efforts to control "victimless" crimes. Course discussions concentrate on the illegal activity associated with prostitution, gambling, homosexuality, drug use and pornography. In this course the social, political, moral, legal and practical consequences of legalizing such activities are examined and evaluated. (GCJC-201, 203, 301)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-523 Crime and Violence
Registration #0501-523
The course will analyze the causes of the outbreak and rapid increase of violent and criminal trends in the world as the most serious realities of the 20th century. Primarily, emphasis will be given to the interdependence between socioeconomic instability and crime, underdevelopment and crime, urban crisis and social mobility, unequal opportunities and racial strife. The course will transcend the national boundaries of America and will focus on crime, violence, and urban crisis in other parts of the world. The course will be a comparative study of America's and the world's problems of violence, crime and urban crisis. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-525 Industrial Security
Registration #0501-525
Analysis of the major problems of industrial and business security, including college campuses, hospitals, etc. Emphasis on current security problems and methods of dealing with them effectively. Administrative, legal and technical problems will also be discussed. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-526 Issues 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 as it relates to the courts, corrections and the community. Conflicts between theory and practice are examined and analyzed, and future trends in law enforcement will be explored. (GCJC-303)
Class 3, Credit 4 (offered annually)

GCJC-527 Advanced Criminal Law
Registration #0501-527
The course will investigate assumptions and concepts of criminal law. The course will emphasize major crimes against the person and major crimes relating to property. (GCJC-201, 203, 301)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-528 Etiology of Crime
Registration #0501-528
This course is a comprehensive survey of the sociological, psychological, and psychiatric views of the etiology of crime and other forms of deviant behavior. With major emphasis on the sociological forms of explanation, the course will undertake a historical review of criminality theory and progress to present-day concerns of both etiological and epidemiological origins. (GCJC-201, 203)
Class 3, Credit 4 (offered annually)

GCJC-529 Physical Security
Registration #0501-529
This course will include an analysis of today's cost of crime against business, and the methodology utilized in creating such losses. Primary course emphasis will be placed upon methods, techniques, and approaches used in the professional field of loss prevention/security administration to provide the widest range of practical solutions in the reduction of losses and the enhancement of security as a tool of management. (GCJC-201)
Class 3, Credit 4 (offered on sufficient demand)

GCJC-530 Women and Crime
Registration #0501-530
This course will deal with women as criminal offenders and women as victims of crime in the past, present, and future. It will focus mainly upon women as criminals, including theories about women in crime, types of crimes committed, patterns of criminality, and the treatment of women within the criminal justice system. Special attention will be given to a discussion and analysis of the changing role of women in crime.
Class 3, Credit 4 (offered annually)

GCJC-599 Independent Study
Registration #0501-599
A combined student/faculty member effort on a chosen topic beyond the normal sequence of course selections. It provides the qualified self-motivated student with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.
Class variable, Credit variable (offered annually)
Social Work

Core Courses

GSWS-210  Introduction to the Profession of Social Work
Registration #0516-210
Designed to assist students in making decisions regarding their careers in social work. The course covers basic exercises for developing self-awareness and professional self-assessment, explores various fields of social work and helps students begin to build their concepts of social work as a profession.
Class 3, Credit 4 (offered fall, spring)

GSWS-211  Social Welfare: Structure & Functions
Registration #0516-211
Examines the provision of social services in four major fields of social welfare: public welfare, traditional voluntary agencies, voluntary social movements and the legal system. Course will also explore organization theory as it applies to the structure of these services, as well as major patterns and sources of funding.
Class 3, Credit 4 (offered fall, spring)

GSWS-302  Social Welfare: History
Registration #0516-302
Designed to explore social welfare institutions and processes and their history, philosophy and relationship to other social institutions in the United States. Emphasis is on the role of social work in various internated social welfare institutions.
Focus is on the gradual modification of social policy in order to provide the student with a basic understanding of the evolution of programs and services to meet the changing needs of people. The development of the social work profession is traced along with its response to the changing needs of society. (GSWS-210 or concurrent)
Class 3, Credit 4 (offered fall, winter, & spring)

GSWS-310  Hispanic Culture for Social Workers
Registration #0516-310
This course is designed to analyze past, present and future social welfare policies, programs and services to meet the changing needs of people. The development of the social work profession is traced along with its response to the changing needs of society. (GSWS-210 or concurrent)
Class 3, Credit 4 (offered fall, winter, & spring)

GSWS-311  Social Work from a Pan-Afrikan Perspective
Registration #0516-311
This course is designed to analyze past, present and future social welfare policies, programs and services from a Pan-Afrikan perspective. This perspective is viewed as essential if one is to attain skills needed to analyze programs and policies from their actual and predictable effects on black people. (GSWS-210 or concurrent)
Class 3, Credit 4 (offered winter)

GSWS-312  Research Methods
Registration #0516-312
Examines the provision of social services in four major fields of social welfare: public welfare, traditional voluntary agencies, voluntary social movements and the legal system. Course will also explore organization theory as it applies to the structure of these services, as well as major patterns and sources of funding.
Class 3, Credit 4 (offered fall, winter, & spring)

GSWS-411  Methods of Social Work I & Laboratory
Registration #0516-411
See GSWS-413 (GSWS-210, GSWS-211 or concurrent, GSWS-302)
Class 4, Credit 4 (offered fall, winter & spring)

GSWS-412  Methods of Social Work II
Registration #0516-412
See GSWS-413 (GSWS-411, concurrent with GSWS-421)
Class 3, Credit 4 (offered every quarter)

GSWS-413  Methods of Social Work III
Registration #0516413
Methods of Social Work is a three-course sequence offered concurrently with laboratory or field experience. Methods of Social Work stresses the basic principles and skills of a generic approach to social work practice, emphasizing the differential use of social work techniques and Interventive skills in a variety of client systems.
Through lectures, discussions, readings, lab simulations and case analysis, it is the overall objective of the sequence to provide the student with the knowledge, skill and self-awareness for beginning professional social-work practice. The development of this knowledge, skill and awareness is seen as a progressive process underlying and underpinning the three-course sequence (GSWS-412, 421, concurrent with GSWS-422)
Class 3, Credit 4 (offered every quarter)

GSWS-421  Field Instruction I & Seminar
Registration #0516-421
See GSWS-422 (GSWS-411, concurrent with GSWS-412)
Class 2, Field 300; Credit 5 (offered every quarter)

GSWS-422  Field Instruction II and Seminar
Registration #0516-422
Field Instruction I and II comprise a 20-week, 30 hr./week supervised field placement. Under the guidance of an instructor, the student is placed in a cooperating social, governmental or education agency in order that he or she may gain first-hand experience with its organization, programs and client assignments. Closely supervised work at the agency is supplemented by consultations with the instructor in a seminar designed to integrate theory and practice. (GSWS-412, 421, concurrent with GSWS-413)
Class 2, Field 300; Credit 5 (offered every quarter)

GSWS-532  Social Welfare: Profession and Issues
Registration #0516-532
For social work students who have completed field experience. Examines the profession of social work and the values in social work practice, as stated in the Code of Ethics. Current practice issues of the profession will be studied and discussed. Maintenance issues of the profession such as licensure, third-party payments and other topics will also be examined. (GSWS-413, 422)
Class 3, Credit 4 (offered fall, winter & spring)

GSWS-533  Social Welfare: Policy & Planning
Registration #0516-533
For social work students who have completed field experience. Course will explore the development of social welfare services as it proceeds from the determination of social need through program design to implementation. Concepts of policy process, large system change, and grant and proposal writing are considered.
Class 3, Credit 4 (offered fall, winter & spring)

GSWS-535  Seminar & Project
Registration #0516-535
For social work students who have completed field experience. The seminar is designed to be the projects that students are working on and consists of weekly presentations developed around individual student’s needs for help and supervision. Students will present current data on their projects’ progress, as well as participate in a helping process with other class members. (GSWS-312, 413, 422)
Class 3, Credit 4 (offered fall, winter & spring)
Social Work Electives

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 own professional use of self in the helping relationship and evaluating the appropriateness of such behavior
3. Observing the client and evaluating the effect one's response has on him/her
Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills. (GSWS-210, concurrent with or before GSWS-411)
Class 3, Credit 4 (offered winter & spring)

GSWS-213 Gerontology
Registration #0516-213
An introductory study of the second half of the life span with a design to increase understanding of the processes of social accommodation, socialization and social change of the aged as they interact with the community and others. (GSISP-210)
Class 3, Credit 4 (offered fall)

GSWS-214 Drug Abuse
Registration #0516-214
This course is designed to familiarize the social-work student with the many varieties of drugs, drug abuse, drugs and the social scene. Emphasis is placed on a variety of treatment modalities to be used by the social worker when working with drug abusers.
Class 3, Credit 4 (offered spring)

GSWS-313 Women in the Social Work System
Registration #0516-313
This course is designed to sensitize social-work students to the specific concerns of women as a minority group. The course will focus on a woman's cultural upbringing and specific problems and issues related to the worker-client relationship. The student who completes this course will have a better general understanding of the status of women in our society and a particular awareness of the position of women as workers and clients in the social welfare system.
Class 3, Credit 4 (offered on sufficient demand)

GSWS-314 The Social Worker as Advocate
Registration #0516-314
This course will examine the role of social workers in advocating with and on behalf of clients and others in their efforts to negotiate or bring about needed change in institutions or policies of our society. Discussion of the forces in the social, economic and political environment today which directly affect poverty, racism and related urban crises will be related to examining techniques for achieving change.
Class 3, Credit 4 (offered spring)

GSWS-320 Alcoholism Disability: Physiology and Psychology
Registration #0516-320
This course presents the chemistry of alcohol and its effects on the body and mind as well as signs, symptoms, addiction and withdrawal. The study of normal and abnormal personality development and the psychological and social mechanisms of alcohol use and alcoholism in our society are emphasized.
Class 3, Credit 4 (offered annually)

GSWS-321 Alcoholism: Interventive Skills and Techniques
Registration #0516-321
Teaches a variety of interventive skills to those giving cars to alcoholics, their families and communities. Emphasis is on the method of use of these skills. Role play, video tape and case study will be included. (Second-year standing)
Class 3, Credit 4 (offered annually)

GSWS-322 Alcoholism: Rehabilitation Modalities
Registration #0516-322
The course analyzes symptoms and diagnosis of the alcoholic and current methods of rehabilitation. Explores structure, function and use of community resources. (Second-year standing)
Class 3, Credit 4 (offered spring)

GSWS-323 Alcoholism—Supervision in an Alcoholism Setting
Registration #0516-323
Presentation of current supervisory methods and principles with emphasis on their use in agencies serving the alcohol abuser. (Second-year standing)
Class 3, Credit 4 (offered occasionally)

GSWS-330 Rural Social Services
Registration #0516-330
This course is designed to familiarize the social-work student with the economic, political, and social conditions during which rural workers developed in rural areas and the social services which they are developed. It is designed to help students understand the problems of rural social workers vis-a-vis urban social techniques which will be discussed.
Class 3, Credit 4 (offered on sufficient demand)

GSWS-354 Mental Health and Mental Illness from a Social-Work Perspective
Registration #0516-354
This course is designed to give social-work students a general understanding of mental health and illness and the role of the social worker in working with mentally ill and mentally retarded individuals and their families. Students will be given a general understanding of current mental hygiene systems. (GSWS-314, 210)
Class 3, Credit 4 (offered winter)

GSWS-357 Supervision in Social Work
Registration #0516-357
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 dependent on current issues and student interest. Areas related to expressions of student interest, faculty expertise and developments in the field will be examined. Specific readings will be assigned with classroom discussions, special speakers, films, field trips or role plays included depending on the nature of the issues being addressed.
Class 3, Credit 4 (offered fall, winter & spring)

GSWS-509 Services to Children and Their Families
Registration #0516-509
This course is designed to give social-work students a beginning knowledge of social-work services to children and their families. 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-413, 422)
Class 3, Credit 4 (offered fall)

GSWS-512 Intervention with Individuals
Registration #0516-512
This course is designed to familiarize the social-work student with the theory and practice of awareness skills in essentially three broad areas:
1. Skills in noticing or observing
2. Observing one's own professional use of self in the helping relationship and evaluating the appropriateness of such behavior
3. Observing the client and evaluating the effect one's response has on him/her
Students are expected and required to increase their awareness skills, and this course offers a unified learning experience where students can concentrate on the theory and practice of awareness skills. (GSWS-210, concurrent with or before GSWS-411)
Class 3, Credit 4 (offered annually)
GSWS-522 Intervention in Communities
Registration #0516-522
This course examines community intervention as a social work method. Methods of assessing needs, the roles and functions of the community intervention practitioner and alternative models of practice are analyzed. The course will investigate specific applications of community intervention theory to political influence processes, coalition, neighborhood associations and regionalization. (GSWS-413, 422)
Class 4, Credit 4 (offered fall)

GSWS-523 Intervention with Groups
Registration #0516-523
This course examines social treatment as one form of group work practice. There are different service procedures and approaches which center on the use of client groups, and each may have utility in pursuing distinct service objectives. The course will investigate the scope, techniques and function of the group work concept as practiced in such diverse settings as social service agencies, business, correctional institutions and communities. (GSWS-413, 422)
Class 4, Credit 4 (offered winter)

GSWS-599 Independent Study
Registration #0516-599
A combined student/faculty effort on a chosen topic beyond the normal sequence of 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.
Credit variable (offered every quarter)
The courses GLLC-404 (Communication with the Handicapped) and GLZ2-201, 202, 203 (Manual Communication I, II, III) are offered by the College of General Studies as service courses (Page 48) but may be taken as electives by students enrolled in the Social Work Program.
The following courses are offered by the College of Continuing Education but may be taken as electives by students enrolled in the social work program.

CBCP-401 Psycho-Social Aspects of Deafness
Registration #0216-401
This course provides a broad overview of the effects of deafness on individuals, its relation to their social and intellectual development, and an appreciation for the hearing impaired as a person. It provides basic information regarding the nature of the sound anatomy of hearing and the causes and types of deafness.
Class 3, Credit 4 (offered annually)

CHGS-541 Advanced Aspects of Deafness
Registration #0237-541
Selected topics are presented for in-depth study. Possible topics include: legal and educational precedents and considerations of deaf persons in the range of mainstream settings, effects of deafness on cognitive development, impact of deafness on the family, the feasibility of integrating deaf and normally hearing college students, the scope of services available to deaf persons in Rochester and nationally, the relationship of the deaf community to the police. Students will participate in the final selection of course topics.
May be taken for 4 or 5 credits.

General Studies Courses

Language and Literature

GLLC-220 English Composition
Registration #0502-220
This required course is to be taken in the lower division, preferably in the freshman year. The purpose of the course is to develop certain language skills needed to write effectively. The specific objectives of the course are the following: to teach students the basic skills required for the discovery, selection, and arrangement of ideas and the expression of such ideas in a manner appropriate to the purpose and audience for writing; to familiarize students with the uses of a library; to acquaint students with the purposes and procedures of documentation; to teach students the skills of accurate proofreading and critical reading of their own prose; to emphasize the necessity for the basic conventions of grammar, usage, spelling, and punctuation; to emphasize critical reading and thinking as essential components of good writing.
Class 3, Credit 4 (offered annually)

GLLC-421, 422 German I, II
Registration #0502-421, 422
The courses are designed to enable the student to read and understand technical and scientific German.
Class 3, Credit 5/Qtr. (offered annually)

GLLC-501 Effective Speaking
Registration #0502-501
The development of the techniques of formal public speaking as an aid to self-confidence in modern social and business situations. Weekly practice talks with emphasis on organization, clarity, vocal expression, poise.
Class 3, Credit 5 (offered annually)

GLLC-511 Modern Applications of Language Theory
Registration #0502-511
The history and theory of communication from basic human communication through the mass media extensional systems.
Class 3, Credit 5 (offered alternate years)

GLLC-514 Mass Communication
Registration #0502-514
Content will cover the theoretical and practical aspects of the mass media with particular emphasis on the relationship between government, the media, and the public.
Class 3, Credit 5 (offered annually)

GLLC-515 Uses and Effects of the Mass Media
Registration #0502-515
An analysis of the "effects" and the "uses and gratifications" of mass communication research with focus on building mass communication theory. (Note: Students may find GLLC-514 a useful introduction to this course)
Class 3, Credit 5 (offered annually)

GLLC-518 Creative Writing
Registration #0502-518
Students are given maximum freedom to write what they are concerned with in as wide a range of genres as they will attempt.
Class 3, Credit 5 (offered annually)

GLLC-520 Vocabulary Building
Registration #0502-520
Appliciation to the process of vocabulary building of the various disciplines of language study will be provided. Included among these will be applications of dictionary study, etymology, semantics, and structural linguistics. In addition, literary works, periodicals, and newspapers will be examined to strengthen the student's awareness of the contextual variation in the meaning of words. Ineffective and faulty devices of language usage will also be discussed.
Class 3, Credit 5 (offered annually)
A chronological survey of the masterpieces of Western literature from the epic of Homer to selected works of 20th century American and European writers.

GLLL-334 Studies in the American Novel
Registration #0504-334
A study of selected American novels of the 19th and 20th centuries which have become literary classics.
Class 3, Credit 4 (offered occasionally)

GLLL-335 The Hero in Literature
Registration #0504-335
This course is an introduction to the literature of Western civilization. It will trace the changing nature and treatment of the hero in literature from the time of ancient Greece to contemporary America.
Class 3, Credit 4 (offered occasionally)

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 beliefs.
Class 3, Credit 5 (offered annually)

GLLL-503 Great World Drama
Registration #0504-503
A chronological survey of the major periods of theatrical evolution, with emphasis on the physical theatre and production techniques which influenced the playwrights’ works within the respective periods.
Class 3, Credit 5 (offered annually)

GLLL-504 Shakespeare: Comedy and History
Registration #0504-504
Several of Shakespeare’s comedy and history plays are read and analyzed to reveal their literary excellence and their theatrical power.
Class 3, Credit 5 (offered annually)

GLLL-505 The American Spirit in Literature
Registration #0504-505
A survey of the development of American philosophy (political and social) through the study of selected works from the colonial period to the 19th century. Particular attention will be given to the ideas of the writers under consideration and their effect on modern American thought.
Class 3, Credit 5 (offered annually)

GLLL-506 Literary Symbolism in Short Fiction
Registration #0504-506
Emphasis is on defining literary symbolism and in recognizing this device when it is employed in literary works, with special attention given to the accurate interpretation of symbolic works.
Class 3, Credit 5 (offered annually)

GLLL-513 Ecological Awareness in Literature
Registration #0504-513
A chronological examination of selected works dealing with man’s relationship to nature.
Class 3, Credit 5 (offered alternate years)

GLLL-515 Contemporary American Novel
Registration #0504-515
The course will cover American fiction written after World War II. Works by contemporary American writers such as Ellison, Mailer, Bellow, and Updike will be examined, with special emphasis being placed on these writers’ relation to contemporary American culture.
Class 3, Credit 5 (offered annually)

GLLL-516 Literature and Society
Registration #0504-516
Selected works by writers such as Sophocles, Dante, Dickens, Camus and Vonnegut as important works of art that reflect the human condition and implicitly prophesy against particular evils in attitudes or institutions of their times.
Class 3, Credit 5 (offered annually)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration No.</th>
<th>Class Credit</th>
<th>Offered Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLLL-517</td>
<td>Literature of the Bible</td>
<td>#0504-517</td>
<td>3, 5</td>
<td>Annually</td>
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<td></td>
<td>A close and rapid reading of selected Old and New Testament books to show</td>
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<td>the range and variety of literary genres and styles in the Bible.</td>
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<tr>
<td>GLLL-522</td>
<td>Mark Twain and the American Dream</td>
<td>#0504-522</td>
<td>3, 5</td>
<td>Annually</td>
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<td>Focus will be on the bitter-comic writings of the last part of Twain’s</td>
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<td>career and his various ‘escapisms.’</td>
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<tr>
<td>GLLL-524</td>
<td>Contemporary Film</td>
<td>#0504-524</td>
<td>3, 5</td>
<td>Annually</td>
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<td>A study of contemporary world films, to be drawn from those presently</td>
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<td>showing in the Rochester area (theaters, television, film festivals).</td>
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<td>Emphasis will be on both technical and aesthetic aspects of the films.</td>
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<tr>
<td>GLLL-527</td>
<td>Shakespeare: Tragedy and Romance</td>
<td>#0504-527</td>
<td>3, 5</td>
<td>Occasionally</td>
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<tr>
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<td>A generous sample of Shakespeare’s tragedy and romance plays is</td>
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<td>investigated to reveal their literary excellence and their theatrical</td>
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<td>power.</td>
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<tr>
<td>GLLL-529</td>
<td>Literature and Religious Experience</td>
<td>#0504-529</td>
<td>3, 5</td>
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<td>An interdisciplinary course which attempts to explore the complexity and</td>
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<td>variety of man’s personal religious quest and its conflicts as they are</td>
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<td>portrayed by both psychoanalysts and literary artists.</td>
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<tr>
<td>GLLL-530</td>
<td>Religions of the East: Hinduism, Buddhism</td>
<td>#0504-530</td>
<td>3, 5</td>
<td>Occasionally</td>
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<td></td>
<td>A study of the major religions of the East.</td>
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<tr>
<td>GLLL-531</td>
<td>American Literature of the 1920’s and 1930’s</td>
<td>#0504-531</td>
<td>3, 5</td>
<td>Annually</td>
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<tr>
<td></td>
<td>A study of American writers of the 20th century with particular attention</td>
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<td>to the beginnings of realism, naturalism, and symbolism.</td>
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<tr>
<td>GLLL-532</td>
<td>Man, Nature, and Technology</td>
<td>#0504-532</td>
<td>3, 5</td>
<td>Annually</td>
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<td></td>
<td>The interdisciplinary ecology course; texts include Commoner,</td>
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<td></td>
<td>The Closing Circle.</td>
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<tr>
<td>GLLL-533</td>
<td>The Modern Movement in Literature</td>
<td>#0504-533</td>
<td>3, 5</td>
<td>Occasionally</td>
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<td></td>
<td>Examination of the philosophy and literary achievements of modernism</td>
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<td>throughout the works of Mann, Joyce, Proust, Beckett, Faulkner,</td>
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<td>and Borges.</td>
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<tr>
<td>GLLL-535</td>
<td>Technology in American Literature</td>
<td>#0504-535</td>
<td>3, 5</td>
<td>Annually</td>
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<td></td>
<td>A study of 19th and 20th century short fiction and novels criticizing the</td>
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<td>impact of technology upon society.</td>
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<tr>
<td>GLLL-536</td>
<td>Short Fiction</td>
<td>#0504-536</td>
<td>3, 5</td>
<td>Annually</td>
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<tr>
<td></td>
<td>The short story as a particular form of literature: definition,</td>
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<td>characteristics and aims.</td>
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<tr>
<td>GLLL-538</td>
<td>The Nightmare of Technology: Studies in</td>
<td>#0504-538</td>
<td>3, 5</td>
<td>Annually</td>
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<tr>
<td></td>
<td>19th Century British Writing</td>
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<td>Study of British prose and poetry on the effects of industrialism</td>
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<td>and the social problems in 19th century England.</td>
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<tr>
<td>GLLL-539</td>
<td>The Romantic Vision</td>
<td>#0504-539</td>
<td>3, 5</td>
<td>Annually</td>
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<td>A study of 19th century European prose and poetry (primarily British)</td>
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<td>with particular attention paid to the collapse of the Romantic vision,</td>
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<td>and its gradual absorption into the aesthetic and decadent literary</td>
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<td>traditions of late nineteenth century European literature.</td>
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<tr>
<td>GLLL-540</td>
<td>Hero Image in the Theater</td>
<td>#0504-540</td>
<td>3, 5</td>
<td>Annually</td>
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<td>An evolutionary survey of the image of the theatrical hero from ancient</td>
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<td>Greece to the mid-20th century, with emphasis on the changes which take</td>
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<td>place in the hero image and the reasons for such character changes.</td>
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<tr>
<td>GLLL-541</td>
<td>Literature and Cinematic Adaptation</td>
<td>#0504-541</td>
<td>3, 5</td>
<td>Occasionally</td>
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<tr>
<td></td>
<td>Examination of both the literary and cinematic qualities and characteristics</td>
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<td></td>
<td>of common works, with emphasis on their similarities and differences and</td>
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<td>their resultant strengths and weaknesses as creative endeavors.</td>
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<tr>
<td>GLLL-542</td>
<td>Literature of Violence</td>
<td>#0504-542</td>
<td>3, 5</td>
<td>Occasionally</td>
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<td>An evaluation of the promoting forces, the types, and the effects of</td>
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<td>violence as it occurs in literary themes from different periods and</td>
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<td>backgrounds.</td>
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<tr>
<td>GLLL-545</td>
<td>Deaf Studies in Literature</td>
<td>#0504-545</td>
<td>3, 5</td>
<td>Annually</td>
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<tr>
<td></td>
<td>A study of the literature of deafness, with special emphasis on literary</td>
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<td>works which identify and illuminate “the deaf experience.”</td>
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<tr>
<td>GLLL-546</td>
<td>Philosophy of Justice</td>
<td>#0504-546</td>
<td>3, 5</td>
<td>Annually</td>
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<td>Examination of dissent and private conscience in collision with the</td>
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<td>claims of order and stability in a democratic society.</td>
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<tr>
<td>GLLL-547</td>
<td>Modern Poetry</td>
<td>#0504-547</td>
<td>3, 5</td>
<td>Annually</td>
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<tr>
<td></td>
<td>A close examination of poems of important English and American poets of</td>
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<td></td>
<td>the 19th and 20th centuries, including several living poets.</td>
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<tr>
<td>GLLL-548</td>
<td>Women in Literature</td>
<td>#0504-548</td>
<td>3, 5</td>
<td>Annually</td>
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<td></td>
<td>Reading and analysis of literature by and about women, mostly in the</td>
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<td></td>
<td>19th and 20th centuries.</td>
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<tr>
<td>GLLL-550</td>
<td>Jonathan Swift and the Age of Satire</td>
<td>#0504-550</td>
<td>3, 5</td>
<td>Annually</td>
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<td>Vicious satirical writings of Jonathan Swift and other early 18th century</td>
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<td>authors (Alexander Pope, John Dryden) will be read and analyzed, focusing</td>
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<td>on the intrigue and scandals marking the political and religious</td>
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<td></td>
<td>environment of the age.</td>
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<tr>
<td>GLLL-551</td>
<td>World Literature in English</td>
<td>#0504-551</td>
<td>3, 5</td>
<td>Annually</td>
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<td>The course will cover short stories and novels written in English by</td>
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<td>Australian, African, Asian, and West Indian authors. The selection will</td>
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<td>be discussed against the background of the social, political, and cultural</td>
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<td>milieu in which the authors worked.</td>
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This course deals with the historical and stylistic aspects of the avant-garde painters of the second half of the nineteenth century and the first decade of the twentieth 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 5 (offered annually)

GLLL-552 Milton: Literature of Revolution
Registration #0504-552
John Milton, the author of Paradise Lost, was the English Commonwealth’s foremost propagandist and defender of regicide. His major works will be read and analyzed, focusing both on their literary brilliance and how they reflect the religious, moral, political, and philosophical turmoil of the 17th century.
Class 3, Credit 5 (offered alternate years)

GLLL-555 American Literature in the Industrial Age
Registration #0504-555
This course is a survey of the development of American culture from the Civil War to the early twentieth century. The reading will consist of selected literary and philosophical works of this period, and the course will concentrate on the American response to several developments of the period: the increasing power of technology and industry, the use of America as a world power, the growth of new philosophies and Social Darwinism and Marxism, and the pressure for social change arising from various reform movements.
Class 3, Credit 5 (offered occasionally)

GSHF-501 Art of the Cinema
Registration #0504-501
A critical examination of certain films as an integral part of modern culture.
Class 3, Credit 5 (offered annually)

Science and Humanities

GSHF-510 Introduction to the Performing Arts: Music
Registration #0505-510
An introduction to the nature, form and significance of music and of the listening experience. Emphasis is placed on the development of a personal awareness of music through an examination of its structure, historical development and its purpose to society.
Class 3, Credit 4 (offered annually)

GSHF-511 Introduction to the Performing Arts: Film
Registration #0505-511
Emphasis on seeing and knowing good films. How the director exploits cinematic techniques to create a work of art is the focus for study and discussion of international cinema.
Class 3, Credit 4 (offered annually)

GSHF-512 Master Drawings Since the Renaissance
Registration #0505-512
A study of drawings from the 15th to the 20th century, including the work by Leonardo da Vinci, Michelangelo, Durer, Rembrandt and Picasso.
Class 3, Credit 5 (offered occasionally)

GSHF-513 Oriental Art
Registration #0505-513
A survey outlining the development of art in India, China and Japan and examining the philosophical circumstances that distinguish Eastern traditions.
Class 3, Credit 5 (offered annually)

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 will also be discussed.
Class 3, Credit 5 (offered annually)

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 5 (offered annually)

GSHF-520 Picasso
Registration #0505-520
The life and work of one of the most influential artists of our century.
Class 3, Credit 5 (offered annually)

GSHF-525 Major Symphonies
Registration #0505-525
A non-specialized humanistic approach to the understanding of the people, ideas, and times during which major musical compositions were created.
Class 3, Credit 5 (offered occasionally)

GSHF-526 Twentieth Century Music
Registration #0505-526
A survey of major 20th century composers and their works. Emphasis will be placed on the development of music in the classical tradition, experimental music and jazz.
Class 3, Credit 5 (offered annually)

GSHF-527 Orchestral Music
Registration #0505-527
Examination of selected orchestral works from the 18th to the 20th century with emphasis on listening and stylistic analysis. Works by Bach, Beethoven, Brahms, Tschaikovsky, Stravinsky, Bartok, and others.
Class 3, Credit 5 (offered occasionally)

GSHF-528 Romanticism in Music
Registration #0505-528
A survey of music written during the Romantic Period (19th century), including later trends - Impressionism (Debussy, Ravel) and Neo-classicism (Satie, Stravinsky). Genres include orchestral music, chamber music, piano, song, ballet, and opera. Representatives composers are Chopin, Brahms, Wagner, and Tschaikovsky.
Class 3, Credit 5 (offered occasionally)
GSHH-529 Visual interpretation of the Drama
Registration #0505-529
Study of the visual components in a play from the point of view of a theatrical designer. Plays from various countries and time periods will be studied in order to develop skill in interpreting character, literary style and dramatic structure and techniques for communicating this understanding to an audience through stage design. Students will be expected to master the content of a selected group of plays as well as increase their ability to find visual equivalents through which to render their understanding. The course is designed for upper division students with interest in dramatic literature, theater or the application of visual design to the performing arts.
Class 3, Credit 5 (offered occasionally)

GSHH-530 Art, Music and Ideas
Registration #0505-530
This is a non-specialized course offering the student the opportunity to examine specific works of art and music against the background of ideas and concepts that influenced and animated the life of their times.
Class 3, Credit 5 (offered annually)

GSHH-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 literate societies of sub-Saharan Africa.
Class 3, Credit 5 (offered occasionally)

GSHH-301 Modern American History
Registration #0507-301
Political, social, cultural, and economic development of the American people in the modern period.
Class 3, Credit 4 (offered annually)

GSHH-302 Modern European History
Registration #0507-302
A thematic analysis of the major social, political, economic and ideological movements of modern Europe. Special attention is given to the impact of European thought and institutions on the contemporary world.
Class 3, Credit 4 (offered annually)

GSHH-303 Latin American History: From Independence to the Modern Period
Registration #0507-303
Survey of historical development of Latin America.
Class 3, Credit 4 (offered annually)

GSHH-310 The Future As History
Registration #0507-310
Through historical analysis from 1200 A.D. to the present, the course will study the social forces from the past that have caused today's major problems. Understanding this, it becomes possible to plan for the future to solve these problems.
Class 3, Credit 4 (offered annually)

GSHH-313 Communism, Fascism and Democracy in Europe
Registration #0507-313
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 annually)

GSHH-316 The History of the World Since 1450
Registration #0507-316
Survey of the major events of world history since 1450: Europe, Africa, Asia, and the United States.
Class 3, Credit 4 (offered alternate years)

GSHH-320 The Unification of Europe: Achievements and Perspectives
Registration #0507-320
An analysis of the concepts of Europe, of its making and disintegration, of its resilience after two World Wars, of the movement for a political union and of its first achievements: the Common Market and its goals up to 1980.
Class 3, Credit 4 (offered annually)

GSHH-508 History of England
Registration #0507-508
A political and constitutional history of England from the Anglo-Saxon period to the present.
Class 3, Credit 5 (offered on sufficient demand)

GSHH-510 Contemporary Middle East
Registration #0507-510
An historical analysis of the origins of the modern Middle East with particular emphasis on the patterns of political developments in the region during the 19th and 20th centuries.
Class 3, Credit 5 (offered annually)

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.
Class 3, Credit 5 (offered alternate years)

GSHH-516 The Middle Ages and the Rise of Europe
Registration #0507-516
The Medieval society and its political, religious, economic, and social problems and achievements will be analyzed as the foundation and the cradle of our modern society.
Class 3, Credit 5 (offered annually)

GSHH-518 The Advance of Communism
Registration #0507-518
An examination of the expansion of Communism from Marx up to the present time: an analysis of the basic ideas of Marxism, of the rise of communist parties and regimes in West and East Europe, in China and Southeast Asia, in Africa, and on the American continent.
Class 3, Credit 5 (offered annually)

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 5 (offered annually)

GSHH-520 Crime, Violence and Urban Crisis in the 20th Century
Registration #0507-520
The course will analyze the causes of the outbreak and rapid increase of violent and criminal trends in the world as the most serious realities of the 20th century.
Class 3, Credit 5 (offered annually)

GSHH-522 20th Century American Diplomatic History
Registration #0507-522
A narration and interpretation of the events and forces which shaped American foreign relations from 1898 to 1950. Special emphasis will be placed on such issues as the Open Door Policy, the Treaty of Versailles, Pearl Harbor and the Yalta Conference.
Class 3, Credit 5 (offered annually)

GSHH-523 Religion in Society
Registration #0507-523
This course will examine religion in the West-Christiyanity, Judaism and atheism-as an integral and interrelated aspect of the totality of society.
Class 3, Credit 5 (offered annually)

GSHH-524 The Italian-American Experience
Registration #0507-524
Examines the history and culture of the Italian-Americans from the colonial period to the present.
Class 3, Credit 5 (offered annually)

GSHH-525 Culture and Counterculture in the Modern Period
Registration #0507-525
This course will examine the cultural, social, political and economic conflicts which were prominent during the 1960s in America and around the world.
Class 3, Credit 5 (offered occasionally)
GSHH-526 The United States and The Third World
Reg#0507-526
One of the dominant features of the 20th century has been the revolu­tion of rising expectations in the countries of the Third World. This course will study the underlying causes of these revolutions and the reaction of the United States government to this revolu­tionary ferment in Latin America, Asia, and Africa.
Class 3, Credit 5 (offered annually)

GSHH-528 History of Popular Culture in America
Reg#0507-528
A study of selected special social and cultural issues and topics in American history from the colonial period to the present, focusing as well on leading personalities.
Class 3, Credit 5 (offered annually)

GSHH-529 Military History
Reg#0507-529
An analysis of the causes and nature of war.
Class 3, Credit 5 (offered on sufficient demand)

GSHH-530 19th Century American Diplomatic History
Reg#0507-530
An examination of American diplomacy from the early years of American independence to the emergence of the United States as a world power. The War of 1812, Monroe Doctrine, and Manifest Destiny are among the topics considered.
Class 3, Credit 5 (offered annually)

GSHH-531 The Black Experience in America
Reg#0507-531
This course explores the history of blacks in America and treats it primarily from a social and cultural perspective.
Class 3, Credit 5 (offered annually)

GSHH-532 Civil Liberties in American History
Reg#0507-532
The course will teach the history of civil liberties in America. Emphasis will be placed on analyzing Supreme Court cases that explain the current state of civil liberties. This is a companion course to GSHH-538, Social Justice and the Constitution in American History.
Class 3, Credit 5 (offered annually)

GSHH-533 China, Russia and the United States
Reg#0507-533
This course is a follow-up of the other two courses on Russia and on the advance of Communism.
Class 3, Credit 5 (offered annually)

GSHH-536 History of Mexico
Reg#0507-536
The historical development of Mexico including the colonial period, independence movement, the liberal-conservative class, and the revolution of 1910.
Class 3, Credit 5 (offered alternate years)

GSHH-537 Russia: Imperial and Communist
Reg#0507-537
An analysis of the last century of Czarist Russia and of the Communist Regime. Emphasis will be placed on the agricultural, social, industrial, economic, and political situation.
Class 3, Credit 5 (offered annually)

GSHH-538 Social Justice and the Constitution
Reg#0507-538
in American History
The course will analyze how well the constitution has met the social and political expectations of citizens. Emphasis will be placed on analyzing Supreme Court cases that explain the current state of social justice. This is a companion course to GSHH-532, Civil Liberties in American History.
Class 3, Credit 5 (offered annually)

GSHH-540 Selected Problems in Black History
Reg#0507-540
A seminar approach to the thought of key black leaders (Washington, Garvey, King) and the study of the civil rights and black power movements.
Class 3, Credit 5 (offered occasionally)

GSHH-541 Modern Germany
Reg#0507-541
A study of Germany in the 19th and 20th centuries.
Class 3, Credit 5 (offered annually)

GSHH-543 20th Century European Diplomatic History
Reg#0507-543
The course seeks to appraise the crisis of diplomacy, and the quest for a higher level of political organization in Europe in the age of mass democracies, totalitarianism and contending political ideologies.
Class 3, Credit 5 (offered annually)

GSHH-544 19th Century European Diplomatic History
Reg#0507-544
This course focuses on the relations of the European Great Powers, their rivalries and national jealousies which ultimately resulted in the first total war in the history of humanity.
Class 3, Credit 5 (offered annually)

GSHH-545 Revolutionary Leaders in Latin America
Reg#0507-545
In this course three movements will be studied: the rise of Juan Peron in Argentina in the 1940s; Fidel Castro’s revolution in Cuba; and Salvador Allende’s electoral victory in Chile in 1970. By studying these three “revolutionary” movements, it is hoped that the student will come to an understanding of the historical perspective and nature of the social discontent in Latin America.
Class 3, Credit 5 (offered annually)

GSHH-546 The Immigrant in American History
Reg#0507-546
This course traces the history of the Irish, Germans, Jews, and Polish in the United States.
Class 3, Credit 5 (offered occasionally)

GSHH-547 History of Social Discrimination
Reg#0507-547
A study of the discriminatory practices, present and historical, found in the United States. To include the cultural values and problems of acculturation for the American Indian, Black, Puerto Rican, Chicano, Asian, women, and religious groups, with emphasis on its implications to social work.
Class 3, Credit 5 (offered annually)

GSHH-550 The Ascent of Man
Reg#0507-550
The course is a multi-disciplinary study-in societal, historical, technological and scientific perspectives-of biological and cultural adaptation; natural and genetic evolution; cosmological and physical relations; matter, elements, and energy; human behavior and the environment, among others. The course is based on the television series The Ascent of Man, created and narrated by Jacob Bronowski.
Class 3, Credit 5 (offered annually)

GSHH-210 The Face of the Land
Reg#0608-210
The course is concerned with those selected aspects of geology that pertain to surface features of the earth. The aim is to acquaint students with land forms and the processes that produce and change them, and to show that policy for man’s use of the land is being developed to protect the surface of the earth and the people who live on it.
Class 3, Credit 4 (offered annually)

GSHN-211 Science and Human Values
Reg#0508-211
Concerned with the nature of scientific thought and the effect of scientific thinking and technological development on our values.
Class 3, Credit 4 (offered annually)

GSHH-502 Social Consequences of Technology
Reg#0508-502
An attempt to identify, understand, and probe the causes of current technological problems.
Class 3, Credit 5 (offered annually)
GSHP-503 Technology and the Individual
Registration #0508-503
A study of the effects on the life of the individual due to the acceleration of technological change.
Class 3, Credit 5 (offered occasionally)

GSHP-504 Energy and the Environment
Registration #0508-504
An analysis in lectures, films, off-campus trips, class discussion, and a course paper, of the twin crises facing this country and the world in the use of energy: depletion of resources and environmental impact.
Class 3, Credit 5 (offered annually)

GSHP-210 Introduction to Philosophy
Registration #0509-210
An introduction to some of the major problems in philosophy with readings from contemporary sources.
Class 3, Credit 4 (offered alternate years)

GSHP-211 Ethics
Registration #0509-211
An introduction to ethics through an analysis, comparison, and critical examination of the main theories that have been offered as systematic ways of making ethical decisions. Readings from classical and/or contemporary sources.
Class 3, Credit 4 (offered alternate years)

GSHP-212 Introduction to Biblical Studies
Registration #0509-212
An introduction to the bases of Jewish and Christian beliefs through the Old and New Testaments and related texts.
Class 3, Credit 4 (offered annually)

GSHP-302 Greek and Roman Philosophy
Registration #0509-302
This course will provide an account of Greek and Roman philosophy from what is known as the pre-Socratic period to the early Christian era.
Class 3, Credit 4 (offered occasionally)

GSHP-502 Philosophy of Religion
Registration #0509-502
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.
Class 3, Credit 5 (offered annually)

GSHP-504 Logic
Registration #0509-504
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.
Class 3, Credit 5 (offered alternate years)

GSHP-507 Aesthetics
Registration #0509-507
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.
Class 3, Credit 5 (offered annually)

GSHP-511 Social Philosophy
Registration #0509-511
An introduction to some of the main problems of social philosophy through an analysis, comparison and critical examination of various views concerning the relation of morality to social policies, the nature of social justice, and the claim that there are certain natural human rights.
Class 3, Credit 5 (offered alternate years)

GSHP-512 Philosophy of Science
Registration #0509-512
An examination of the nature of the scientific enterprise; 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.
Class 3, Credit 5 (offered alternate years)

GSHP-513 Political Philosophy
Registration #0509-513
An introduction to the philosophical foundations of political thought: a critical examination of one or more of the most influential works in the field.
Class 3, Credit 5 (offered alternate years)

GSHP-514 The Great Thinkers
Registration #0509-514
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.
Class 3, Credit 5 (offered alternate years)

Social Science

GSSA-205 Deafness in American Culture
Registration #0510-205
Using principles of cultural anthropology, this course investigates the cultural patterns of hearing and hearing impaired Americans. Emphasis is placed on how these patterns compare and contrast, how they are learned and outcomes of social interaction between members of both groups.
Class 3, Credit 4 (offered annually)

GSSA-210 Cultural Anthropology
Registration #0510-210
A study of the basic institutional patterns of behavior and of thought which the human animal uses to provide the means of life and experience.
Class 3, Credit 4 (offered annually)

GSSA-501 Anthropological Research Methods: 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 sub-culture of their own selection in the Rochester area.
Class 3, Credit 5 (offered occasionally)

GSSA-525 Planned Society
Registration #0510-525
A study of the principles of economic planning, of political decision making and of institutions of social control required to implement the plans of mankind for human survival. This course features a simulation laboratory.
Class 3, Credit 5 (offered annually)

GSSA-530 Man Builds/Man Destroys
Registration #0510-530
Class 3, Credit 5 (offered annually)

GSSE-210 Introduction to Economics
Registration #0511-210
A study of the basic macro-economics concepts. Along with demand and supply topics such as determination of G.N.P., inflation, unemployment and money will be discussed.
Class 3, Credit 4 (offered annually)
GSSM-210 Introduction to Political Science
Registration #0513-210
An introduction to the complex issues of politics, political behavior, and types of governmental structures. The purpose of this course is to develop analytical skills so that students as citizens may identify and deal with political alternatives.
Class 3, Credit 4 (offered annually)

GSSM-211 American Politics
Registration #0513-211
To promote an understanding of the American political system and some of the major contemporary issues that confront it. Additionally, an analysis of the historical and philosophical roots of democratic political thought and studies of current political, economic, and social problems will be made in an attempt to separate myths from reality. Special emphasis will also be placed on the institutions of government, political parties, and interest groups.
Class 3, Credit 4 (offered annually)

GSSM-212 American Political Development
Registration #0513-212
An examination of the development of the American political system from the Constitutional Convention through the post-Civil War era. Emphasis will be placed upon personalities, theories, events, and trends which influenced the political evolution of the United States.
Class 3, Credit 4 (offered annually)

GSSM-215 Ideology and Politics
Registration #0513-215
The course is specifically designed to introduce lower division students to the interrelationship between ideology and politics from national, regional and international perspectives. Apart from nationalism, the ideologies of liberal, socialism, communism and fascism in their theoretical contents and political implications will be carefully analyzed.
Class 3, Credit 4 (offered annually)

GSSM-216 The American Presidency
Registration #0513-216
A study of the role of the presidency in the American political system. Among the topics to be examined are: evolution and expansion of presidential powers, nomination and election of the president, and the process of impeachment. Presidential administrations will be cited to illustrate the various subjects.
Class 3, Credit 4 (offered annually)

GSSM-217 American Foreign Policy
Registration #0513-217
A study of the formulation and execution of American foreign policy. Special emphasis will be given to such topics as the American philosophy and ideology and its impact upon policy making, diplomatic procedures, the role of public opinion, and the functions of the instruments of government in foreign policy. Additionally, current policies will be discussed.
Class 3, Credit 5 (offered annually)

GSSM-501 American Foreign Policy
Registration #0513-501
A study of the formulation and execution of American foreign policy. Special emphasis will be given to such topics as the American philosophy and ideology and its impact upon policy making, diplomatic procedures, the role of public opinion, and the functions of the instruments of government in foreign policy. Additionally, current policies will be discussed.
Class 3, Credit 5 (offered annually)

GSSM-503 The Cold War
Registration #0513-503
An examination of the origins and evolution of the Cold War. Emphasis will be placed upon the Russian-American conflict in the post World War II era, but attention will also be given to the Sino-American rivalry during this period.
Class 3, Credit 5 (offered annually)

GSSM-504 Twentieth Century America
Registration #0513-504
An examination of the major political, social, and economic developments affecting the United States in the 20th century. Emphasis will be placed upon the reactions of the various presidential administrations to conditions in both the domestic and foreign fields.
Class 3, Credit 5 (offered annually)

GSSM-507 International Relations
Registration #0513-507
This course is designed to provide the student with an understanding of basic concepts and theories of international relations, American foreign policy, and the major developments in the contemporary world arena. Additionally, selected ideologies, doctrines, and institutions operative in the present international system will be analytically examined in order to shed light on the relationship between myth and objective reality in world politics.
Class 3, Credit 5 (offered annually)
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.

Class 3, Credit 5 (offered annually)
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Registration #</th>
<th>Format</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GSSS-518</td>
<td>Psychology of Aging</td>
<td>0514-518</td>
<td>Class 3, Credit 5</td>
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<tr>
<td>GSSS-519</td>
<td>Psychology of Altered States of Consciousness</td>
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<tr>
<td>GSSS-520</td>
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<tr>
<td>GSSS-521</td>
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<tr>
<td>GSSS-522</td>
<td>Psychology of Art</td>
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<tr>
<td>GSSS-523</td>
<td>Sociology of Deviant Behavior</td>
<td>0515-517</td>
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<tr>
<td>GSSS-524</td>
<td>Medical Sociology</td>
<td>0515-522</td>
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<tr>
<td>GSSS-525</td>
<td>Sociology of Work</td>
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<tr>
<td>GSSS-526</td>
<td>Educational Sociology</td>
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<tr>
<td>GSSS-527</td>
<td>Sociological Seminar</td>
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<tr>
<td>GSSS-528</td>
<td>Applied Sociology</td>
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<tr>
<td>GSSS-529</td>
<td>Population &amp; Society</td>
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<tr>
<td>GSSS-530</td>
<td>Urbanization: Urban Man and Society</td>
<td>0515-512</td>
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<tr>
<td>GSSS-531</td>
<td>Marriage</td>
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<td>Class 3, Credit 5</td>
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<tr>
<td>GSSS-532</td>
<td>Marriage</td>
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<td>Class 3, Credit 5</td>
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**Course Descriptions**

- **Psychology of Aging (GSSS-518)**: The Psychology of Aging course will present a psychological overview of human aging with some study of the dynamic problems of the elderly in contemporary society. Psychological aspects of adulthood and aging will be emphasized within the perspectives of an interdisciplinary approach.
- **Psychology of Altered States of Consciousness (GSSS-519)**: This course will cover such topic areas as the specialized consciousness in the two halves of the brain, dreaming, hypnosis, meditation, systematic relaxation, and parapsychology. The course format will be discussion/demonstration.
- **Psychology of Creativity (GSSS-520)**: A psychological investigation of the creative process and creative individuals with a focus on techniques which stimulate creativity.
- **Psychology and Politics (GSSS-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.
- **Psychology of Art (GSSS-522)**: An introduction to psychological research in the area of cognition (thinking, perception, memory) and the application of these findings to the study of art.
- **Sociology of Deviant Behavior (GSSS-523)**: Examination of conditions under which deviance develops and changes over time. Study of individual deviance, deviant subcultures, and the transformation of a deviant identity.
- **Medical Sociology (GSSS-524)**: The development of sociological and socio-psychological types of knowledge that have relevance for or logical connections to educational practices. This course will be based on substantive material about social phenomena making up the social order in which the educational systems are operating and by which they are influenced.
- **Sociological Seminar (GSSS-525)**: A course of minimum procedural as well as substantive structure which approaches matters of contemporary concern from a sociological perspective.
- **Applied Sociology (GSSS-526)**: 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.
- **Sociology of Work (GSSS-527)**: An analysis of selected factors that contribute to our understanding of the present status of women.
- **Urbanization: Urban Man and Society (GSSS-528)**: The social and spatial characteristics of cities are analyzed, encompassing such topics as the reason for urban development, ecological factors, types and networks of settlements, and urbanism as a way of life.
- **Population & Society (GSSS-529)**: Study of demographic variables of mortality, fertility, and migration as they affect the rise and quality of population.
- **Marriage (GSSS-530)**: Contemporary trends in courtship patterns, male-female relationships and marital systems.
GSSE-569  
Human Sexuality  
Registration #0515-569  
An overview of various aspects of human sexuality including basic physiology, sex roles, sexual myths, legal and social issues, pre-natal and marital sexual behavior, and alternative sexual behavior.  
Class 3, Credit 5 (offered annually)

Open Elective or Independent Study  
The student has the freedom to select any course within the Institute or to create an independent study project subject to the approval of the student's dean or department chairperson, the faculty sponsor, and the dean of the College of General Studies. An independent study course enables the interested student and his or her faculty sponsor to coordinate their efforts on subject and topics that range beyond the normal sequence of course selections. The student may, for example, participate in a volunteer community human service experience.  
Credit variable (offered annually)

Service Courses  
Service courses are required courses offered by the College of General Studies for specific professional departments. These courses may not be taken as general studies electives.

GLLC-402  
Conference Techniques  
Registration #0502-402  
Basic theories of conference techniques including leadership, participation, types, and functions of public and private conferences and their evaluation. Student participation in training, problem solving, and informational-developmental conferences.  
Class 4, Credit 4 (offered annually)

GLLC-404  
Communication with the Handicapped  
Registration #0502-404  
An examination of the communication difficulties with the handicapped: specifically the deaf, blind and others with physical handicaps. To include interpersonal, family, social and rehabilitation modes of communication. (Introduction to Psychology)  
Class 3, Credit 4 (offered annually)

GLLC-431, 432, 433  
Spanish I, II, III  
Registration #0502-431, 432, 433  
This is a specially designed course in conversational Spanish which lays stress upon communications in different languages or in argot, slang, and vernacular of the various groups of clients with whom the social worker is likely to come in contact. Proficiency in Spanish would satisfy this requirement.  
Class 3, Credit 4 (offered annually)

GSSE-301, 302  
Principles of Economics I, II  
Registration #0511-301, 302  
A study of the basic concepts and principles pertaining to the economic behavior of the consumer and the firm (micro-economics), the economic problems of the nation (macro-economics), and international-economic relations.  
Class 3, Credit 4 (offered annually)

GSSP-203  
Psychology of Childhood and Adolescence  
Registration #0514-203  
A systematic, integrated, and interpretive study of a growing person. Includes physical, cognitive, social, moral and emotional development.  
Class 3, Credit 4 (offered annually)

GLLL-701  
Film History and Criticism  
Registration #0504-701  
A critical examination of key aspects of film criticism and of the development of film as an art. The emphasis of the course will be historical, with the development of cinema being traced through major films by important directors. There will be an opportunity to pursue individual interests.  
Class 3, Credit 5 (offered occasionally)

GSHE-703  
American Architecture  
Registration #0505-703  
An examination of American architecture from the 17th century to the present designed for the graduate level of study. Emphasis will be placed on American building art in the late 19th and 20th centuries.  
Class 3, Credit 5 (offered occasionally)

GSHE-707  
Cubism to the Present  
Registration #0505-707  
Cubism as a way of seeing and as an expression of 20th century thinking. Differences and similarities with art forms of earlier eras and other cultures will be discussed.  
Class 3, Credit 5 (offered occasionally)

GSHE-708  
Oriental Art  
Registration #0505-708  
A seminar exploring the philosophical and cultural perspectives underlying traditional Far Eastern art as a prelude to examining selected topics in Indian, Chinese and Japanese art. Emphasis will be placed on the application of research techniques and critical methods to an individually selected area of interest which may serve as a foundation for continuing study.  
Class 3, Credit 5 (offered occasionally)

GSHE-711  
20th Century American Art  
Registration #0505-711  
An investigation of American art from the Civil War to the present. Emphasis will be placed on the visual arts but many references will be made to music and architecture.  
Class 3, Credit 5 (offered occasionally)

GSHE-712  
Arts and Crafts in Tribal Societies  
Registration #0505-712  
A study of the function of "primitive" art and the techniques of its production, including the use of clay, stone, fibers, bark, wood, bronze, gold, etc. Hair-styling, body painting and scarification will also be discussed.  
Class 3, Credit 5 (offered occasionally)

GSHE-713  
Contemporary Issues in Art  
Registration #0505-713  
This course offers the graduate art student the opportunity to investigate those aspects of 20th century art that question the very nature of art and the role of the artist in today's and tomorrow's society.  
Class 3, Credit 5 (offered occasionally)

GSHE-714  
Art: Vision and Concept  
Registration #0505-714  
Though the course will develop chronologically from the Renaissance to the present, emphasis will be placed on a close analysis of (1) selected works of art, including paintings, sculpture and architecture, and (2) the development of the unique oeuvre of selected artists. Topics chosen for study will be limited in number but treated in depth. Topical choices will be based on richness and import of the formal and/or conceptual content embodied therein. Some background in the history of art is helpful but not necessary.  
Class 3, Credit 5 (offered occasionally)
GSHF-715 Picasso Registration #0505-715
The impact of Picasso and his circle on 20th century art. Their affinities with modern scientific and philosophical attitudes will also be discussed.
Class 3, Credit 5 (offered occasionally)

GSHF-716 Rembrandt Registration #0505-716
A detailed analysis of the art and times of the Baroque master. Emphasis will be placed on the development of his style and technique, on his and other artists' relationship to their society and to the character of the Baroque outlook.
Class 3, Credit 5 (offered annually)

GSHF-717 Music Literature Registration #0505-717
A comparison of various musical styles from the 17th to the 20th century with emphasis on music's relationship to the other fine arts and its socio-cultural environments. Representative composers include Bach, Beethoven, Chopin and Stravinsky.
Class 3, Credit 5 (offered on sufficient demand)

GSSP-701 Developmental Psychology Registration #0514-701
This course seeks to investigate the broad developmental patterns of human behavior with emphasis upon the cognitive and moral aspects of development, personality and culturally patterned behaviors. Consideration is given to major theoretical perspectives. It is strongly suggested that students have a background in introductory psychology before taking this course.
Class 3, Credit 5 (offered annually)

GSHP-704 Ethics and Philosophy of Education Registration #0509-704
This graduate seminar is designed to raise for discussion a variety of issues regarding the purpose of education, the value of education, and the proper role of the educator vis-a-vis the student, the educational institution, the "community," and the academic profession represented by the teacher. Ethical issues will occupy a prominent place among those discussed, and these issues may sometimes involve a discussion of particular teaching techniques.
Class 3, Credit 5 (offered annually)

GSHP-705 Seminar in Aesthetics Registration #0509-705
A range of questions will be addressed in the seminar. What is it to perceive something aesthetically? Are there any essential or defining properties shared by all works of art? Are our evaluations and interpretations of art works objective or subjective? Are an artist's intentions relevant factors in critical arguments? Understanding how answers to these questions are constrained by features of actual art works will be an important part of discussion.
Class 3, Credit 5 (offered occasionally)
College of Graphic Arts and Photography

School of Photographic Arts and Sciences

All courses in the School of Photographic Arts and Sciences will be offered at least once annually, except as noted.

Biomedical Photography

PPHB-201, 202, 203  Biomedical Photography I
Registration #0901-201, -202, -203

Basic photography program for biomedical photographers with emphasis on theory, craftsmanship and visual communication. Patient photography, close-up and other photography as a foundation for future biomedical photography.

Class 4, Lab. 8, Credit 6/Qtr.

PPHB-211  Survey of Biomedical Photography
Registration #0901-211

Career opportunities, typical biomedical photography settings, types of photography performed. Ethical, professional, and personal relationships with patient, physicians, research and staff personnel.

Class 1, Credit 1 (Spring Quarter 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 photomicrography, photomicroscopy, hospital photography techniques, infrared and ultraviolet light, biological field studies.

Class 2, Lab. 10, Credit 5/Qtr.

PPHB-331, 332, 333  Preparation of Biomedical Visuals
Registration #0901-331, -332, -333

Study of basic principles of effective visual communication and design. Student will produce slide and slide/tape presentations and exhibition displays.

Lab. F-4, W-4, S-6, Credit 3/Qtr.

PPHB-402  Advanced Photography in Biomedical Communications
Registration #0901-402

Sophisticated and creative applications of photography serving the needs of the scientific community. Students explore a variety of specialized photographic techniques and a variety of philosophies. Assignments are performed which are similar to those encountered in biomedical and research institutes.

Class 2, Lab. 4, Credit 4

PPHB-413  Biomedical AV Design and Production
Registration #0901-413

Design, creation, and presentation of 35mm slide and 35mm slide/tape productions as applied to medical and scientific needs. Planning, researching, scripting, production, revision, evaluation. Multiple projector uses. Multiple screen uses. Lap dissolve, stop-frame, stop-motion,key-frame animation, graphics: eclectic combination of music, words, and images.

Class 2, Lab. 4, Credit 4

PPHB-501, 502, 503  Senior Thesis Production
Registration #0901-501, -502, -503

An investigation, planning, organization and production of an audiovisual presentation, a learning package or an informational program for a biomedical communications client.

Class 2, Lab. 8, Credit 4/Qtr.

Film and Television

PPHF-207  Introduction to Film Making
Registration #0902-207

A basic course for novices. Emphasis is on film making and the use of the medium as an interpretive and expressive form. There is no restriction on the choice of style or content. Learning will take place in a communal, participatory environment so that ideas can be shared and the medium experienced as a total, integrated process.

Short films by contemporary film makers will be screened to familiarize students with the diversity and potential of the medium.

A minimum of two independent film making projects are required of each student. One of these includes the use of sound. Super 8 equipment and facilities are provided by RIT. Students are responsible for film and processing costs, 1/4 inch recording tape and editing incidentals. Approximate cost to students is $50.00 for the quarter. (Introduction to Film Making)

Class, Lab., Studio, 7 hours, Credit 3

PPHF-208  Introduction to Film Making II
Registration #0902-208

An exploration of the diverse contemporary forms used to interpret and express subject matter in film. This course provides an opportunity for the student to make films which exploit traditional and experimental uses of camera, editing, sound, and attitudes toward subject matter. Although complete films can be attempted, the primary objective will be to create short film experiments.

Short films by film makers from the past and present will be screened to familiarize students with the diversity and potential of the medium.

Super 8 equipment and facilities are provided by RIT. Students are responsible for film and processing costs, 1/4 inch recording tape and editing incidentals. Approximate cost to students is $50.00 for the quarter. (Introduction to Film Making)

Class, Lab., Studio, 7 hours, Credit 3

PPHF-209  Basic Television Production
Registration #0902-209

This is an overview course designed to familiarize students with the entire television production process. Emphasis is placed on design of graphics for television, shooting film and slides which conform to video system limitations and operation of the film chain. Topics covered include basic visualization, camera operation, portable video equipment, studio production techniques and set design. Limited hands-on experiences include half inch portable systems, “real time” studio production, limited studio electronic assembly techniques and video art techniques. (Permission of the Art and Design Department/SPAS. No previous media experience required.)

Lab and lecture required. Class 3 hrs., Lab. 4 hrs. (Spring Quarter only)

Class 3, Credit 3

PPHF-301  Conceptual Film Production
Registration #0902-301

A fundamental course in Conceptual Film Production. Film making as a means of interpretation and expression. Film as a medium of communication, as a structural unity, the main elements of structure, organizational principles with special application to the conceptual film form. A combined theoretical-practical approach to the dynamics of the film medium. The student is expected to demonstrate the techniques in film assignments. Production will be in non-sync (Super 8) format. Students furnish film processing; equipment is furnished by the department. Electronic assembly techniques and video art techniques. (Permission of the Art and Design Department/SPAS. No previous media experience required.)

Class 2, Lab 6, Credit 4
PPHF-302 Narrative Film Production  
Registration #0902-302  
A fundamental course in Straight Narrative Film Production. Film making as a means of interpretation and expression with emphasis on the straight narrative but not to the exclusion of the conceptual film form. Application of the elements of structure and organizational principles appropriate to the main area of emphasis. A combined theoretical-practical approach to the dynamics of the film medium. The student is expected to demonstrate technical and theoretical knowledge of the film making process through a series of film assignments. Production will be in non-sync (Super 8) format. Students furnish film and processing; equipment is furnished by the department. (PPHF-301 or a satisfactory equivalent or by permission of the instructor)  
Class 2, Lab 6, Credit 4

PPHF-303 Fiction and Dramatic Short Film Production  
Registration #0902-303  
A fundamental course in Fiction and Dramatic Short Film Production. Film making as a process of interpretation and expression with an emphasis in the narrative film form as applied to fiction and dramatic short films. Included will be the non-fictional narrative and conceptual film form. Application of the elements of structure are organizational principles appropriate to the main area of emphasis. A combined theoretical-practical approach to the dynamics of the film medium. The student is expected to demonstrate technical and theoretical knowledge of the film making process through a series of film assignments. Production will be in non-sync (Super 8) format. Students furnish film and processing; equipment is furnished by the department. (PPHF-302 or a satisfactory equivalent)  
Class 2, Lab 6, Credit 4

PPHF-407,408,409 Film History  
Registration #0902-407, 408, 409  
Survey of developments in film from the early beginnings to the present. Objective is to explore the uses of the medium within a historical and theoretical context. Each quarter will emphasize a different film form: 407 fiction feature, 408 documentary, and 409 experimental and animation. No prerequisites. Admission during any quarter of the academic year.  
Class 3, Credit 3/Qtr.

PPHF-411 Visualization and Commercial Film Production  
Registration #0902-411  
A general review of professional production methods and the theory and practice of expressing an effective film continuity. Basic synchronous sound recording is included. (PPHF-303 or permission of the instructor)  
Class 2, Lab , Credit 4

PPHF-412 Film Planning and Studio Operations  
Registration #0902-412  
Introduction to studio crew work and editing systems for professional film. Budgeting and an elementary view of the economics of production are also included. Film writing is introduced and related to production planning (PPHF-411 or permission of the instructor)  
Class 2, Lab , Credit 4

PPHF-413 Film Project with Synchronous Sound  
Registration #0902-413  
A short (5-10 min. suggested) film is produced by student teams. Advanced sound editing, sound mixing and A&B roll conforming are included; Cameras, lighting and editing equipment are provided but students are expected to provide sensitized goods and processing.  
Class 2, Lab , Credit 4

PPHF-417 Basic Television Production  
Registration #0902-417  
A general, rigorous "hands on" introduction to the art and technology of video communications designed as a foundation experience for the intensive year's course. It stresses that the student become involved in both the practical-technical and aesthetic responsibilities of studio television and portable video production. The student gains experience in: video editing, camerawork, soundwork, basic lighting, real time switching and portapack taping. Scriptwriting, visual continuity and composition, storyboarding, graphics design, set design and Television directing provide creative challenge. Each Lab section produces a full studio production at the end of the quarter.  
Class 2, Lab 4, Credit 4

PPHF-418 Studio and Documentary Video  
Registration #0902-418  
Refinement of skills learned in the first quarter is achieved through the design and production of individual student programs. Staging, camera blocking, pre-production planning, film in television, broadcast history, copyrights; and a tour of local broadcast facilities supplements the emphasis placed on the development of professional producing and directing skills. The viewing of and discussion of several commercial and independent single camera productions. A two person team mini-documentary assignment provides further experience in color portapack taping and editing. (PPHF-417 or permission of the instructor)  
Class 2, Lab 4, Credit 4

PPHF-419 Advanced Television and Video Production  
Registration #0902-419  
Lab work explores advanced lighting and staging, television remote units, video art, technical limits of the video image and industrial/educational taping techniques. Lectures include the present and future of cable television, production planning, management, update and selection, public broadcasting, experimental video and the educational/industrial and broadcast television job market. The major spring project, a final production, concludes the broad based three quarter program.  
Class 2, Lab 4, Credit 4

PPHF-421,422 Writing for Film and Television  
Registration #0902-421,422  
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 (winter and spring quarter)

PPHF-424,425, 426 Introduction to Animation and Graphic Film Production  
Registration #0902-424, 425, 426  
An introduction to the techniques and practice of graphic and animated film production. This course provides training and practical experience in a wide variety of approaches to single frame motion picture production. Students produce a number of short film exercises utilizing both existing and original artwork. Some techniques covered in the course are: direct modification of the film surface, cel, ink and paint animation, and kinestasis. Screenings of professionally made films will illustrate each technique. Proficiency in drawing is not required. No prerequisites.  
Class 3, Lab 2, Credit 4 (fall and winter)

PPHF-520 Sound Recording  
Registration #0902-520  
Specialized information and work in sound. To give information and lab work beyond the regular course. To encourage the beginning of vocational level work in sound. Each student prepares a mixed sound track to professional quality standards.  
Class 2, Credit 2
The second and third quarters deal with more advanced techniques and principles of photography.

The major emphasis is placed on the individual’s learning to identify and articulate personal response to his 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 print-making techniques, may be utilized. (PPHL-303)

A course designed to help students become more concerned and visually aware of the natural environment. This is accomplished principally by direct involvement through study and photography of major natural forms. The student also acquires valuable basic understanding of the natural world, special photographic techniques and a broader concept of people’s attitudes toward and impact on their environment. (PPHG-203)
PPHL-431, 432, 433  Illustration Photography I
Registration #0904-431, 432, 433
Advanced and extended study of the making of photographs in the studio and on location. Emphasis on the growth of the imagination and aesthetic aspects of creating illusions. Investigation into the photographic medium as a means of communicating ideas. The development of individual vision and self expression through the disciplines of photography, both in black-and-white and color images. (PPHL-313)
Class 2, Lab. 8*, Credit 4/Qtr.

PPHL-437, 438, 439  Visual Communications
Registration #0904-437, 438, 439  Workshop
Primarily a photographic course, however, emphasis is placed on experimental approaches to communications. Visual and psychological purpose of media will be explored. This course presupposes a basic background in design, as well as in photography.
Class 2, Lab. 8*, Credit 4/Qtr.

PPHL-440  News Writing and News Reporting
Registration #0904-440
Principles and practices of observing, interviewing, investigating, analyzing, organizing, and writing for publication in the news media. Emphasis will be on actual student work in all phases of news reporting and news writing, and class work will be focused on critical editorial appraisal of student projects.
Class 3, Credit 3 (offered every quarter)

PPHL-460  Photo for Printers
Registration #0904-460
A workshop in black and white and color photography for non-photography majors. Technical and esthetic information will be given to enhance the non-vocational photographers' use of their equipment. Darkroom work will be limited to the black and white negative and print. Color work will emphasize improvement of camera techniques.
Class 2, Lab. 4, Credit 4

PPHL-501, 502, 503  Photography as a Fine Art II
Registration #0904-501, 502, 503
The major emphasis is placed on the individual's learning to generate and intensify personal statement through the medium of photography. Students select their own projects and work with their own ideas under the guidance of an instructor. Class discussions center around certain common problems found in working with this medium, such as the self-imposition of unnecessary limitations. Development of awareness of the other arts is continued.
Class 2, Lab. 8*, Credit 4/Qtr.

PPHL-511, 512, 513  Photojournalism I
Registration #0904-511, 512, 513
A workshop course with emphasis upon the production of photographic images for publication in mass media. Study includes market research, marketing methods, accepted industry practices, as well as the production of photographic images for the market.
Class 2, Lab. 8*, Credit 4/Qtr.

PPHL-521, 522, 523  Color Photography Workshop
Registration #0904-521, 522, 523
A workshop course in which the student designs and executes projects in advanced color photography. Emphasis is on the aesthetic use of color photography techniques. (PPHL-313 or equivalent, and permission of instructor)
Class 2, Lab. 6*, Credit 4/Qtr.

PPHL-531, 532, 533  Illustration Photography II
Registration #0904-531, 532, 533
Advanced individual creative approaches to visual problem solving. Conceptual ideas employing the photographic medium are stressed. The student is encouraged to find a personal photographic approach and to develop a portfolio. (PPHL-433 or Prerequisite)
Class 2, Lab. 8*, Credit 4/Qtr.

PPHL-551, 552, 553  Special Topics
Registration #0903-551, 552, 553
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum.
Class 2, Lab. 6, Credit 4/Qtr.

Photographic Processing and Finishing Management
PPHM-201, 202, 203  Basic Principles of Photography
Registration #0905-201, 202, 203
The program of study is designed to provide photographic marketing students with a thorough knowledge of the basic photographic process in order that they may have an understanding of how photographic products work. The course will include units of study in film characteristics, lighting, optics, photographic chemistry, sensitometry and color theory. Each of these will be related to the actual practice of photography.
Class 2, Lab. 6, Credit 4/Qtr.

PPHM-204  Orientation to Production Photographic
Registration #0905-204
Processing and Finishing
This course is designed to provide the photo management freshman with an orientation to the facilities, equipment, practices and procedures of the Processing and Finishing Management Lab. Prior to having to assume responsibility of working in the lab. This course will also introduce the freshman to some of the basic problems of the processing and finishing industry. Prerequisite: freshman standing in the photo management program.
Credit 1 (spring only)

PPHM-300  Production Processing and Finishing
Registration #0905-300
A 10-week summer course which provides an opportunity for students who have completed basic photography to gain an understanding of all aspects of production processes and finishing. They will be involved with machine processing on a full production basis. A hands-on-type of learning experience will be the method most often employed in this course. (Permission of the instructor)
Class 2, Lab. 30, Credit 12

PPHM-301, 302, 303  Production Processing and Finishing
Registration #0905-301, 302, 303
Provides an opportunity for photographic students to gain an understanding of the mechanical, electrical, electronic, chemical, and production concepts of automated processing and finishing. Students will be involved with automated processing and finishing on a full production basis. (PPHS-203, or PPHG-213 and PPHG-203)
Class 2, Lab. 8, Credit 4/Qtr.

PPHM-310  Survey of Production
Registration #0905-310
Processing and Finishing
Provides the non-photographic processing and finishing major with an opportunity to become knowledgeable in the operational procedures and services of a processing and finishing laboratory.
Class 2, Credit 2 (spring only)

PPHM-320, 321, 322  Mechanics of Photographic
Registration #0905-320, 321, 322
Processing
Hardware
The course will cover causes, effects and benefits of the application of basic principles of optics, mechanisms and electronics embodied in the type of hardware handled by retail and wholesale photographic establishments catering to the general public.
(PPHM-203)
Class 4, Credit 4/Qtr. (winter and spring only)

PPHM-401, 402, 403  Photographic Process Control
Registration #0905-401, 402, 403
Statistical methods of studying repetitive processes, with special application to photographic processing; methods of obtaining data about processes, including chemical and physical factors; methods of making process adjustments, including automatic control methods. (PPHM-303)
Class 2, Lab. 6, Credit 4/Qtr.
Professional Photography

PPHP-301, 302, 303 Photography II Registration #0906-301, 302, 303
Advanced applied photography in black-and-white and color with emphasis on craftsmanship, problem solving, and visual communication. Further emphasis is placed on the development of the student's ability to apply creative thinking and contemporary techniques in executing meaningful and effective professional photographs for a wide variety of media and utilization. (PPHP-303)
Class 2, Lab. 7, Credit 4/Oqr.

PPHP-311, 312, 313 Basic Color Registration #0906-311, 312, 313
Color photographic image-making based on the study of color principles, color vision, and color photographic material and processing. Part of this course is a visual design workshop which explores what constitutes an image, concentration in visual awareness, perception, and sensitivity. Color transparencies are emphasized in the design workshop, and practices in negative-positive printing, negative analysis, interpositive making, transparency duplicating, and the use of special processing techniques are used to emphasize theory. (PPHP-313)
Class 2, Lab. 4, Credit 3/Oqr.

PPHP-407 AV Preparations and Presentations Registration #0906-407
A survey of the problems involved in conceiving, constructing, and exhibiting audiovisual productions. Special emphasis is placed on photographic techniques and how they relate to other phases of production. (PPHP-313, 303, or PPHL-313)
Class 2, Lab. 8, Credit 4

PPHP-408 Scientific and Technical Applications Registration #0906-408
An introduction into the field of photography as it applies to technical problem solving. Event timing, photo sensing, visible and invisible radiation recording are presented in class and laboratory projects. (PPHP-303, PPHP-408, or PPHL-313)
Class 2, Lab. 8, Credit 4

PPHP-409 Corporate and Special Interest Publications Registration #0906-409
A survey of this type of publication with particular emphasis on the photographic problems involved. Skill building assignments to improve competence and an introduction into the problems of the art director, editor, printer, layout person, and writer form the basis of the course content. (PPHP-303, PPHP-408, or PPHL-313)
Class 2, Lab. 8, Credit 4

PPHP-411, 421, 422, 423 Advertising Photography Registration #0906-411, 421, 422, 423
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. (PPHP-303, PPHP-412, PPHL-313)
Class 2, Lab. 7*, Credit 4/Oqr.

PPHP-431 Forensic Photography Registration #0906-431
The use of photography in forensic application for business and industry, surveillance, photographic evidence, forgery detection, and security. (PPHP-203)
Class 2, Lab. 6, Credit 4 (spring only - on sufficient demand)

PPHP-441, 442, 443 Advanced Color Printing Registration #0906-441, 442, 443
Advanced Color Printing (PPHP-407 to a greater depth on a seminar basis). (PPHP-407 or permission of the instructor)
Lecture 1, Lab. 6, Credit 4/Oqr.

PPHP-461 Micrographics Registration #0906-461
A one-quarter course designed to acquaint the professional photography student with a career in the micrographic industry. It is directed to familiarize the student with microimaging techniques and materials utilized in microfilm production situations as well as in media production situations where the creation and reproduction of illustrative imagery is of prime importance. (PPHP-303)
Class 1, Lab. 5, Credit 4 (offered on sufficient demand)

PPHP-501, 502, 503 Industrial Photography Seminar Registration #0906-501, 502, 503
Depending on the student's interest, the course is subdivided into three areas of emphasis.
(a) AV preparations and presentations; a continuation of PPHP-407 to a greater depth on a seminar basis. (PPHP-407 or permission of the instructor)
(b) Instrumentation; a continuation of PPHP-408 to a greater depth on a seminar basis. (PPHP-408 or permission of the instructor)
(c) Corporate and Special Interest Publications; a continuation PPHP-409 or permission of the instructor)
Class 2, Lab. 3, Studio 5, Credit 4/Oqr.

*Lab hours may be rescheduled, to be completed during available time.
Photographic Science and Instrumentation

The two courses, PPHS-200 and PPHS-210, are special intensive summer courses designed for students transferring into the Photographic Science and Instrumentation Program at the third year level, and for others who desire a background in photographic science and instrumentation at an introductory engineering level. Students normally take both courses concurrently.

PPHS-200 Fundamentals of Photographic Science I
An intensive course presenting the subject matter normally taken by photographic science and instrumentation students during their first year. Topics include the basic physics and chemistry of photo-sensitive systems, characteristics of radiation, introduction to sensitometry and tone reproduction, and applied photography. (Permission of the department) Credit 9 (summer only)

PPHS-201, 202, 203 Photography for Scientists
Registration #0907-201, 202, 203 and Engineers
An introduction to the theory and applications of radiation-sensitive materials and systems. Physical properties of photographic materials, characteristics of radiation, sensitometric properties of photo-sensitive materials, processing chemistry, and fundamentals of black-and-white and color photography. Credit 9 (summer only)

PPHS-210 Fundamentals of Photographic Science II
Registration #0907-210
An intensive course presenting the subject matter normally taken by photographic science and instrumentation students during their second year. Topics include the chemistry and physics of black-and-white and color materials and processes as a continuation of topics covered in PPHS-200. (Permission of the department and PPHS-200 or PPHS-203)

Class 3, Lab. 3, Credit 4/Qtr.

PPHS-311 Advanced Sensitometry of Black-and-White Materials
Registration #0907-311
Photographic Materials
The design of sensitometers for exposing photographic materials to light and other forms of radiation; densitometry; the measurement of exposure and processing effects; the analysis of data from sensitometric tests; spectral response measurement; objective and subjective tone reproduction; the performance of the human visual system. The laboratory includes two extended problems on topics chosen by the student. (PPHS-203)

Class 2, Lab. 6, Credit 4

PPHS-312 Applied Processing
Registration #0907-312
Problems in applied processing and the application of analytical chemical techniques to the control of black-and-white and color processing solutions. Processing faults, and image restoration, trouble shooting, archival permanence, ecology and processing machine operation. Statistical techniques application to machine control. (SCHG-206, PPHS-203)

Class 2, Lab. 6, Credit 4

PPHS-313 Color Systems
Registration #0907-313
Introduction to color and color imaging systems; systems of color specification; additive and subtractive trichromatic systems of color recording and reproduction; the technology of color photography; sensitometry and densitometry of color materials; introduction to graphic reproduction and electronic systems. Laboratory work in the exposure and evaluation of color photographic materials. (SMAM-305, PPHS-201 through PPHS-312)

Class 3, Lab. 3, Credit 4

PPHS-401 Radiometry
Registration #0907-401
The course serves as an introduction to the physics of light, its generation, propagation, absorption and measurement. This is combined with an introduction to the human visual process, to general photometry and radiometry, to light sources and to light receivers. (SMAM-205, SPSP-313, PPHS-311)

Class 3, Lab. 6, Credit 5

PPHS-402 Image Microstructure
Registration #0907-402
Introduction to image formation and structure; mathematical models for spread functions of image-forming elements and detectors; superposition and convolution; noise; sinusoidal response functions; figures of merit; characteristics of instruments used for small-scale image measurements. Laboratory work in microdensitometry and subjective image evaluation. (SMAM-305, PPHS-203, SPSP-313)

Class 3, Lab. 5, Credit 5

*Lab hours may be nonscheduled, to be completed during available time.
PPHS-404 Introduction to Scientific Research
Registration #0907-404
A course for third-year students in photographic science and instrumentation designed as preparation for the fourth-year research project. Project selection and the use of scientific literature; preparation of proposals; research notebooks; patents; considerations in data collection and analysis; written and oral presentations. (Third-year status in Photographic Science and Instrumentation or permission of the instructor)
Class 2, Credit 2/Qtr.

PPHS-411 Statistical Inference
Registration #0907-411
Hypothesis testing, confidence intervals, and sample size for variables; introduction to analysis of variance and regression analysis.
Class 2, Lab. 2, Credit 3

PPHS-412 Design of Experiments
Registration #0907-412
Basic designs for experiments; objectives, conclusions, error estimation, data analysis; continuation of analysis of variance and regression analysis; response surfaces and factorials.
Class 2, Lab. 2, Credit 3

PPHS-413 Statistical Quality Control
Registration #0907-413
Basic probability, control charts, sampling plans, power and O.C. curves, and modern applications of product and process control.
Class 2, Lab. 2, Credit 3

PPHS-421, 422, 423 Photographic Chemistry
Registration #0907-421, 422, 423
The chemistry and photographic properties of photographic materials; radiation and radiometry, properties of radiation-sensitive materials, chemistry of photographic processing, sensitivity, emulsion, latent image, and processing of both black-and-white and color materials; chemistry and physics of selected non-silver and other non-conventional processes. (PPHS-312, SCHG-207)
Class 3, Lab. 3, Credit 4/Qtr.

PPHS-501, 502, 503 Research
Registration #0907-501, 502, 503
An investigation of a problem in photographic science or engineering, including planning and execution of experiments, statistical data analysis, and reporting results orally and in a written paper. (PPHS-404, 413)
Class 2, Credit 2 (fall)
Class 2, Lab. 2, Credit 4 (winter and spring)

PPHS-511, 512, 513 Optical Instrumentation
Registration #0907-511, 512, 513
Principles of geometrical and physical optics, image evaluation, optical instruments, and instrumentation. (SMAM-305, SPSP-313, PPHS-303)
Class 3, Credit 3/Qtr.

PPHS-521, 522, 523 Image Systems and Evaluation
Registration #0907-521, 522, 523
An analytical approach to analysis and evaluation of photographic and other image recording systems; objective and subjective evaluation techniques and their correlation. The use of convolution, correlation, autocorrelation, and Fourier methods in the analysis of the image recording systems. Laboratory work in the design of optical-optical systems. (PPHS-402, SMAM-305, SPSP-313)
Class 2, Lab. 6, Credit 4 (fall)
Class 2, Credit 2 (winter and spring)

PPHS-531, 532, 533 Theory of the Photographic Process
Registration #0907-531, 532, 533
An advanced course in photographic theory: sensitivity, emulsions, latent image, and processing of both black-and-white and color materials; chemistry and physics of selected non-silver and other non-conventional processes. (PPHS-423, SPSP-313)
Class 3, Credit 3/Qtr.

PPHS-551, 552, 553 Special Topics in Photographic Science
Registration #0907-551, 552, 553
Topics of special interest, varying from quarter to quarter, selected from the field of photographic science and not currently offered in the Division's curriculum. Specific topics are announced in advance. (Not offered each quarter. Consult staff chairman of the Photographic Science Division)
Class, Credit: variable

PPHS-599 Independent Study
Registration #0907-599
Faculty directed study of appropriate topics on a tutorial basis. Approval of the proposal by the staff chairman of the Photographic Science Division required.
Class, Credit: variable

PPHS-600 Principles of Photographic Science
Registration #0907-600
A course intended for students who have completed their undergraduate programs in engineering or the sciences and who desire to prepare themselves for entry into the graduate program in photographic science and instrumentation or who desire a working knowledge of photographic science at an undergraduate level. It is an intensive course, assuming working knowledge of undergraduate mathematics, physics and chemistry. Course topics include radiation and radiometry, properties of radiation-sensitive materials, chemistry of photographic processing, sensitivity, tone reproduction, principles of color measurement, color photographic systems, image microstructure, and photographic instruments. The course includes both lectures and laboratory work. (Registration requires consent of the graduate coordinator.) Credit 15 (summer only)
(Not applicable to the 45 required graduate credits in the photographic science and instrumentation graduate program)

PPHS-601, 602, 603 Principles of Photographic Science
Registration #0907-601, 602, 603
Science Equivalent to PPHS-600, but offered in the evening and Saturdays during the regular fall, winter, and spring Quarters. (Preliminary admission to the M.S. program in Photographic Science or consent of graduate coordinator. Not offered every year. Consent coordinator of photographic science graduate program.) Credit 5/Qtr.
(Not applicable to 45 required graduate credits)

Master of Fine Arts in Photography
PPHG-500 Fundamentals of Photographic Communication
Preliminary admission to the M.F.A. program with insufficient undergraduate credits and experience in photography and/or the visual arts.
An intensive survey of photographic materials, processes, equipment and practice; workshop in the application of photography to the solution of problems in visual communication and design.
Undergraduate credit (15 hours) will be granted upon completion.

PPHG-701, 702, 703 History and Aesthetics of Photography
Registration #0903-701, 702, 703
An intensive inquiry into the history and aesthetics of photography to the present. Some of the areas of exploration: the rise and development of portrait, architectural and landscape photography in the 19th and 20th centuries; a survey of old and recent processes and how they affect the image-making of their particular period; exploring new frontiers; the photographers of the geological and geographical U.S. Surveys and NASA moon-scapes; “straight” photography vs. pictorialism: 135-year battle; the document and Robert Frank’s Americans and the evolution of color photography.
Credit 3/Qtr.

PPHG-705, 706, 707 Student/Faculty Seminar
Registration #0903-705, 706, 707
An all-purpose weekly meeting to facilitate communication among members of the M.F.A. community and to introduce them to the resources available on campus and in the community.
Credit 1/Qtr.
Some of the projects are assigned while others are selected by the student, and a written illustrated report.
The thesis is designed and proposed by the candidate. It is considered his culminating experience in the program, involving research, a creative body of work, an exhibition or suitable presentation, and a written illustrated report.

Master of Science

PPHS-711, 712, 713 Theory of the Photographic Process
Registration #0907-711, -712, -713
Physical structure and optical properties of the silver halide emulsion and their relations to the characteristic curve; chemistry and preparation of emulsions; treatment of theory of sensitivity and latent image formation; chemistry and kinetics of processing; chemistry and physics of selected non-silver processes.
Class 3, Credit 3/Qtr.

PPHS-721, 722 Mathematics and Statistics
Registration #0907-721, -722 for Photographic Systems
A special graduate course in mathematics and applied statistics involving those areas of direct concern in design, analysis, and evaluation of photographic systems.
Credit 4/Qtr.

PPHS-731, 732, 733 Instrumental and Theoretical Optical Measurements
Registration #0907-731, -732, -733
Photographic Science
The principles of geometrical and physical optics with application to photographic instrumentation systems. First-order imaging, aberrations and geometrical image evaluation, mirror and prism systems, the eye and vision characteristics, radiometry of optical images, basic instrument systems, electromagnetic waves, polarization, interference and interferometers, coherence. Fraunhofer and Fresnel diffraction, transfer function description of imaging system performance.
Class 3, Credit 3/Qtr.

PPHS-741, 742, 743 Analysis and Evaluation of Imaging Systems
Registration #0907-741, -742, -743
Complex variables and Fourier analysis with application to the evaluation of imaging systems; properties of optical images, structure of photographic images; methods of photo-optical system evaluation.
Class 2, Lab. 6, Credit 4 (winter)
Class 3, Credit 3 (fall and spring)

PPHS-751, 752, 753 Special Topics in Photographic Science
Registration #0907-751, -752, -753
Photographic Science
Advanced topics of current or special interest, varying from quarter to quarter, selected from the field of photographic science. Specific topics announced in advance. (Not offered every quarter. Consult coordinator of the photographic science graduate program.)
Credit varies

PPHS-890 Research and Thesis Guidance
Registration #0907-890
Thesis based on experimental evidence obtained by the candidate in an appropriate field as arranged between the candidate and his or her advisor.
Credit 9 minimum for MS

School of Printing

All School of Printing courses are offered at least once annually, except as noted.

Management Courses

PPRM-201 Introduction to Technical Writing
Registration #0910-201
Basic approach to fundamentals of modern technical writing; review of English and writing skills; consideration of principles, techniques, form and style.
Class 3, Credit 3
PPRM-210 Financial Controls I  
Registration #0910-210  
Gives the line manager an understanding of the firm’s financial accounting system so that he or she can work with the accountant to use that system effectively. Includes balance sheet, income, funds and cash statements, ratio analysis and asset vs. expense decisions.  
Class 4, Credit 3  

PPRM-301 Application of Computers to the Graphic Arts  
A study of the applications of automated data processing involving the graphic arts industry. Topics include historical development, basic theory and concepts, general and special purpose computer applications. Both technical and managerial aspects of applications are considered.  
Class 4, Credit 3  

PPRM-302 Personnel Relations I  
Registration #0910-302  
An introductory study of human relations in the printing industry, emphasizing the personnel management aspects of a supervisor’s job. Students study problems of individual behavior and how workers are affected by organizational influences. Case analysis is used extensively.  
Class 3, Credit 3  

PPRM-310 Industrial Organization and Management  
An introductory level course which includes such main topic headings as management fundamentals, planning, controlling, organizing, the behavioral environment and managerial adaptation to changing circumstances. Although some emphasis is put on newspaper industry applications, the fundamentals apply to all organizations.  
Class 3, Credit 4  

PPRM-401 Estimating I  
Registration #0910-401  
Introductory course in current estimating practices; the development of hourly costs and production rate standards; costs of materials and outside services; one-color offset press and flat sheet bindery operations; introduction to flat sheet imposition and pre-planning techniques; obtaining and interpreting specifications; design and use of estimating forms; pricing for a profit margin; preparing the quotation. (PPRT-311, PPRM-210)  
Class 4, Credit 4  

PPRM-402 Estimating II  
Registration #0910-402  
Continuing study of sheet-fed offset lithography estimating; multi-color offset presses and signature-related bindery operations; signature imposition; camera, layout, stripping and plate processing production standards; phototypesetting and mechanical output costs; color separations and the costs associated with process color printing; finishing operations; the application of the computer to estimating procedures. (PPRM-301 and PPRM-401 recommended)  
Class 4, Credit 4  

PPRM-403 Printing Production Management I  
Registration #0910-403  
Examines the non-technological functions of production as components of a system, emphasizing organizational alternatives relating to human factors. Includes such topics as organization, systems approach, decision making, production planning and control, purchasing, inventory control, quality control, methods analysis, work measurement. Some simple analytical models based on graphs or elementary algebra are introduced.  
Class 3, Credit 3  

PPRM-404 Printing Production Management II  
Registration #0910-404  
Explores certain analytical models which can be used practically in an ordinary printing company. Includes such topics as decision theory, probability concepts, mathematical modeling, break-even and economic-order analysis under conditions of certainty and uncertainty, linear programming using computer, Markov chains, waiting line analysis, game theory, simulation. These topics are considered from conceptual and problem solving viewpoints without emphasis on mathematics beyond college algebra.  
Class 4, Credit 4  

PPRM-502 Financial Controls II  
Registration #0910-502  
Cost accounting systems; measurement and allocation of manufacturing and non-manufacturing costs; uses of full cost information; differential accounting and alternative choice decisions; capital investment decisions; budget preparation, standard cost, variance analysis and the management control process. (PPRM-501)  
Class 4, Credit 4  

PPRM-503, 504 Statistics of Quality Control I, II  
Registration #0910-503, -504  
Fundamental concepts of statistics and the application of statistical methods to the control and investigation of processes and operations. (SMAM-201)  
Class 4, Credit 4  

PPRM-506 Business Law  
Registration #0910-506  
Elements of the laws of contracts, agency, sales, negotiable instruments, partnerships, corporations, taxes, insurance, libel, copyright, and other laws pertaining to business, printing and publishing.  
Class 3, Credit 3  

PPRM-507 Computer Estimating Workshop  
Registration #0910-507  
The design and writing of computer estimating algorithms; use of a full-scale computer estimating system; estimating for web-fed offset presses; estimating for non-lithographic printing processes; business forms and book manufacturing industries practices; addressing, mailing and order fulfillment; pre-planning and break-even analysis; techniques for competitive estimating and pricing. (PPRM-402 required)  
Class 4, Credit 4  

PPRM-509 Economics of Production  
Registration #0910-509  
Intended as a seminar in management for seniors, this course combines readings in managerial economics with case studies, most of which describe real printing company situations involving price, product or equipment decisions. Students analyze situations; prepare, present and defend arguments for specific courses of action. The student will find it helpful but not mandatory to have completed courses in Financial Controls I & II, Printing Production Management I & II, Principles of Economics.  
Class 4, Credit 4  

PPRM-510 Personnel Relations II  
Registration #0910-510  
Advanced study of employer-employee relationships, introduction to major management concepts as they relate to the printing field. Management functions and organization theory are considered in the light of behavioral science. Supervisory practices are analyzed. (PPRM-302)  
Class 4, Credit 4  

PPRM-511 Labor Relations in Graphic Arts  
Registration #0910-511  
History and background for organized labor movement; makeup and characteristics of the contemporary labor force; collective bargaining and its effects on wages, hours, and conditions of work; the process of negotiating, administering, interpreting, applying, and enforcing the labor-management contract within the graphic arts area of the modern industrial society.  
Class 4, Credit 4
PPRM-512  Collective Bargaining in the Graphic Arts
Registration #0910-512
A study of the strategies and tactics of collective bargaining as applied to the graphic arts. Wage issues, fringe issues, and such concepts as seniority, discipline, grievance procedures, and managerial prerogatives are considered.
Class 3, Credit 3 (offered every other year)

PPT-513  Sales in the Graphic Arts
Registration #0910-513
Explores economic, psychological and sociological bases of selling, with emphasis on customer and salesman interplay as well as techniques and practices of creative salesmanship in graphic arts companies. This course aims at benefiting both students considering a career in sales and those who will otherwise work with salesmen, either by supporting their company’s salesmen in plant action or by buying from outside salesmen.
Class 4, Credit 4

PPTM-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

PPTM-515  Legal Problems of Publishing
Registration #0910-515
Legal aspects of news gathering; freedom of the press; state and federal legislation; libel, privilege, obscenity, privacy, copyright, and laws pertaining to advertising, photography, and publishing.
Class 4, Credit 4

PPTM-516  Marketing in the Graphic Arts
Registration #0910-516
Primarily from a printing industry viewpoint, the class explores the marketing concepts (organizing a team to find out what customers want to buy and then produce it at a profit). Students examine marketing functions and consider alternative ways to perform them in various company situations.
Class 4, Credit 4

PPTM-518  Purchasing in the Graphic Arts
Registration #0910-518
Role of the purchasing agent in the printing plant. Methods of procurement, purchasing policies and sources of supply. Characteristics of paper, ink, sensitized materials and other graphic arts supplies. Inventory control, economic order quantity, role of trade shops, make or buy decisions, blanked orders, consignment agreements, capital investment decisions and the purchase order as a legal document.
Class 4, Credit 3

PPTM-551  Special Topics—Printing
Registration #0910-551
A management, or management related, course used to present and investigate special topics not normally covered in the curriculum on a “one-time” basis. 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 varies/Qtr.

PPTM-590  Senior Seminar
Registration #0910-590
Consideration of related graphic arts areas not normally covered in regular courses; investigation of recent and possible future developments in technology, management, and scientific applications; and their implications and probable effects on the industry.
Class 2, Credit 2

PPTM-599  Independent Study
Registration #0910-599
Student selects and develops, with approval from a faculty sponsor, an independent study project of his or her own design. Project and amount of credit assigned must have final approval from the director of the School of Printing. (Generally seniors with qualifying grade point average)
Credits 1 to 5

Technical Courses

PPRT-200  Introduction to Printing
Registration #0911-200
For packaging science students; study of different printing processes; analysis of process advantages and disadvantages relative to a variety of applications; examination of procedures for each process, from design through finished product; practice of basic operations necessary for the production of a simple package printing job.
Class 2, Lab. 3, Credit 3

PPRT-201  Typography I
Registration #0911-201
Conventional rules of good traditional typography are reviewed through familiarization with basic terminology, type classification and typeface recognition; course includes lectures and laboratory exercises.
Class 2, Lab. 3, Credit 3

PPRT-202  Composition Technology
Registration #0911-202
A study of the use, operation, and application of machine principles and mechanisms as related to hot metal and phototype-setting; laboratory projects in setting composition photographically and in hot metal; utilization of various tape systems.
Class 2, Lab. 3, Credit 3

PPRT-203  Layout and Printing Design
Registration #0911-203
A comprehensive introduction of essential requirements and principles of layout and printing design as applied to commercial printing and advertising; practical application of design concepts in solving printing problems. Basic rendering skills are encouraged for model building, interrelationship of idea development, analyzing copy, logic of alphanumeric and related graphic images and copy preparation.
Class 2, Lab. 3, Credit 3

PPRT-204  Relief Press
Registration #0911-204
Theory and practice of letterpress presswork, using platen and cylinder presses; techniques, mechanics of equipment, care of equipment and materials used; application of special techniques of letterpresses, diecutting, scoring, numbering, perforating, embossing; makeready methods for line and halftone printing; introduction to photographic principles and practices used in the industry. Mounting and proofing of plates and pre-press preparation.
Press operation and printing on a variety of substrates.
Class 2, Lab. 3, Credit 3

PPRT-205  Gravure Printing
Registration #0911-205
Introductory course designed to survey the gravure printing process and the study of related information regarding applications, techniques, equipment, materials and supplies. The course is conducted by means of lectures, class discussions, demonstrations and supervised laboratory exercises using a 4-color Champlain Web Press.
Class 2, Lab. 3, Credit 3

PPRT-206  Reproduction Photography
Registration #0911-206
A basic course in the fundamental principles, procedures, techniques, and applications of the photographic process as it is related to the production of film negatives or film positives for the major printing processes.
Class 2, Lab. 3, Credit 3

PPRT-207  Printing Plates
Registration #0911-207
Introductory course in the elements of platemaking procedures for letterpress, flexographic, and lithographic plates and gravure cylinders. Theoretical study plus practical involvement in making of various plates.
Class 2, Lab. 3, Credit 3
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Classroom Hours</th>
<th>Laboratory Hours</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPRT-208</td>
<td>Lithographic Press</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>An introductory study of the principles and methods of offset presswork; press functions; operations and care of presses; exercise in running simple jobs.</td>
</tr>
<tr>
<td>PPRT-209</td>
<td>Screen Printing</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>Theory and practice of screen printing covering areas such as preparation of positives, frames, fabrics, stretching of fabrics, stencil methods, fillers, squeegees, inks, presses, and dryers; experiences in printing of papers, plastics, and irregular shapes; a study of some of the economic aspects of screen printing and its place in the total concept of graphic arts.</td>
</tr>
<tr>
<td>PPRT-210</td>
<td>Newspaper Presses</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>An introduction to major presses used to produce both weekly and daily newspapers. Letterpress and offset presses will be considered, along with gravure presses used for the production of newspaper supplements.</td>
</tr>
<tr>
<td>PPRT-213</td>
<td>Principles of Copy Preparation</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>A basic course involving theory of camera copy requirements through lecture, examples and project work. Includes projects in black and white and color, register, veloces, silhouettes cropping, “window,” etc. Lectures cover all aspects of copy. Directed to those who do not require the depth of involvement given in PPRT-313.</td>
</tr>
<tr>
<td>PPRT-301</td>
<td>Typography II</td>
<td>3</td>
<td>Class 2, Lab. 6</td>
<td>Credit 4</td>
<td>Emphasis is put upon finished typographic problems. Topics included in lectures are typographic movements, design concepts, analysis of current typographic practices, private presses, and bookmaking. The lab work is designed to present interesting and challenging problems to the serious student of typography. (PPRT-201)</td>
</tr>
<tr>
<td>PPRT-302</td>
<td>Composition Systems</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>Detailed study of photocomposition with emphasis on systems approach; introduction to use of computers in composing rooms, and operation of specialized equipment. (PPRT-202)</td>
</tr>
<tr>
<td>PPRT-303</td>
<td>Layout and Printing Design</td>
<td>3</td>
<td>Class 2, Lab. 6</td>
<td>Credit 4</td>
<td>Typical printing design problems with emphasis on typographic arrangements, pictorial arrangement with consideration of production follow-through. Includes design of complete booklet dummy and other commercial items for black-and-white and color reproduction from roughs to comprehensible layout.</td>
</tr>
<tr>
<td>PPRT-304</td>
<td>Advanced Relief Press</td>
<td>3</td>
<td>Class 2, Lab. 6</td>
<td>Credit 4</td>
<td>A study of pressroom problems in letterpress printing on cylinder press equipment; commercial forms, single and multi-color work; makeready system; operation and care of equipment. (PPRT-204)</td>
</tr>
<tr>
<td>PPRT-306</td>
<td>Tone Reproduction Photography</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>The photographic processes as they relate to the measurement and reproduction of tones for the major printing processes. The emphasis will be on the scientific analysis of a complete system of halftone sensoimetry and process control. (PPRT-206)</td>
</tr>
<tr>
<td>PPRT-307</td>
<td>Lithographic Plates</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>An advanced Lithographic plate course covering the theory and practice of all types of litho plates; their processing, problems, controls, and applications in the industry. Included are related plate department operations such as step and repeat, and work with non-light-contact films.</td>
</tr>
<tr>
<td>PPRT-308</td>
<td>Lithographic Press Problems</td>
<td>3</td>
<td>Class 2, Lab. 6</td>
<td>Credit 4</td>
<td>An advanced course in the theory, practice, and problems of offset presswork; development of technical knowledge of materials and equipment; practice in running multicolor work. (PPRT-208)</td>
</tr>
<tr>
<td>PPRT-309</td>
<td>Advanced Screen Printing</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>Further study of the theory and practice of screen printing covering areas such as experiments with fabrics or screens; stencil forming materials and the effects these have on finished product. Further study into the inks and substrates that are common to the screen printer. Introduction to and running of automatic cylinder screen printing press and container press capable of printing cylindrical, conical and flat objects. (PPRT-209)</td>
</tr>
<tr>
<td>PPRT-310</td>
<td>Relief and Gravure Plates</td>
<td>3</td>
<td>Class 2, Lab. 6</td>
<td>Credit 4</td>
<td>Further study of the theory and practice of screen printing covering areas such as experiments with fabrics or screens; stencil forming materials and the effects these have on finished product. Further study into the inks and substrates that are common to the screen printer. Introduction to and running of automatic cylinder screen printing press and container press capable of printing cylindrical, conical and flat objects. (PPRT-209)</td>
</tr>
<tr>
<td>PPRT-311</td>
<td>Imposition and Finishing</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>Printing production planning to correlate pre-press and post-press operations. Topics include preparing layouts, forms and a study of how they are affected by various bindery operations. Laboratory experiments include the operation of modern bindery equipment, evaluation and application of adhesives, binding materials and book performance testing. Several projects are followed through from design, signature layout to a finished product, including a gold stamped, hardcover bound book.</td>
</tr>
<tr>
<td>PPRT-312</td>
<td>Stripping</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>An introductory course covering the basic- and specialized procedures for film assembly. The course covers work with contact- and duplicating films, including the new roonight films. Stripping of line-halftone- and complementary flats is discussed and practiced. Fake color and process color stripping assignments are given. Automated imposition is presented in form of slides and discussion. Hands on step-and-repeat projects on various units is assigned in lab.</td>
</tr>
<tr>
<td>PPRT-313</td>
<td>Copy Preparation</td>
<td>3</td>
<td>Class 2, Lab. 3</td>
<td>Credit 3</td>
<td>Preparation of copy for camera; working from layouts, making analysis of requirements; paste-up techniques, methods of pre-separation mechanicals, use of photographic and typographic copy, relation to production steps in follow-up for offset plate-making and photo-engraving; proper instructional specification writing. (PPRT-203)</td>
</tr>
<tr>
<td>PPRT-314</td>
<td>Flexography</td>
<td>3</td>
<td>Class 2, Lab. 6</td>
<td>Credit 4</td>
<td>A study of the theory and practice of flexographic printing; uses and development of flexography; plate and ink requirements; press principles and operation; experiments in printing on a wide variety of surfaces. (PPRT-204)</td>
</tr>
</tbody>
</table>
PPRT-315  Ink and Color
Registration #0911-315
Theory of light and color; basic theory of process color and correction, use of color comparator and spectrophotometer, the study of color systems and color matching systems; theory and application of various ink systems; practice in standard ink mixing and color matching emphasizing offset and letterpress processes; correlation of ink properties with applications; emphasis on relationship of ink to paper and press; study of ink problems and their correction.
Class 2, Lab. 3, Credit 4

PPRT-317  Calligraphic Forms
Registration #0911-317
A study of the basics of calligraphy; exercises in use of broad-edge pen to develop primary forms of italic and Chancery Curvilinear letter styles and skills in rapid writing; consideration of historical origins of letters, use of basic tools, understanding of methods and disciplines stressed.
Class 2, Lab. 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.
Class 2, Lab. 3, Credit 3

PPRT-320  Newspaper Production
Registration #0911-320
A study of the methods of producing a newspaper by the use of photocomposition systems and the offset process. Students organize a staff, design a newspaper, set type, paste up paper, go to camera, make plates and go to press.
Class 2, Lab. 3, Credit 3

PPRT-321  Web Offset
Registration #0911-321
An analytical study of the technological developments in web offset; emphasis on the interrelationship of procedures, materials, and equipment; practical laboratory projects on a commercial four-unit perfecting web offset press. (PPRT-208)
Class 2, Lab. 3, Credit 3

PPRT-322  Circulation and Mailrooms
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.
Class 3, Credit 3

PPRT-323  Newspaper Color
Registration #0911-323
A study of the basic theory, materials and methods used in the graphic arts for the reproduction of color for newspapers.
Class 2, Lab. 3, Credit 3 (offered every other year)

PPRT-324  Newspaper Composition
Registration #0911-324
A study of composition techniques used in the publishing of weekly and daily newspapers, with emphasis on the systems approach to newspaper production.
Class 2, Lab. 3, Credit 3 (offered every other year)

PPRT-329  Introduction to Book Design
Registration #0911-329
A course intended to give the student an understanding of how a book designer functions within a book publishing firm. Emphasis is placed upon the many factors involved in book design decisions, including the important relationship between book design and book production in producing a readable, functional book. (PPRT-301, PPRT-303, or instructor’s approval)
Class 3, Credit 3

PPRT-330  Newspaper Production II
Registration #0911-330
The production of a newspaper by photocomposition methods and the offset process. A continuation of PPRT-320 Newspaper Production I in more depth, with special emphasis on presswork on the Goss Community Offset Press. Also, emphasis will be made on the use of color in newspaper production. (PPRT-329)
Class 2, Lab. 3, Credit 3 (offered every other year)

PPRT-333  Introduction to Book Production
Registration #0911-333
This course is intended to give the student an insight into an understanding of how a production manager functions within a publishing firm. Emphasis is placed upon production decisions and purchasing requirements for producing a wide range of books including trade, textbooks, juveniles and special editions.
Class 2, Lab. 3, Credit 4

PPRT-401  Typographic Workshop
Registration #0911-401
Allows the student to create and solve a typographic problem of his own choice. Complete freedom is given and experimentation is encouraged, giving the student the opportunity to meet his own objectives and satisfaction. The project or projects that the student chooses should be of significant interest to the student to warrant taking this course. (PPRT-301)
Class 2, Lab. 6, Credit 4

PPRT-402  Applications of Electronics to Graphic Arts
Registration #0911-402
A basic course in the fundamentals of electricity and electronics covering DC, AC and semiconductors. Theory and application are combined as major topics and studied, implicating numerous graphic arts machines and devices. Students will perform laboratory experiments using basic electronic components and instruments.
Class 2, Lab. 3, Credit 3

PPRT-403  Layout and Printing Design
Registration #0911-403
A project course with design problems which involves students in converting their designs into the actual camera copy, trying various media, learning to identify art techniques and printing processes; more individualized approaches emphasized, more advanced principles applied. (PPRT-303)
Class 2, Lab. 6, Credit 4

PPRT-406  Color Separation Photography
Registration #0911-406
Color separation and color correction methods in the graphic arts industry; color theory, masking requirements, tone reproduction for color, color proofing systems, electronic scanners.
Class 2, Lab. 3, Credit 3

PPRT-410  Introduction to Paper
Registration #0911-410
This course begins with a discussion of papermaking fibers, pulping procedures, papermaking machines, and proceeds to show how they affect paper properties and printing characteristics. Laboratory experiences include making paper from various raw materials, physical and optical testing of paper and paper identification.
Class 3, Lab. 2, Credit 3

PPRT-500  Quality Control in the Graphic Arts
Registration #0911-500
A study of the methods and instrumentation necessary to produce a product consistent with the appropriate quality level. Topics will include process variability, waste reduction, problem analysis, materials testing, process control, process optimization, and quality assurance.
Prerequisite: Students should have completed all required 200 level technical courses in the School of Printing or have consent of the instructor.
Class 3, Credit 3
The study of the criteria necessary for selecting the methods, procedures, and materials relevant to planning and executing an effective lecture or demonstration lesson.

Credit 4 (offered every other year)

PPRT-506 Advanced Color Reproduction
Registration #0911-506
Further study of color measurement and color reproduction. The emphasis will be on the analysis of a color reproduction system using such tools as color measurement instrumentation, visual color evaluation, color tone reproduction, and process control.

Class 2, Lab. 3, Credit 3

PPRT-551 Special Topics—Printing
Registration #0911-551
This course presents and investigates technological topics which normally are not covered in the regular curriculum on a one-time basis. Guest lecturers such as industry leaders as well as regular faculty are used to conduct this course. Topics to be covered are announced in advance.

Credit varies/Or.

PPRT-591 Reproduction Photography
Registration #0911-591
An intensive course designed to enable photography students to gain a basic understanding of the various printing processes. The application of photography to each, with an emphasis on problems involved in obtaining optimum tone and color reproduction of their photographs.

Class 2, Lab. 3, Credit 3

PPRT-592 Printing Plates
Registration #0911-592
A specialized course for photography students to develop understanding of various imaging methods and characteristics, processing steps, applications, and major problems of platemaking.

Class 2, Lab. 3, Credit 3

PPRT-593 Printing Presses—Lithographic
Registration #0911-593
Course offered for photography students; theory and practice of the methods of planographic processes.

Class 2, Lab. 3, Credit 3

PPRT-594 Printing Presses—Screen
Registration #0911-594
Course offered for photography students; theory and practice of the methods of screen processes.

Class 2, Lab. 3, Credit 3

Graduate Courses

Master of Science in Printing

PPRE-701 Introduction to Graphic Arts Education Registration #0908-701
A prerequisite course for most students working in the printing education major. A study of historical trends along with the development and overview of philosophy and methodology, including a survey of current industrial education teaching problems.

Credit 4 (offered every other year)

PPRE-702 Teaching Methods in Graphic Arts Registration #0908-702
The study of the criteria necessary for selecting the methods, procedures, and materials relevant to planning and executing an effective lecture or demonstration lesson.

Credit 4 (offered every other year)

PPRE-713 Typographical Procedures
Registration #0908-713
An introductory course in the basic tenets of traditional typography. Areas that will be covered are: terminology, style, copyfitting, point systems, legibility, initials and typeface recognition. Laboratory demonstrations will be given to illustrate the theoretical areas covered in the lectures.

Credit 4

PPRE-860 Practice Teaching in the Graphic Arts Registration #0908-860
A 10-week teaching experience in a school offering an appropriate exposure for the student teacher in the areas of student relationships and understanding, development of teaching methods and procedures, and a supervised involvement in the duties of the cooperating teacher.

Credit 12 (offered every other year)

Printing Management

PPRM-702 Computers in Management
Registration #0910-702
Discussion of printing requirements in relation to computer system configurations; applications of computers to management and production control problems; investigation of computer-oriented production control techniques. (PPRM-501)

Credit 4

Printing Technology

PPRT-701 Research Methods in Graphic Arts Registration #0911-701
Theory and application of principles of laboratory oriented research in the graphic arts, analysis of research techniques, inter-disciplinary relationships, conditions for technology transfer and synergism; status of research in the graphic arts including organization, basic vs. applied research and organization of literature including patents, illustrations of techniques and research programs and methods followed in various research situations; systematic study theory of scientific methods including induction, deduction, hypothetico-deduction, hypothesis formation, theory development, etc.

Credit 4

PPRT-702 Graphic Reproduction Theory
Registration #0911-702
Analysis of the basic theories of graphic reproduction and study of the principles underlying prevalent and proposed printing processes; special topics such as classification and description of the various light-sensitive systems as applied to the graphic arts, ink transfer theory, present and proposed systems of printing based on electrostatics, electrolysis, magnetism and lasers; study of hybrid systems and the significance and application of inter-disciplinary methods.

Credit 4

PPRT-703 Statistical Inference
Registration #0911-703
Descriptive statistics, patterns of variability, measures of variability, working with the normal curve, tests of hypotheses for means, tests of hypotheses for variance, internal estimates for means, internal estimates for variance, sample size for variables, introduction to analysis of variance, and applications of applied statistics to graphic arts.

Credit 5

PPRT-704 Design of Experiments
Registration #0911-704
Analysis of variance, components of variance, crossed vs. nested experiments, studying individual effects, introduction to matrix algebra, regression analysis, planning experiments from a statistical point of view, basic experimental designs, factorial experiments, fractional factorials, determination of optimum conditions, introduction to nonparametrics and quality control concepts (as time allows).

Credit 5
PPRT-705, 706, 707 Application of Mechanics and Electronics
Registration #0911-705, 706, 707 to Materials, Machine
Design, and Processes in Printing
Force systems, elementary dynamics, work, power, energy, stress
and strain, axial loads, beams, torsion bars, and columns, particu­
larly as applicable to printing equipment and processes. Design of
machine elements; bearings, gears, shafts, fasteners, and frames.
Application of basic circuits to electronic devices and systems.
Credit 4/Qtr.

PPRT-708 Introduction to Systems Analysis
Registration #0911-708
Problems of systems analysis in printing operations for the
highest quality product at the minimal cost including optimal floor
designs and methods of study. (PPRM-301)
Credit 4

PPRT-709 History of Printing Technology
Registration #0911-709
A study of the forces which have influenced the development of
printing with emphasis upon the technological factors involved;
examinations of the relationships of aesthetics and craft con­
cepts to modern industrial techniques.
Credit 4

PPRT-711 Tone and Color Analysis
Registration #0911-711
Methods of instrumentation necessary for the evaluation and pro­
cess control of printed tone and color and the photographic inter­
mediate images required for the photomechanical reproduction
of tone and color.
Credit 4

PPRT-799 Independent Study
Registration #0911-799
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.
Credits 1 to 5

PPRT-850 Research Projects
Registration #0911-850
Individual research projects in which independent data is collect­
ed by the student, followed by analysis and evaluation. A compre­
hensive written report is required. Consent of advisor required.
Credit variable

PPRT-890 Research and Thesis Guidance
Registration #0911-890
An experimental survey of a problem area in the graphic arts.
Credit variable

SSEG-201 Contemporary Science—Biology
Registration #1018-201
A study in various biological topics relevant to contemporary
problems of society. Topics may include population biology, pol­
lution, disease control, human heredity, contagious diseases,
marine biology.
Class 4, Credit 4 (F, W, S)

SSEG-202 Contemporary Science—Chemistry
Registration #1018-202
The overall intent of this course is to relate the important role of
chemistry to issues of immediate and contemporary concern.
Basic chemistry principles are discussed qualitatively and then
applied to environmental concerns, energy, pesticides, food and
drugs, and the properties of polymers. Lap-dissolve projection,
current films and invited speakers are integrated into the lecture
schedule.
Class 4, Credit 4 (F, W, S)

SSEG-203 Contemporary Science—Physics
Registration #1018-203
Introductory science for non-science students. Several topics
such as 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 soci­
ety. A minimum of mathematics is used. A laboratory or discussion
option is offered for the small-group meetings once a week, which
reinforce the material given in demonstration lectures and audio­
visual presentations.
Class 4, Credit 4 (F, W, S)

SSEG-204 Contemporary Science—Mathematics
Registration #1018-204
A basic survey of mathematical structures as well as an introduc­
tion to problem solving. Topics will be chosen from foundations of
mathematics, algebra, topology, number theory, graph theory,
and probability theory. These structures will be examined as they
occur naturally in modern settings.
Class 4, Credit 4 (F, W, S)

Biology

SBIB-550 Biology Seminar
Registration #1001-550
Writing and oral reports and their discussion by class members
covering topics of current interest in the biological sciences. (40
quarter hours in biology)
Class 2, Credit 2 (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 every quarter)

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.
Class variable, Credit variable (Offered every quarter)
Molecular & Cellular Biology
SBIC-320 Histology
Registration #1002-320
Detailed study of the structure and function of normal and abnormal vertebrate tissue, (one year of general biology)
Class 2, Lab 4, Credit 4 (F - alternate years)

SBIC-402 Immunology
Registration #1002-402
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, immunosuppressive drugs and tolerance, (one year of general biology, one year of organic chemistry)
Class 2, Credit 2 (W, S alternate years)

SBIC-403 Cell Physiology
Registration #1002-403
Functional cytology, cellular water and electrolyte homeostasis, exchange of materials across cell membranes, regulation of cellular metabolism and control of cell growth, (one year of general biology, one year of organic chemistry)
Class 3, Lab 3, Credit 4 (F)

SBIC-404 Introductory Microbiology
Registration #1002-404
Principles of anatomy, biochemistry, genetics, taxonomy, ecology of viruses, bacteria, molds, algae, and protozoa. Useful and harmful activities. Basic laboratory techniques, microscopy, staining, counting, identifying, (one year of general biology, one year of organic chemistry)
Class 3, Lab 4, Credit 5 (F, SR)

SBIC-406 Virology
Registration #1002-406
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 (W/S alternates)

SBIC-409 Plant Anatomy
Registration #1002-409
A detailed study of the cellular structure and development of plant tissues and organs, (one year of general biology)
Class 3, Lab 3, Credit 4 (F-alternate years)

SBIC-412 Immunology Laboratory
Registration #1002-412
Laboratory work to complement the lectures in Immunology (SBIC-402). Each student experiences a variety of techniques (including use of laboratory animals) used in immunological research and clinical laboratories.
Lab 3, Credit 1 (W/S alternates)

SBIC-710 Antibiotics & Chemotherapy
Registration #1002-710
Antibiotics and therapeutic chemicals used clinically against microbial infections. Chemotherapy of cancer. Discovery, production, sale and usage of antibiotics. Impact of antibiotics on viruses, bacteria, fungi, protozoa and on the patient. Medical consequences. Assay procedures, fermentation technology (SBIC-404, one year of organic chemistry)
Class 3, Lab 2, Credit 4 (W-alternate years)

Developmental, Genetic & Environmental Biology
SBID-340 General Ecology
Registration #1003-340
Introduction to ecosystem ecology stressing the dynamic inter-relationships of plant and animal communities with their environment. A study to include such ecological factors as energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, bio-geography and representative ecosystems, (one year of general biology)
Class 3, Lab 3, Credit 4 (F)

SBID-420 Plant Ecology
Registration #1003-420
A consideration of the nature and variation of plant communities with a discussion of factors which limit, maintain, and modify communities both locally and regionally. Field studies of various plant communities will be conducted. (SBID-340)
Class 3, Lab 3, Credit 4 (S-alternate years)

SBID-421 Genetics
Registration #1003-421
Genes and cytoplasmic factors as units of inheritance; the nature and origin of inheritable characteristics and variations. Principles of inheritance in plants, animals and man. (one year of general biology, third year status)
Class 3, Lab 3, Credit 4 (S, SR)

SBID-422 Developmental Biology
Registration #1003-422
Study of the processes of growth, differentiation and development which lead to the mature form of an organism. Both plants and animal systems are considered, (one year of general biology)
Class 2, Lab 6, Credit 4 (F/W alternate years/alternate quarters)

General Biology
SBIG-201 General Biology
Registration #1004-201
Characteristics and origin of life; basic principles of modern cellular biology including cell organelle structure; physiological processes of gas exchange, internal transport, and osmoregulation and excretion.
Class 3, Credit 3 (F)

SBIG-202 General Biology
Registration #1004-202
Chemical basis and functions of life including enzyme systems, respiration and photosynthesis; nutrient procurement in plants and animals, hormones and behavior.
Class 3, Credit 3 (W)

SBIG-203 General Biology
Registration #1004-203
A study of cellular and organismal reproduction, the principles of molecular biology, genetics, and developmental biology, introduction to evolution and ecology.
Class 3, Credit 3 (S)

SBIG-205, 206, 207 General Biology Laboratory
Registration #1004-205, -206, -207
Laboratory work to complement the lecture material of General Biology (SBIG-201, 202, 203). The experiments are designed to illustrate concepts, develop laboratory skills and techniques, and improve ability to make, record and interpret observations (Co-requisite SBIG-201, 202, 203)
Lab 3, Credit 1 (F-205, W-206, S-207)

SBIG-210** Microbiology in Health and Disease
Registration #1004-210
An introduction to microorganisms, their relationship to the environment and human health, and the causes, prevention and treatment of infectious diseases, (one year of high school biology or equivalent)
Class 4, Credit 3 or Class 3, Res. 1, Credit 4 (F, S)

SBIG-220** Microbiology in Health & Disease Laboratory
Registration #1004-220
Laboratory culturing handling and identification of microorganisms with special emphasis on the relationship of bacteria to food handling and preservation, the production of food products by bacteria, and the prevention of food-borne diseases.
Lab 3, Credit 1 (F, S)

SBIG-211** Human Biology
Registration #1004-211
An introduction to the structure and function of the human body.
Class 4, Credit 4 (W)

*Not acceptable for biology credit for biology major.
SBIO-213*  Biology of Human Reproduction
Registration #1004-213
The study of the anatomy, functioning and diseases of the human reproductive systems. An introduction to human heredity, inherited diseases, and birth defects.
Class 4, Credit 4 (F)

SBIO-315*  Medical Genetics
Registration #1004-315
A survey of selected human variations and diseases of medical importance, with emphasis on the underlying genetic principles. (SBIO-203, or equivalent)
Class 2, Credit 2 (W)

SBIO-440*  Environmental Microbiology
Registration #1004-440
Microorganisms in water and sewage, biological and medical aspects; methods for detection, isolation, and enumeration. Treatment methods for eliminating and controlling harmful organisms.
Class 3, Lab 2, Credit 4 (S, SR)

Organismal Biology

SBIO-301  Invertebrate Zoology
Registration #1006-301
Biology of invertebrate animals with reference to classification, structure, function, and ecology. (One year of general biology or permission of instructor).
Class 3, Lab 3, Credit 4 (F, alternate years)

SBIO-302  Vertebrate Zoology
Registration #1006-302
Morphology, physiology, behavior, classification, and ecology of chordates. (One year of general biology)
Class 3, Lab 3, Credit 4 (F-Alternate years)

SBIO-303  Comparative Vertebrate Anatomy
Registration #1006-303
A comparative study of the organ systems of representative members of the vertebrates with emphasis on structural changes which occur during evolution. (One year of general biology)
Class 3, Lab 3, Credit 4 (S)

SBIO-304  Botany
Registration #1006-304
Distribution of the major groups of plants and their adaptations to their particular environment. (One year of general biology or permission of the instructor)
Class 3, Lab 3, Credit 4 (F/W)

SBIO-305  Physiology and Anatomy
Registration #1006-305
An integrated systems approach to cellular, nerve, muscle and cardiovascular physiology. Laboratory exercises include detailed studies of the human skeletal and muscular systems. (One year of general biology, SCHG-217 or permission of instructor)
Class 3, Lab 3, Credit 4 (W)

SBIO-306  Physiology and Anatomy
Registration #1006-306
Integrated systems approach to renal, respiratory and gastrointestinal physiology, metabolism and endocrinology. Laboratory exercises include detailed studies of the human kidney, lung performance, nervous and gastrointestinal anatomy and physiology. (SBIO-305)
Class 3, Lab 3, Credit 4 (S)

SBIO-410  Plant Physiology
Registration #1006-410
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, one year of organic chemistry)
Class 3, Lab 3, Credit 4 (alternates W/S)

SBIO-411  Systematic Botany
Registration #1006-411
Study of diversity existing in vascular plants. Its origin and its organization into a hierarchy of categories, orders, and families. Laboratory experience in collection, identification, and study of vascular plants with special emphasis on local flora. Practice in use of manuals and interpretation of morphological characters. (SBIO-304)
Class 3, Lab 3, Credit 4 (S-alternate years)

SBIO-412  Parasitology
Registration #1006-412
Structure, life cycle, and control of human parasites. Emphasis on forms of diagnostic importance. (One year of general biology)
Class 3, Lab 3, Credit 4 (W/S alternate years)

SBIO-413  Comparative Animal Physiology
Registration #1006-413
A comparative study of the physiological mechanisms of the animal kingdom. An interpretation of the physiological variations in terms of evolutionary significance, morphological variation and ecological conditions, (one year of general biology, one year of organic chemistry)
Class 3, Lab 3, Credit 4 (alternates W/S)

SBIO-705  Advanced Physiology
Registration #1006-705
An in-depth study of the functions of the human body. Both the chemical and physical factors of normal physiology will be studied along with the modified functions that are a result of disease. (SBIO-305, 306, SCHB-602, SCHB-603)
Class 3, Credit 3 (S-alternate years)

SBIO-720  Introduction to Pharmacology
Registration #1006-720
The chemical properties, metabolism and excretion of drugs and their effects on physiological systems such as cardiovascular, renal, gastrointestinal, respiratory, endocrine, and central nervous system. Antimicrobial and cancer chemotherapeutic agents will also be discussed. (SBIO-305, 306 and permission of the instructor)
Class 3, Credit 3 (F/W alternate years and alternate quarters)

SBIO-721  Pharmacology Laboratory
Registration #1006-721
Laboratory work to accompany SBIO-720. Experiments relate to principles discussed in corresponding lectures.
Lab 3, Credit 1 (alternate years, alternates F/W)

Biological Techniques

SBIT-320  Small Animal Surgery
Registration #1007-320
A course designed to prepare the student for small animal handling, biological administrations and preparations, minor surgery and autopsies. (Major status and permission of the instructor).
Class 1, Lab 3, Credit 2 (alternates W/S)

SBIT-430  Radiation Biology
Registration #1007-430
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 2, Lab 6, Credit 4 (F)

SBIT-431  Histological Techniques
Registration #1007-431
Preparation of plant and animal tissues for 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 (alternate years, alternates F/W)

*Not acceptable for biology credit for biology major.
Chemistry

SCHA-261, 262, 263 Introduction to Chemical Analysis

An introduction to qualitative and quantitative analysis. Traces of inorganic ions by qualitative analysis. Classical methods of gravimetric analysis and titration analysis based on precipitation, oxidation-reduction and complex formation as well as non-aqueous solvent acid-base reactions. Introduction to electro-chemical techniques, and fundamentals of spectrophotometry are stressed. Equilibrium concepts and statistical evaluation of results are incorporated.

Class 2, Lab. 5, Credit 3 (261-F, 262-W, 263-S)

SCHA-311 Analytical Chemistry—Instrumental Analysis

Elementary treatment of instrumental theory and techniques, properties of light, refractive index, ultraviolet, visible and infrared spectrophotometry; emission spectrophotometry; flame photometry; electrochemistry; Nernst Law; pH meters and electrodes (SCHC-212).

Class 3, Lab. 4, Credit 4 (offered every year) (F, W)

SCHA-312 Analytical Chemistry—Separations

Inorganic and organic separations; Raoult and Henry Laws; phase rules; distillation; extraction; adsorption and surface effects; electrophoresis, chromatography including gas, liquid, column, paper, thin layer, and ion exchange (SCHC-212).

Class 3, Lab. 4, Credit 4 (offered every year) (S, SR)

SCHA-402 Introduction to Research

Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.

Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHC-599 Independent Study—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.

Class variable, Credit variable (offered every year) (F, W, S, SR)

SCHC-600 Biochemistry

Biological and clinical case studies of biochemistry. The cases are arranged to be correlated with the lecture topics of Biochemistry, SCHC-702, 703. (Concurrent registration in SCHC-702, 703)

Class 1, Credit 1 (offered every year) (605-F, 606-W)

SCHC-700 Laboratory Safety and First Aid

Discussion and demonstrations of protective devices and equipment; techniques for safety handling chemicals, glassware, and performing chemical reactions; basic first aid in case of accidents. Emphasis on flammable solvents, explosives, cryogens, and toxic materials; radiation hazards, storage of chemicals, waste disposal.

Class 1, Credit 0 (offered every year) (F)

SCHC-801 Forensic Science

A survey of forensic science for non-science majors, e.g., Dietetics and other Health Related Professions majors. (SCHC-801)

Class variable, Credit variable (offered every year)

Class 2, Credit 2 (offered every year) (S)

SCHC-802 Introduction to Research

Faculty directed student projects or research usually involving laboratory work and/or calculations over a period of at least two quarters.

Class variable, Credit variable.

SCHG-202 Organic Chemistry

A two quarter survey of biochemistry for non-science majors, e.g., Dietetics and other Health Related Professions majors. (SCHG-202)

Lec. 3, Rec. 1, Credit 4 (offered every year) (S, F)
SCHG-205, 206, 207  Chemical Principles Laboratory Registration #1011-205, -206, -207
A laboratory course for photoscience, mathematics, and physics majors who are taking general chemistry (SCHC-211, 212) and Introduction to Organic Chemistry (SCHO-230) concurrently. Laboratory experiments are designed to complement the lecture material in these courses.
Lab. 3, Credit 1 (offered every year) (205-F, 206-W, 207-S)

SCHG-208, 209  College Chemistry Registration #1011-208, -209
For engineering students. The concepts of energy and the work function is discussed in terms of industrial chemical processes. Topics include applications of the gas laws, equilibrium theory, nuclear chemistry, electrochemistry, thermodynamics, and modern instrumental methods of structure analysis. Students will have two lectures and one recitation period per week. One additional lecture period is scheduled for chemistry demonstration material, problem review and simulated laboratory experiments.
Class 4, Credit 4 (offered every year) (208-F, 209-S)

SCHG-215, 216, 217  General and Analytical Chemistry Registration #1011-215, -216, -217
Principles of chemistry presented for students in medical technology and the life sciences.
Class 3, Credit 3 (offered every year) (215-F, 216-W, 217-S)

SCHG-221, 222, 223  General Chemistry Laboratory Registration #1011-221, -222, -223
Laboratory course to accompany SCHG-201. Emphasis on introduction to methods of chemical analysis, qualitative and quantitative techniques.
Lab. 3, Credit 1 (offered every year) (F)

SCHG-225, 226, 227  General and Analytical Chemistry Laboratory Registration #1011-225, -226, -227
Laboratory course to accompany SCHG-202. Emphasis is on representative examples of typical organic techniques and syntheses.
Lab. 3, Credit 1 (offered every year) (W)

SCHG-271, 272, 273  Chemistry of Water Registration #1011-271, -272, -273
Basic training in general chemistry assuming no prior experience, concentrating on those aspects important in the field of water conservation. Laboratory work trains the student in volumetric analysis.
Class 2, Lab. 3, Credit 3 (offered every year) (F, W)

SCHO-230  Introduction to Organic Chemistry Registration #1013-230
Introduction to the structure and reactivities of organic molecules for physical science majors. An overview of the structure, nomenclature, bonding, and reactivity of the various functional groups. Chemistry of alkenes, alkynes, and aromatic molecules. (SCHC-212 or permission of instructor) (S)
Class 3, Credit 3 (offered every year)

SCHO-231, 232  Organic Chemistry Registration #1012-231, -232
Types of organic compounds, names, and structures, preparations, properties, and reactions. Laboratory work emphasizes techniques; involves preparations and analysis. (SCHG-216, or SCHG-212) Class 3, Lab. 3, Credit 4 (offered every year) (231-F, 232-W)

SCHO-233  Organic Chemistry Registration #1013-233
Chemistry of the major classes of compounds of direct biological significance: carbohydrates, proteins, nitrogen heterocycles. Basic mechanisms of organic reactions and methods of elucidation, including spectrophotometry. (SCHG-232) Class 3, Lab. 3, Credit 4 (offered every year) (S)

SCHO-431, 432, 433  Organic Chemistry Registration #1013-431, -432, -433
A rigorous survey of the reactions of all major functional groups. Conformational Analysis, Stereochemistry and Spectral (IR, NMR) analysis are also covered. Prior coursework in Organic Chemistry is required. (SCHO-230 or its equivalent)
Class 2, Credit 2 (offered every year) (431-S, SR, 432-F, W, 433-S, SR)

SCHO-435, 436  Preparative Organic Chemistry Registration #1013-435, -436
Synthesis of Organic Compound utilizing a variety of laboratory techniques. Purification and Spectral Characterization will be routinely used. (SCHO-230), (SCHO-431 should be taken concurrently with SCHO-435 and SCHO-432 with SCHO-436).
Lab. 6, Credit 2 (offered every year)

SCHO-437  Systematic Identification of Organic Compounds Registration #1013-437
A laboratory course utilizing chemical and spectral (largely IR and NMR) techniques to identify and characterize organic compounds. (SCHO-432, 436) (SCHO-433 should be taken concurrently)
Lab. 6, Credit 2 (offered every year) (437-S, SR)

SCHP-340  Introduction to Physical Chemistry Registration #1014-340
Properties of gases, kinetic molecular theory; Boltzmann distribution functions; non-ideal behavior; first law of thermodynamics; heat capacities. Euler’s theorem and homogeneous functions; thermochromy; and introduction to the second law. (SCHC-213)
Class 3, Credit 3 (offered every year) (F, W)

SCHP-441, 442, 443  Physical Chemistry Registration #1014-441, -442, -443
Atomic theory, states of matter, chemical thermodynamics, molecular properties, solutions, equilibria, phase rule, electrochemistry, kinetics, surface chemistry, and photochemistry. (SCHP-340, SPSP-311)
Class 3, Lab. 3, Credit 4 (offered every year) (441-S, SR, 442-F, W, 443-S, SR)

SCHT-241  Chem Tec I (General) Registration #1015-241
Safety in the chemical laboratory, toxicity of chemicals, use of compressed gases, laboratory notebooks, separation techniques, paper and gas chromatography, properties of gases and their measurement, common units and conversion factors, weighing techniques, density of solids and liquids, chemical equilirium, visible spectrophotometry, ionic and covalent bonding.
Class 3, Lab. 9, Credit 6 (offered every year) (F)
SCHT-242  Chem Tec II (Analytical)  Registration #1015-242  
Periodicity and chemical properties. Qualitative detection of 
common metallic and non-metallic ions. Sampling techniques and 
and sample preparation. Quantitative analysis by gravimetric and titri-
metric procedures-acid base and redox. Measurement of pH.
Class 3, Lab. 9, Credit 6 (offered every year) (W, S)

SCHT-243  Chem Tec III (Organic)  Registration #1015-243  
Techniques of handling organic compounds: recrystallization and 
melting points, distillation, extraction. Reflective index and 
optical activity. Reactions of functional group classes. Infrared 
spectroscopy.
Class 3, Lab. 9, Credit 6 (offered every year) (SR, F)

SCHT-244  Chem Tec IV (Organic)  Registration #1015-244  
Continuation of classes and reactions of organic compounds. 
Synthetic techniques, vacuum distillation, gas chromatography.
Class 2, Lab. 9, Credit 5 (offered every year) (W, S)

SCHT-305  Chemical Specialty (Spectrometry)  Registration #1015-305  
Quantitative analysis including trace analysis by spectrometric 
methods involving visible, infra-red, ultra-violet and atomic ab-
sorption. Techniques of sample preparation, spectral scanning 
and measurement using a variety of instruments. Interpretation of 
spectra.
Class 2, Lab. 6, Credit 4 (offered every year) (SR, F)

SCHT-306  Chemistry Specialty  Registration #1015-306  
The final academic quarter of the Chem Tec curriculum is de-
signed so that students are given the opportunity to develop more 
definite options as to their own individual goals. The student may 
elect to branch-off into one of three areas of specialization: ad-
vanced instrumental techniques, the development of synthetic 
techniques in organic chemistry and polymer technology.
Class 2, Lab. 6, Credit 4 (offered every year) (W, S)

SCHT-307, -308  Research Familiarization  Registration #1015-307,-308  
A chemical technician does exploratory work following general 
directions with little or no formal supervision and is often en-
couraged to innovate after consultation with his or her supervising 
chemist or engineer. In this context each student will have the 
opportunity to work alongside one of our faculty or graduate stu-
dents and perform a number of tasks related to the progress of a 
research operation. The choice of a faculty supervisor is left to the 
student.
Credit variable (offered every year) (307-F, SR)

SCHT-309  Glassblowing Techniques  Registration #1015-309  
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 appa-
ratus, annealing, use of a simple lathe and hand torch work.
Lab. 4, Credit 2 (offered every year) (F, SR)

Graduate Courses

SCHA-711  Instrumental Analysis  Registration #1008-711  
Theory, applications and limitations of instrumental methods in 
qualitative, quantitative, and structural analysis. Topics covered 
include fluorescence and phosphorescence, Raman, mass spec-
trometry, nuclear magnetic resonance, X-ray and radiochemistry, 
and electrochemistry. (SCHA-312)
Class 3, Credit 3 (offered every year) (F, W)

SCHB-702  Biochemistry  Registration #1009-702  
Introduction to biological chemistry. Chemical structures, reac-
tions and physiological functions of molecular components of 
cells: amino acids, sugars, lipids, nucleotides and selected bio-
polymer. Solution behavior, catalytic properties and structure of protiens and enzymes. (SCHO-433 or SCHO-232)
Class 3, Credit 3 (offered every year) (F)
SCHO-736 Spectrometric Chemical Identification of Organic Compounds
This course is concerned with the theory and application of nuclear magnetic resonance, infrared, mass spectrometry, and ultraviolet and visible absorption spectra as applied to organic structure determination. (SCHO-433)
Class 2 (offered every year)

SCHO-737 Advanced Organic Chemistry
Registration #1013-737
Several of the following advanced topics in organic chemistry are covered: polyfunctional compounds, modern synthetic methods, stereochemistry, conformational analysis, free radical reactions; natural and synthetic polymers. (SCHO-433)
Class 3, Credit 3 (offered every year)

SCHO-738 Systematic Identification of Organic Compounds
Registration #1013-738
The laboratory utilizes systematic chemical and spectral tests to deduce the structure of organic compounds. (SCHO-433)
Class 2 (offered every year)

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 and SCHP-443. Note: SCHO-737 is recommended but not required)
Class 3, Credit 3 (offered every year)

SCHO-832 Spectroscopy of Organic Compounds
Registration #1013-832
Advanced treatment of steric relationships and stereoisomerism in organic compounds. (SCHO-433, SCHP-443)
Class 3, Credit 3 (offered upon sufficient request)

SCHO-833 Heterocyclic Chemistry
Registration #1013-833
The preparation, properties, and reactions of heterocyclic systems, especially heteroaromatic rings. (SCHO-433)
Class 3, Credit 3 (offered upon sufficient request)

SCHO-835 Organic Chemistry of Polymers
Registration #1013-835
Introduction to the chemistry of synthetic, high molecular weight polymers and a survey of their diverse structures and properties. Mechanisms of condensation, free radical and ionic polymerization. (SCHO-433)
Class 3, Credit 3 (offered in alternate years)

SCHP-741 Chemical Thermodynamics
Registration #1014-741
A study of the basic fundamentals of thermodynamics and their use in deriving the interrelationships of thermodynamic functions. Thermodynamic properties of gases will be calculated based on spectroscopic data. (SCHP-443 and SMAM-307)
Class 3, Credit 3 (offered every year)

SCHP-742 Survey of Physical Chemistry
Registration #1014-742
This course will present principles of physical chemistry to students who have an interest in the health related sciences. Molecular structure, thermodynamics and kinetics will be discussed with a view to their biological applications. (SCHG-217, SCHO-232)
Class 3, Credit 3 (offered upon sufficient request) Not acceptable for M.S. in Chemistry.

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 3, Credit 3 (offered alternate years)

SCHP-744 Quantum Mechanics
Registration #1014-744
Matrix formulation of quantum mechanics, variations and perturbation methods, the uncertainty relations, particle in a box, tunneling, harmonic oscillator, angular momentum and magnetic resonance, the hydrogen atom and more complex atoms. (SCHP-443)
Class 3, Credit 3 (offered alternate years)

SCHP-745 Quantum Chemistry
Registration #1024-745
Application of quantum mechanics to problems of chemical interest. Group theory; calculations of vibrational frequencies and selection rules for complex molecules; molecular orbital energies of complex molecules. (SCHP-744)
Class 3, Credit 3 (offered upon sufficient request)

SCHP-746 Physical Chemistry of Polymers
Registration #1014-746
Study of the theoretical and experimental aspects of polymer characterization. In addition, theoretical considerations of the configuration of polymer chains and statistical thermodynamics of polymer solutions will be related to experimental results. (SCHP-443)
Class 3, Credit 3 (offered upon sufficient request)

SCHP-747 Principles of Magnetic Resonance
Registration #1014-747
A development of the principal ideas of magnetic resonance including the theory of resonance line shapes, magnetic interactions, experimental considerations, and spectral analysis. These concepts are discussed in terms of nuclear magnetic, nuclear quadrupole, and electron spin resonance spectroscopy. (SCHP-443)
Class 3, Credit 3 (offered upon sufficient request)

Mathematics
SMAC-365 Combinatorial Mathematics
Registration #1022-365
An introduction to the mathematical theory of combination, arrangement and enumeration of discrete structures. Emphasis is on structural, not quantitative, aspects of problems. Topics include enumeration, recursion, inclusion-exclusion, blockdesigns, Polya counting theory. (SMAM-265)
Class 4, Credit 4 (offered every year) (S)

SMAC-465 Linear Programming
Registration #1022-465
A presentation of the type of problem to be solved. A review of pertinent matrix theory including convex sets and systems of linear inequalities. The simplex method of solution, artificial bases, duality, parametric programming. Applications. (SMAM-431)
Class 4, Credit 4 (offered upon sufficient request)

SMAC-466 Integer Programming
Registration #1022-466
The optimization of functions of integers, theory and practice of branch and bound, implicit enumeration, cutting plane duality and related solution techniques, heuristics, applications. (SMAC-465)
Class 4, Credit 4 (offered upon sufficient request)

SMAC-467 Theory of Graphs and Networks
Registration #1022-467
The basic theory of graphs with applications to problems in transportation, communications and computer networks. Mathematical techniques for analysis of design, performance, and reliability of network structures modeled by graphs. (SMAM-265 or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request)
SMAC-565 Game Theory
Registration #0022-565
Introduction to the theory of games with solution techniques and applications. Graphs, matrix games, linear inequalities and programming, convex sets, the minimax theorem, n-person games, Pareto optimality (SMAM-431 or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request)

SMAC-566 Non-Linear Optimization Theory
Registration #0122-566
The theory of optimization of non-linear functions of several real variables. 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-432 and SMAM-305)
Class 4, Credit 4 (offered upon sufficient request)

SMAM-201, 202, 203 Algebra, Trigonometry and Analytic Geometry
Registration #0106-201, 202, 203
A sequence of courses covering essential skills and concepts in such topics as solutions of equations, graphing, exponents and radicals, logarithms, trigonometric functions and applications, vectors, determinants, inequalities and conic sections.
Class 3, Credit 3 (offered every year) (201-F, 202-W, 203-S)

SMAM-204 College Algebra
Registration #0106-204
Topics include a review of the fundamentals of algebra; solution of linear, fractional and quadratic equations; functions and their graphs; polynomial, exponential, logarithmic and circular functions; systems of linear equations.
Class 4, Credit 4 (offered every year) (F)

SMAM-210, 211 Freshman Seminar
Registration #0106-210, 211
An orientation program for entering mathematics majors to give them information and guidance concerning the various aspects of mathematics and the numerous programs from which they may choose.
Class 1, Credit 1 (offered every year) (210-F, 211-W)

SMAM-214, 215 Introductory Calculus
Registration #0106-214, 215
A standard first course in calculus intended for students majoring in mathematics, science or engineering with the major emphasis placed on understanding the concepts and using them to solve a variety of physical problems. The subject matter is divided as follows:
214: Functions and graphs, polynomial, exponential, logarithmic and circular functions. (SMAM-204)
215: Derivatives, chain rule, related rates, maxima and minima.
Class 3, Credit 3 (offered every year) (214-F, W; 215-S)

SMAM-216, 217 Mathematics of Business and Finance
Registration #0106-216, 217
An introduction to selected topics from those areas of mathematics used extensively in business and finance applications. These topics are useful to any students interested in their personal finances or the operation of a small business.
216: Lines, curves, break-even analysis, interest, cash flow, annuities, business applications and matrices, operations with matrices, systems of linear equations.
217: Optimizing business applications with linear programming methods, Simplex method, transportation and assignment problems, non-rigorous introduction to the derivative, modeling, optimization of applications through differentiation including profit-revenue-cost problems. (SMAM-204 or equivalent)
Class 3, Credit 3 (offered every year) (216-W, S; 217-S)

SMAM-221, 222, 223 College Mathematics
Registration #0106-221, 222, 223
A survey of selected topics from college algebra, trigonometry, analytic geometry and differential and integral calculus generally useful for laboratory technicians. The emphasis is placed on understanding of concepts, problem solving and graphs. The topics are divided roughly as follows:
221: Algebra (exponential, log & trig functions; linear equations, curve fitting and special graph papers)
222: Basic integral calculus with applications
223: Basic integral calculus with applications
Class 4, Credit 4 (offered every year) (221-F, 222-W, 223-S)

SMAM-251, 252, 253 Calculus
Registration #0106-251, 252, 253
A standard first course in calculus intended for students majoring in mathematics, science or engineering with the major emphasis placed 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, function limits, the derivative and its formulas (in terms of algebraic functions). Applications of the derivative, introduction to anti-differentiation. Numerical integration.
252: The transcendental functions. Anti-derivatives by various methods. The definite integral applications to area, work, etc. Numerical integration.
253: Parametric equations, polar coordinates, more techniques of anti-differentiation, improper integrals, indeterminate forms. Application of integrals to volumes, moments. Infinite series.
Class 4, Credit 4 (offered every year) (251-F, W; 252-W, S; 253-S.F)

SMAM-265 Foundations of Discrete Mathematics
Registration #0106-265
A study of several discrete mathematics topics with careful attention to the underlying concepts and developments. Topics include: logic, proofs, switching circuits, sets, Well-Ordering Principle, Mathematical Induction Theorem, relations, equivalence classes, functions, one-to-one, onto, permutations, discrete functions, counting principles, combinations, elementary probability, two-dimensional geometric linear programming.
Class 4, Credit 4 (offered every year) (S)

SMAM-305 Calculus
Registration #0106-305
A continuation of SMAM-253 treating partial derivatives, multiple integrals, 3-dimensional analytic geometry and vector algebra. (SMAM-253)
Class 4, Credit 4 (offered every year) (F, W, SR)

SMAM-306 Differential Equations
Registration #0106-306
Class 4, Credit 4 (offered every year) (W, S)

SMAM-307 Differential Equations
Registration #0106-307
Class 4, Credit 4 (offered every year) (S)

SMAM-308 Engineering Mathematics
Registration #0106-308
Topics will be chosen from among matrix algebra, vector analysis and applications of boundary-initial value problems to suit students' academic discipline. (SMAM-306)
Class 4, Credit 4 (offered every year) (S)
SMAM-309 Statistics Registration #1016-309
Handling of statistical data; measures of central tendency and dispersion; sample space, events; probability and its basic laws; conditional probability; basic rules of counting; binomial, geometric, Poisson and normal distributions; sampling distributions; estimation of population mean; t-distributions; testing of hypothesis concerning the mean and difference between means. Use of chi-square in testing statistical independence and in estimating variance. (SMAM-203 or equivalent)
Class 4, Credit 4 (offered every year) (W, S)

SMAM-351, 352 Introduction to Probability and Statistics Registration #1016-351, -352
In order to cover continuous probability; random variables; probability, density, and distribution functions. Measures of central tendency and dispersion. Sampling theory; confidence limits; correlation. (SMAM-253)
Class 4, Credit 4 (offered every year) (351-F, S, SR; 352-W, S)

SMAM-361 Mathematical Modeling Registration #1016-361
The course will emphasize problem solving, formulation of the mathematical model from physical considerations, solution of the mathematical problem, testing the model and interpretation of results. Problems will be selected from the physical sciences, engineering, economics. (SMAM-352, SMAM-306)
Class 4, Credit 4 (offered every year) (S)

SMAM-410 Advanced Calculus Registration #1016-410
Topics from Fourier Series, orthogonal functions, special functions, and asymptotic expansions. This course gives an introduction to function spaces and approximating solutions of certain differential equations by given classes of orthogonal functions. Additional topics may be chosen to suit special needs of students. (SMAM-360 or SMAM-308)
Class 4, Credit 4 (offered every year)

SMAM-411, 412 Real Variables Registration #1016-411, -412
Functions of one and several variables are considered, with the basic concepts of sequences, series, continuity, differentiation, and integration studied in depth. Included are the Heine-Borel, Mean Value, Taylor, and implicit function theorems. (SMAM-305 and either 265 or permission of the instructor)
Class 4, Credit 4 (411-F, W; 412-S, SR) (offered alternate years)

SMAM-420 Complex Variables Registration #1016-420
A study of the complex number system and preliminary items leading to the concepts of an analytic function. Integrals of complex functions, Cauchy integral theorem, Cauchy integral formulas. If time allows, topics such as Taylor and Laurent series, singularities, residues, conformal mapping, and special transformations are discussed. (SMAM-305)
Class 4, Credit 4 (offered every year) (F, W)

SMAM-431 Matrix Algebra Registration #1016-431,
A first course in the algebra of matrices and n-tuple vectors over the complex numbers. Topics include addition, multiplication, transposes and inverses of matrices; symmetric and triangular matrices; partitioning; solution of Ax=b; Gauss algorithm, residual and error, partial pivoting, ill-conditioning, iterative techniques; elementary matrices; echelon form; determinants; eigenvalues and eigenvectors; real symmetric matrices and diagonalization.
Class 4, Credit 4 (F, W, S) (offered every year)

SMAM-432 Linear Algebra Registration #1016-432
Topics will be pursued to a greater depth, with more emphasis on theory than in Matrix Algebra. Topics include: R^n, C^n and function spaces; subspaces; spanning sets; linear independence and dependence; basis; dimension; inner products; Gram-Schmidt orthogonalization; linear transformations; representation relative to ordered bases; change of basis; similarity; eigenvalues and eigenvectors; diagonalization; Hermitian matrices; Jordan forms; unitary matrices; quadratic forms; principal axis theorem. (SMAM-431)
Class 4, Credit 4 (S, SR) (offered every year)

SMAM-501, 502 Advanced Differential Equations Registration #1016-501, -502
A study of first order, linear higher order and systems of differential equations including such topics as existence, uniqueness, properties of solutions, Green’s functions, Sturm-Liouville systems and boundary value problems. (SMAM-307)
Class 4, Credit 4 (offered upon sufficient request) (501-F, W; 502-S, SR)

SMAM-511, 512 Numerical Analysis Registration #1016-511, -512
Class 4, Credit 4 (offered alternate years) (511-F, W; 512-S, SR)

SMAM-521, 522 Probability Theory Registration #1016-521, -522
Selected topics in applied probability and statistics to meet the needs and interest of the students. (SMAM-305, SMAM-352 or permission of instructor)
Class 4, Credit 4 (offered upon sufficient request) (521-F, W; 522-S, SR)

SMAM-531, 532 Abstract Algebra Registration #1016-531, -532
Groups, subgroups, cyclic and permutation groups, Lagrange’s theorem, quotient groups, isomorphism theorems, applications to scientific problems. 532: The basic theory of rings, integral domains, ideals and fields, polynomial rings, quotient structures, finite Galois fields GF(p^n), applications to coding theory, abstract vector spaces, function spaces, direct sums, applications to differential equations, applications to scientific problems.
Class 4, Credit 4 (531-F, W; 532-S, SR) (offered every year)

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) (F, W)

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-205, SMAM-412)
Class 4, Credit 4 (offered upon sufficient request) (S, SR)

SMAM-559 Special Topics—Mathematics Registration #1016-559
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. These courses will be structured as ordinary courses and will have prerequisites, contact hours, and examination procedures specified in advance.
Class variable, Credit variable (offered upon sufficient request)
SPAM-561, 562 Complex Variables
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's and Laurent's series; singularities; residues; analytic continuation; conformal mapping. A more in-depth study of analytic function theory than SMAM-420. (SMAM-305)
Class 4, Credit 4 (offered upon sufficient request) (561 - F, W; 562 - S, SR)

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) (571 - F, W; 572 - S, SR)

SMAM-599 Independent Study—Math
Registration #1016-599
Faculty directed study of appropriate topics on a tutorial basis.
This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.
Class variable, Credit variable (offered every year)

SMAM-620 The Fourier Transform
Registration #1016-620
This course provides an introduction to an important mathematical tool for the analysis of linear systems. Topics covered are: a Fourier integral theorem; the Fourier transform and its inverse; an introduction to generalized functions; the Dirac delta function; evaluating transforms; convolution; partial products; the sampling theorem; Rayleigh, power, convolution, and auto-correlation theorems; the discrete Fourier transform; the fast Fourier transform. (SMAM-420)
Class 4, Credit 4 (offered every year) (S)

SMAT-420 Introduction to Solution of ODE
Registration #1019-420
Application of algebra and trigonometry to solution of engineering problems. Development and application of differential calculus to electromechanical problems. Introduction to integration.
Class 4, Credit 4 (offered every year) (F, W)

SMAT-421,422 Solution of Engineering Problems I, II
Registration #1019-421, -422
Application of principles of mathematics and physics to the solution of engineering and technical problems. To include the principles of calculus applied to solutions of problems in mechanics, thermodynamics, electric circuits, and vibrations.
Class 4, Credit 4 (offered every year) SMAT-421 (F, W, S); SMAT-422 (W, S, SR)

Physics

SPSP-200 Physics Orientation
Registration #1017-200
Introduction to physics as a profession and opportunities for physicists in inter-disciplinary efforts. Introduction to the literature of physics.
Class 1, Credit 0 (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.
Class 2, Lab. 2, Credit 3 (offered upon sufficient request) (W, S)

SPSP-205, 206, 207 General Physics
Registration #1017-205, -206, -207
General physics for engineering and computer science majors. Mechanics, heat, sound, electricity and magnetism, making moderate use of calculus. (Co-registration or credit in SMAM-252, or SMAM-253) (See SPSP-275, 276, 277 for laboratory)
Class 3, Credit 3 (offered every year) (205-W; 206-S; 207-F)

SPSP-211, 212, 213 College Physics
Registration #1017-211, -212, -213
An elementary course in college physics. Mechanics, heat, sound, light, and electricity and magnetism, with some elements of modern physics. (SMAM-203 or SMAM-223) (See SPSP-271, 272, 273 for laboratory)
Class 3, Credit 3 (offered every year) (211 - F, 212-W, 213-S)

SPSP-214, 215, 216 Physics for Graphic Arts
Registration #1017-214, -215, -216
An introductory course in college physics covering the fundamentals of mechanics, heat, sound, light, electricity and magnetism, and some modern physics, with emphasis on topics having application in the printing industry. (SMAM-203) (See SPSP-217, 218, 219 for laboratory)
Class 3, Credit 3 (offered every year) (214-F, 215-W, 216-S)

SPSP-217, 218, 219 Physics for Graphic Arts Lab
Registration #1017-217, -218, -219
The labs for these courses will include exhibits related to the principles and theories discussed in the corresponding lectures. (SPSP-214, 215, 216)
Lab. 2, Credit 1 (offered every year) (F, W, S)

SPSP-271, 272, 273 College Physics Lab
Registration #1017-271, -272, -273
The labs for these courses will include experiments related to the principles and theories discussed in the corresponding lectures. (SPSP-211, 212, 213)
Lab. 2, Credit 1 (offered every year) (F, W, S)

SPSP-275, 276, 277 General Physics Lab
Registration #1017-275, -276, -277
The labs for these courses will include experiments related to the principles and theories discussed in the corresponding lectures. (SPSP-205, 206, 207)
Lab. 2, Credit 1 (offered every year) (F, W, S)

SPSP-301 Electronics for Technologists
Registration #1017-301
A laboratory-oriented course to provide the science or technology student with a basic understanding of electronics and instrumentation. Particular emphasis is placed on systems encountered in chemical laboratories. (SPSP-213)
Class 1, Lab. 6, Credit 3 (offered every year) (W, S)

SPSP-311, 312, 313 University Physics
Registration #1017-311, -312, -313
An intensive course in general physics, using calculus, for majors in the sciences. Also open to engineering majors. Mechanics, heat, sound, electricity and magnetism, and light. (Co-registration or credit in SMAM-252 or SMAM-253)
Class 4, Credit 4 (offered every year) (311 - F, W; 312-W, S; 313-S, F)

SPSP-314, 315 Introduction to Modern Physics
Registration #1017-314, -315
An introductory course in modern physics at the sophomore level. Fundamentals of relativity, atomic phenomena, introduction to quantum physics, elementary wave mechanics, nuclear physics, statistical mechanics, and solid state physics. (SMAM-305, SPSP-207, or SPSP-313)
Class 4, Credit 4 (offered every year) (314-W; 315-S)

SPSP-319 Electrical Processes in Solids
Registration #1017-319
Electronic properties of conductors and semiconductors, junction characteristics, operating principles of solid state devices. Theory and application. (SPSP-315 or permission of instructor)
Class 4, Credit 4 (offered every year) (W, S)
SPSP-321 Introduction to Laboratory Techniques
Registration #1017-321
A C. circuits, the oscilloscope, vacuum systems.
Class 2, Lab. 3, Credit 4 (offered every year)

SPSP-331 Introduction to Electricity and Electronics
Registration #1017-331
Fundamentals of electricity, construction and measurements of electrical and electronic circuits encountered in a scientific laboratory.
Class 4, Lab. 3, Credit 5 (offered every year) (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 science at the college level.)
Class 2, Credit 2 (offered upon sufficient request) (F, W)

SPSP-351, 352, 353 Radiation Physics
Registration #1017-351, -352, -353
The physics of nuclear radiation and the electronics used in its detection and monitoring. Application of radioactivity to nuclear medicine. (SPSP-213, SMAM-223 required; SMAM-309 recommended)
Class 4, Lab. 3, Credit 5 (offered every year) (351-F; 352-W; 353-S)

SPSP-371, 372, 373 University Physics Lab
Registration #1017-371, -372, -373
Lab for these courses will include experiments related to the principles and theories discussed in the corresponding lectures (SPSP-311, 312, 313)
Lab. 3, Credit 1 (offered every year) (F, W, S)

SPSP-380 Theoretical Physics I
Registration #1017-380
Introduction to the theoretical concepts and techniques used in the description of physical phenomena: fields, periodic phenomena, quantization, etc. (SPSP-314, SMAM-306)
Class 3, Credit 3 (offered every year) (S)

SPSP-401, 402 Intermediate Mechanics
Registration #1017-401, -402
Particle dynamics, systems of particles, motion of a rigid body, gravitational fields and potential, moving coordinate systems, generalized coordinates, Lagrange's equations, mechanics of continuous media. (SMAM-306, SPSP-313)
Class 4, Credit 4 (offered every year) (401-F; 402-S)

SPSP-411, 412 Electricity and Magnetism
Registration #1017-411, -412
Electric and magnetic fields using vector methods, Gauss's law, theory of dielectrics, Ampere and Faraday laws, vector potential, displacement current, Maxwell's equations. (SMAM-308, SPSP-401)
Class 4, Credit 4 (offered every year) (411-F; 412-S)

SPSP-415 Thermal Physics
Registration #1017-415
Fundamental principles of classical thermodynamics, kinetic theory, statistical mechanics, and low temperature physics. Applications to physical problems. (SMAM-306, SPSP-313)
Class 4, Credit 4 (F-alternate years)

SPSP-421, 422 Experimental Physics
Registration #1017-421, -422
Advanced laboratory work in physics, with experiments selected from one or more of the following branches of physics: mechanics, acoustics, heat, electro-magnetism, and physical optics. (SPSP-313 plus co-registration or credit in any one of these: SPSP-401, 411, 415, 455)
Class 1, Lab. 3, Credit 2 (offered every year) (421-F, 422-S)

SPSP-431, 432 Electronic Measurements
Registration #1017-431, -432
Laboratory course in electronic measurements and instrumentation, with theory and applications of discrete and integrated circuits in analog and digital electronics. (SPSP-313, SPSP-321)
Class 2, Lab. 3, Credit 3 (431-F, 432-W)

SPSP-455 Optical Physics
Registration #1017-455
Introduction to wave phenomena as applied to the electromagnetic spectrum. Interaction of radiation with matter. (SMAM-305, SPSP-313)
Class 4, Credit 4 (F-alternate years)

SPSP-501 Theoretical Physics II
Registration #1017-501
Application of advanced, mathematical methods to physics. (SMAM-308 plus co-registration or credit in SPSP-401 and SPSP-411)
Class 4, Credit 4 (offered every year) (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. (SMAM-307, SPSP-421)
Lab. 6, Credit 2 (offered every year) (F)

SPSP-531, 532 Solid State Physics
Registration #1017-531, -532
The structure of solids and their mechanical, thermal, electrical, and magnetic properties. (SMAM-307, SPSP-552)
Class 4, Credit 4 (offered upon sufficient request) (531-S, 532)

SPSP-541, 542, 543 Physics Research
Registration #1017-541, -542, -543
Faculty directed student projects or research usually involving laboratory work and/or calculations that could be considered of an original nature.
Class variable. Credit variable, (offered every year)

SPSP-550 Physics Seminar
Registration #1017-550
Discussions of contemporary developments in physics. Special emphasis on technical literature search, preparation and presentation of technical papers. (Senior physics majors.)
Class 1, Credit 1 (offered every year) (F)

SPSP-552 Introduction to Quantum Mechanics
Registration #1017-552
Elements of relativistic mechanics and of wave mechanics, quantum theory, Schrodinger's equation and its solutions, atomic spectra and atomic structure. (SPSP-501; SPSP-315 or permission of instructor)
Class 4, Credit 4 (offered every year) (F)

SPSP-553 Nuclear Physics
Registration #1017-553
A study of the structure of the atomic nucleus as determined by experiment and theory. Description and quantum mechanical analysis of nuclear properties, radioactivity, and nuclear reactions. (SPSP-552)
Class 4, Credit 4 (offered every year) (S)

SPSP-559 Special Topics—Physics
Registration #1017-559
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses are structured as ordinary courses and have specified prerequisites, contact hours, and examination procedures. Topics could include: introductory statistical mechanics; plasma physics; general relativity; linear integrated circuits; cryogenics; radio astronomy; history of physics; astro-physics; astronomy.
Class variable, Credit variable (offered upon sufficient request)
Clinical Sciences

SHPG-204 Communication Skills for Registration #1026-204 Clinical Sciences
Designed to increase skill in recording, describing, and interpreting biological procedures, observations and concepts. Emphasis will be placed on clarity and precision of expression as well as principles of good English. (GLUC-220)
Class 1, Credit 1 (W, S)

SHPG-301 Medical Terminology Registration #1026-301
Emphasizes etymology, definition, pronunciation and correct utilization of medical terms to develop a vocabulary essential to the understanding of and communication with the various health areas in which allied health professional will serve. (SBIO-306)
Class 3, Credit 3 (offered every year) (F)

SHPM-401 Immunohematology Registration #1024-401
Composition of blood, blood groups and the immunology of blood substances. The genetics of blood groups with reference to practical applications in medical laboratory procedures. The structures of antigens and antibodies and the mechanics of antigen-antibody reactions will be stressed. Lab procedures will demonstrate antigen-antibody reactions and compatibility testing of various blood groups. (SBIO-306)
Class 3, Lab 3, Credit 4 (F)

SHPM-405 Diagnostic Bacteriology and Mycology Registration #1024-405
Study of bacteria and fungi that cause human disease. Lecture and laboratory subjects include microorganism growth, isolation, identification, antibiotic sensitivity, and related human immunological and serological responses. (SBIC-404)
Class 3, Laboratory 3, Credit 4 (W)

SHPM-410 Hematology Registration #1024-410
Descriptions of normal and abnormal human red and white blood cells. Study of the structure of hemoglobin, chemical and physical properties of blood cells, hemostasis, and coagulation mechanism. Laboratory testing procedures used for the diagnosis of anemias, leukemias, and coagulation disorders. (SBIO-306)
Class 3, Lab 3, Credit 4 (S)

SHPM-432 Registration #1024-432
Biological Laboratory Techniques I Principles of clinical laboratory instruments in the analysis of body fluids. This quarter stresses the principles of instrumental methods of analysis including visible and ultraviolet, spectrophotometry, fluorometry, flame photometry, atomic absorption photometry, chromatography, electrophoresis, radioimmunoassay, radiation counters, and automated chemical analyzers. (SCHG-217, or equivalent, SBIO-306)
Class 2, Lab 6, Credit 4 (F, W)

SHPM-433 Biology Laboratory Techniques II Registration #1024-433
Biological Laboratory Techniques II Principles of clinical chemistry in the analysis of the chemical component of body fluids. This quarter stresses the basic chemistries underlying the classical methodologies and relates them to the diagnostic laboratory. 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, SBIO-306)
Class 2, Lab 6, Credit 4 (S)
SHPN-514 Instrumentation in Nuclear Medicine* Registration #1025-514
Combined laboratory/practicum in instrumentation in a nuclear medicine laboratory. Laboratories include use of attachment detecting equipment including scintillation camera and use of computers in nuclear medicine. Practicum is used to reinforce laboratories. (Prerequisite: Fourth year standing in NMT program) Credit 3 (All year)

Graduate Courses

Master of Science in Clinical Chemistry

SHPC-820 Advanced Clinical Chemistry I Registration #1023-820
Toxicology, therapeutic drug monitoring, electrolytes acid-base, vitamins, oncology, hepatitis, coagulation, and various standard methods. (Permission of instructor)
2 hr lecture, 2 hr seminar, credit 3
On a rotating basis Ad. Clin. Chem I, II, III will be offered two courses per year, one in the fall, another in the spring, and the third the following fall. They are independent courses that may be taken in any sequence.
820 will be offered in S 1981; F 1982

SHPC-810 Advanced Clinical Chemistry Laboratory I Registration #1023-810
Comparison of current methods for analysis of toxicity samples-gas-liquid chromatography, radioimmunoassay, enzyme multiplied immunoassay. (Permission of instructor, class size limited to 12)
Lab 4, Credit 1 (offered concurrently with SHPC-820)

SHPC-821 Advanced Clinical Chemistry II Registration #1023-821
Proteins, enzymes, hemoglobins, iron, renal function, lipids, quality control, automation, and method selection. (Permission of instructor)
2 hr lecture, 2 hr seminar, credit 3 (F 1981; S 1983)

SHPC-811 Advanced Clinical Chemistry Laboratory II Registration #1023-811
Comparison of current methods for separation and determination of enzymes. (Permission of instructor, class size limited to 12)
Lab 4, Credit 1 (concurrent with SHPC-821)

SHPC-822 Advanced Clinical Chemistry III Registration #1023-822
Radioimmunoassay, hormones, fetal-placement unit, integration of laboratory data. (Permission of instructor)
2 hr lecture, 2 hr seminar, Credit 3 (fall 1980, spring 1982)

SHPC-812 Advanced Clinical Chemistry Laboratory III Registration #1023-812
Methods for the development, improvement, and trouble shooting of radioimmunoassay analyses. (Permission of instructor, class size limited to 12)
Lab 4, Credit 1 (concurrent with SHPC-822)

SHPC-859 External Clinical Chemistry Research Registration #1023-859

SHPC-879 Clinical Chemistry Research Registration #1023-879
Credit 1-16

SHPC-899 Independent Study Registration #1023-899
Credit variable

SHPC-712 Statistics and Quality Control Registration #1023-712
Principles of statistics as they apply to biomedical sciences and to clinical laboratory analyses. Illustrative examples will involve clinical laboratory data. Probability, normal distributions, analysis of variance sampling, normal values, quality control, applications in patient care, hypothesis testing.
Class 3, Credit 3 (Spring of even-numbered years)

SHPC-870 Clinical Chemistry Seminar Registration #1023-870
Credit 1

SHPC-872 Special Topics in Clinical Science Registration #1023-872
In response to student and/or faculty interest, special courses which are of current interest and/or logical continuations of regular courses will be presented. These courses will be structured as ordinary courses with specified prerequisites, contact hours and examination.
Class variable, Credit variable

SHPC-722 Clinical Laboratory Computer Applications Registration #1023-722
Data processing overview and terminology, hospital computer utilizations, evaluation of the need for computers in the laboratory, design of laboratory and hospital systems, evaluation-selection-installation of computer systems, legal aspects of biomedical data processing, instrument interfacing.
Class 3, Credit 3 (Winter of even-number years, e.g., 80-81)

SHPC-712 Statistics and Quality Control Registration #1023-712

SHPC-722 Clinical Laboratory Computer Applications Registration #1023-722

*Offered every year.
Institute College

Department of Instructional Technology

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

Audiovisual Communications

ICIC-401 Message Design Registration #0612-401 Reviews perception and media formats as they may be applied to the design of instructional communications. Examines social psychological principles as they relate to attitude change and motivation in learners. Students use design principles and structure messages for different media forms. Required for all students. Credit 4

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

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

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

ICIC-423 Producing Audiovisual Presentations III Registration #0612-423 Similar to ICIC-421 and 422 but with production of presentations using other media in addition to slide/tape. Characteristics of various presentation media are emphasized along with the hardware and software available for various media. (ICIC-421,422) For nonmajors. Credit 4

ICIC-440 Audiovisual Program Design I Registration #0612-440 Students learn how to develop audiovisual materials by using systematic development procedures. The design model for the development of instructional training materials and the media elements that comprise them focuses on process and analytic skills such as the writing of behavioral objectives and developmental testing. Mastery of skills and techniques rather than theory is emphasized. Required for all students. Credit 4

ICIC-450 Audiovisual Program Design II Registration #0612-450 The systems approach to audiovisual program design is further developed and used as a basis for a systematic, four-stage process of program identification, design, development, and dissemination. Students design, produce, and validate an instructional product by utilizing this systems model. Required for all students. (ICIC-440) Credit 4

ICIC-460 Selection, Storage, and Dissemination of Media Resources Registration #0612-460 Reviews methods of searching for, selecting and evaluating visual information and nonprint materials such as films, filmstrips, videotapes, audiotapes. Covers location of pictorial material in primary and secondary sources and current copyright restrictions governing its use. Also covers proper storage and distribution methods for these materials. Credit 3

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

ICIC-490 Audio Techniques Registration #0612-490 Students review principles of sound recordings and produce audiotapes in a variety of situations. Course includes both practical and theoretical aspects of studio and field recording, selection of equipment, acoustical considerations and the electronics related to audio recording. (ICIC-489 or equivalent) Credit 4

ICIC-500 Practicum in a Special Interest Area Registration #0612-500 Allows a student to explore or develop a special competence in an area of special interest and to work with “clients” in real or simulated work environments. A proposal (guidelines available from the department) must be submitted prior to registration. For audiovisual communications majors only. Credit variable (1-4)

ICIC-501 Practicum in Audiovisual Program Design Registration #0612-501 Allows a student to explore or develop a special competence in audiovisual program design and to work with “clients” in real or simulated work environments. A proposal (guidelines available from the department) must be submitted prior to registration. For audiovisual communications majors only. Credit variable (1-4)

ICIC-502 Practicum in Audiovisual Management Registration #0612-502 Allows a student to explore or develop a special competence in audiovisual management and to work with “clients” in real or simulated work environments. A proposal (guidelines available from the department) must be submitted prior to registration. For audiovisual communications majors only. Credit variable (1-4)

ICIC-503 Practicum in Audiovisual Production Registration #0612-503 Allows a student to explore or develop a special competence in advanced production and work with “clients” in real or simulated work environments. A proposal (guidelines available from the department) must be submitted prior to registration. For audiovisual communications majors only. Credit variable (1-4)

ICIC-510 Writing for Audiovisual Programs Registration #0612-510 Emphasizes the principles of script writing for verbal and visual continuity, clarity, and impact. Considers the audience and purpose for which the script is being written. ( stigma medium and styles of writing. Required for all students. Credit 4

ICIC-550 Management of Audiovisual Programs Registration #0612-550 Covers organizational strategies, management practices, budgeting and fiscal control, personnel recruitment, selection, training, and supervision, resource center operation and organization. Credit 4
The School of Computer Science and Technology offers courses that are offered at least once annually, except as noted. Undergraduate Courses

Service Courses

Service courses are offered by the School of Computer Science and Technology for specific departments. These courses may not be taken by Computer Science and Technology majors.

ICSP-205 Computer Techniques

Registration #0601-205
 Students will be introduced to computer systems, problem-solving techniques, and the FORTRAN programming language. Programming projects will be required.

Class 3, Credit 3

ICSP-216 Program Design and Validation/FORTRAN

Registration #0601-216
 Program Design, including specification, structured development, advanced data types, procedures and functions, program validation and verification and FORTRAN and its use in graphics programming. Programming projects will be required. (ICSP-208)

Class 4, Credit 4

ICSP-220 FORTRAN Programming for Engineers

Registration #0601-220
 Topics include an introduction to computer systems, problem-solving techniques and the FORTRAN programming language. Scientific and engineering applications will be emphasized. Programming projects will be required. (EEEE-201)

Class 4, Credit 4

ICSP-300 Principles of COBOL Programming

Registration #0601-300
 A study of elementary COBOL programming, utilizing structured programming/design methodology and supported by an overview of appropriate data management concepts. COBOL topics covered include program organization, input/output operations with sequential files and basic program control, arithmetic operations and report editing, program logic using the IF statement, control break processing, table handling and additional statements as time permits. Students will write programs which adhere to specific programming standards. (ICSS-200)

Class 4, Credit 4

ICSP-302 Computer Applications in Engineering Problems

Registration #0601-302
 Introduction to programming using the FORTRAN programming language.

Class 1, Credit 1

ICSP-303 Survey of Computer Science

Registration #0603-300
 Topics include problem-solving techniques, an introduction to the BASIC programming language, fundamental hardware concepts and the impact of computers on society. Additional topics relevant to the student’s major will also be included such as more BASIC programming, prepackaged software, business and printing systems. The course is modular in nature.

Class 4, Credit 4
ICSS-370, 371 Computer Graphics in Filmmaking
Registration #0603-370, 371
This course will introduce the filmmaking student to the applica­
tion of computer graphics in filmmaking. Concentration will be on
the use of a graphical software package, computer animation,
applications in the production of logos and short narrative film
sequences and the computer as an artistic dimension. Computer
animated film projects will be required.
Class 4, Credit 4 (Offered upon sufficient demand)

Computer Science Courses
Computer Science and Technology courses may be taken as
Computer Science electives except as noted.
ICSP-208 Introduction to Programming
Registration #0601-208 Fundamentals of programming using a structured programming
language. Topics include methods, algorithm development,
elementary data types, expression evaluation,
use of basic control structures and subprograms. Program­
mings projects will be required. (ICSP-208)
Class 4, Credit 4

ICSP-210 Program Design and Validation
Registration #0601-210 Program design, including specification, structured development,
advanced data types, procedures and functions, program valida­
tion and verification; programming paradigms, including basic
internal sorting and searching algorithms. Programming projects
will be required. (ICSP-208)
Class 4, Credit 4

ICSP-215 Programming Language—FORTRAN
Registration #0601-215 A study of FORTRAN programming techniques and applications.
Topics include data representation and expression evaluation,
logical operations, storage allocation, I/O manipulation, program
structures, subprograms and plotting. Programming projects will
be required. (ICSS-202)
Class 4, Credit 4

ICSP-301 COBOL Programming
Registration #0601-301 Topics include COBOL coding methods, data processing and
sequential file manipulation, table look-up, SORT and SEARCH
verbs, modular and structured programming, COBOL debugging
and editing facilities and establishment of documentation stan­
dards. Programming projects will be required. (ICSS-202) (Not
open to students in the Computer Systems Option)
Class 4, Credit 4

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

ICSP-306 Advanced Assembly Techniques
Registration #0601-306 A study of advanced techniques in assembly language program­
mig. Topics include macro definition and invocation, conditional
assembly, system macros and supervisor calls, program linkage,
reentrant and recursive programs and I/O programming at the
interrupt level. Programming projects will be required. (ICSS-315,
ICSS-325)
Class 4, Credit 4

ICSP-307 Business Applications Programming
Registration #0601-307 The mastery of the techniques and concepts of programming
within a business programming environment. Emphasis on algo­
rithmic solutions to business application problems, including
report generation, sorting and table processing and generation
and complex I/O processing. Project management, programming
teams and tooling and stubbing are used in the course. Structured
COBOL is used. Students will also program against a data base in a
host-embedded programming language. Laboratory emphasis.
(ICSS-325)
Class 4, Credit 4

ICSP-318 APL Programming Techniques
Registration #0601-318 and Applications
Topics include APL programming and style, function definition
and recursive programming, APL report formatting features, file
I/O subsystems, graphic I/O and scientific graphs, system applications. Programming projects will be required. (A high-level
programming language)
Class 4, Credit 4

ICSP-330 PL/I Programming
Registration #0601-330 A study of the syntax and semantics of a diverse set of high-level
programming languages. The similarities and differences of the
languages chosen are discussing in order to demonstrate general
principles of programming language design. Programming projects will be required. (A high-level programming language)
Class 4, Credit 4

ICSP-350 Programming Language Concepts
Registration #0601-350 A study of the syntax and semantics of a diverse set of high-level
programming languages. The similarities and differences of the
languages chosen are discussing in order to demonstrate general
principles of programming language design. Programming projects will be required. (A high-level programming language)
Class 4, Credit 4
ICSS-320  Data Structure Analysis
Registration #0603-320
Information structures: sequential lists, stacks, queues, sequential allocation; linked lists, circular lists, doubly linked lists, linked allocation; trees, tree traversal; lists, orthogonal lists, multilinked structures; dynamic storage allocation and garbage collection. Programming projects will be required. (Either ICSP-210 or ICSP-216 and ICSP-305)
Class 4, Credit 4

ICSS-325  Data Organization and Management
Registration #0603-325
Topics include an introduction to switching theory, sequential circuit analysis and synthesis, error detection, error correction networks, speed-up techniques, serial and parallel approaches, interface techniques and comparative studies of digital computer architectures. (ICSP-315)
Class 4, Credit 4

ICSS-340  Finite State Machines and Automata
Registration #0603-340
Topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis and synthesis, sequential iterative systems and space-time transformations. (ICSS-315)
Class 4, Credit 4

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

ICSS-360  Essentials of Computer Science
Registration #0603-360
Selected topics from ICSS-202, ICSP-208, ICSP-210 and ICSS-305 are presented. This course is required for students transferring into the School of Computer Science and Technology with previous programming experience. Open only to transfer students; not to be taken as a Computer Science elective.
Class 4, Credit 4

ICSS-400  Logical Design
Registration #0603-400
Topics include an introduction to switching theory, sequential circuit analysis and synthesis, error detection, error correction networks, speed-up techniques, serial and parallel approaches, interface techniques and comparative studies of digital computer architectures. (ICSP-315)
Class 4, Credit 4

ICSS-420  Data Communication Systems
Registration #0603-420
Data communication and telecommunication systems, including communication techniques, communication interfaces; common carrier implications and tariffs, exchanges; concentrators, multiplexers, front-end computers; buffering, response time and human factors; network cost and design analysis, software considerations. (SMAM-309 or SMAM-352 and third-year standing in Computer Science and Technology)
Class 4, Credit 4

ICSS-430  Numerical Methods
Registration #0603-430
Topics include introductory error analysis, roots of an equation, solution of systems of linear and non-linear equations, interpolation, power series calculation of functions, numerical integration and first-order ordinary differential equations. The computational aspects rather than mathematical development will be emphasized. Programming projects will be required. (Either SMAM-252 or SMAM-215 and a high-level scientific programming language)
Class 4, Credit 4

ICSS-440  Operating Systems
Registration #0603-440
A general survey of operating system concepts. Topics include process synchronization, interprocess communication, deadlock, multiprocessing and multiprocessor, processor scheduling and resource management, memory management, overlays, static and dynamic relocation, virtual memory, file systems, logical and physical I/O, device allocation, I/O processor scheduling, process and resource protection. (ICSS-315, ICSS-320)
Class 4, Credit 4

ICSS-480  Formal Languages
Registration #0603-480
Formal language theory and principles. Topics include context free, context sensitive grammars, regular expressions; Turing machines, introduction to unsolvability and computability. (ICSS-345)
Class 4, Credit 4

ICSS-485  Data Base Concepts
Registration #0603-485
Topics include data organization and structure; relational, hierarchical, and network approach; data security and recovery. Comparison of the data base approach with traditional file organization and access methods; performance and data organization issues. Existing data-base systems will be studied. (ICSS-325)
Class 4, Credit 4

ICSS-515  Analysis of Algorithms
Registration #0603-515
This course is designed to teach the mathematics and techniques necessary to properly analyze the computational effort of a given algorithm. Selected algorithms will be analyzed and modified for space and time efficiency. (Third-year standing in Computer Science and Technology)
Class 4, Credit 4

ICSS-525  Assemblers, Interpreters, and Compilers
Registration #0603-525
A survey of the three basic programming language processors. Topics include design and construction of language processors, formal syntactic definition methods, parsing techniques, and code generation techniques. Laboratory work includes actual construction of language processors. (ICSS-320)
Class 4, Credit 4

ICSS-540  Operating Systems Laboratory
Registration #0603-540
Application of operating system concepts. Laboratory work includes development of a small multi-tasking operating system and a study of its functional characteristics; special topics include I/O programming, interrupt handling, resource allocation and scheduling methods. Laboratory emphasis. (ICSS-440)
Class 4, Credit 4
Graduate Courses

Undergraduate Computer Science and Technology students may take ICSS-700 level courses as undergraduate computer science electives. They must be fourth- or fifth-year students and have already completed any stated prerequisites or have the consent of the instructor.

Undergraduate students may not take ICSS-800 level courses, ICMS courses, or ICII courses. Graduate students must obtain the consent of a graduate advisor in order to enroll in graduate courses not listed in their own program of study.

Computer Science

ICSS-710 EDP Auditing
Registration #0603-710
A study of the techniques and approaches used to audit computer data centers and systems. Topics include the methodology and tools of EDP auditing, internal departmental controls, program controls, input/output controls, data security, physical security, computer hardware controls and data communication control.
Credit 4

ICSS-720 Computer Architecture
Registration #0603-720
Brief review of a classical computer architecture. Analysis of internal and external bus structures. Architectural features required to support virtual storage and various replacement policies are discussed. Various types of parallel computers are presented along with analyses of the problems preventing them from achieving an ideal n-fold speedup. (ICSS-440 or equivalent)
Credit 4

ICSS-721 Microprocessors and Microcomputers
Registration #0603-721
A study of microprocessors, microcomputers, and their applications. Topics include microprocessor hardware, microcomputer organization, software, microcomputer programming, interface techniques and development trends. Case studies will be provided. (ICSS-315)
Credit 4

ICSS-730 Discrete Simulation
Registration #0603-730
Computer simulation techniques are examined. Topics include abstract properties of simulations modeling, analysis of a simulation run, and statistics. One or more general-purpose simulation languages will be taught. Programming projects will be required. (SMAM-309 or equivalent)
Credit 4

ICSS-735 On-Line Information Systems Design
Registration #0603-735
Topics include basic on-line system characteristics, design guidelines, hardware requirements, comparison of systems and languages, file organization concepts, the simultaneous access problem, file security and recovery, error recovery, system evaluation and case studies. (Background in systems analysis is recommended)
Credit 4

ICSS-736 Data Base System Implementation
Registration #0603-736
Requirements and characterization of generalized data-base systems, the role of the data-base administrator, creation of a general data base, elements of data-base management systems, data-base management in a multi-access environment, survey of data-base management systems, selecting a data-base management system. Projects in data-base systems implementation will be emphasized. (ICSS-485)
Credit 4
ICSS-740  Computer Communication Networks
Registration #0603-740
A study of hardware and software principles of computer commu-
nication networks. Topics include network configuration and
vocabulary, network hardware components, network software
components, network technologies, examples of existing net-
works, network utilization, measurement and evaluation. (ICSS-
420)
Credit 4

ICSS-755  Real-Time Computation
Registration #0603-755
Principles and applied problems in real-time computation using
microprocessors as laboratory equipment. Topics include inter-
rupt handlers, multi-tasking concepts, process synchronization,
response time considerations for interrupt-driven and polled I/O
and elements of computer communications. (ICSS-440 is re-
quired; ICSS-720 is recommended)
Credit 4

ICSS-770  Computer Graphics
Registration #0603-770
Topics include basic concepts, 2-D transformations, windowing,
clipping, interactive and raster graphics, 3-D transformations and
perspective, hidden line and hidden surface techniques, graphi-
cal software packages and graphics systems. Programming pro-
jects will be required. (A scientific high-level programming lan-
guage)
Credit 4

ICSS-805  Fundamentals of Computing
Registration #0603-805
Computer systems, number representations, arithmetic opera-
tions and error analysis, structured programming, recursive pro-
gramming, program correctness, systems software and computer
architecture.
Credit 4

ICSS-806  Foundations of Computing Theory
Registration #0603-806
Topics include basic concepts, 2-D transformations, windowing,
clipping, interactive and raster graphics, 3-D transformations and
perspective, hidden line and hidden surface techniques, graphi-
cal software packages and graphics systems. Programming pro-
jects will be required. (A scientific high-level programming lan-
guage)
Credit 4

ICSS-825  Assemblers, Interpreters, and Compilers
Registration #0603-825
A survey of the three basic programming language processors.
Topics include design and construction of language processors,
formal syntactic definition methods, parsing techniques and code
generation techniques. Laboratory work includes actual
construction of language processors. (ICSS-320)
Credit 4

ICSS-826  Deterministic and Probability Models
Registration #0603-826
Concurrent process control, processor scheduling models, com-
puter sequencing problems, auxiliary and buffer storage models,
storage allocation in paging systems, memory management of
multiprogramming computers. (ICSS-440 or SMAM-362)
Credit 4

ICSS-836  Data Base Systems
Registration #0603-836
Topics include data organization and structure; relational, hier-
archical and network approach; data security and recovery. Com-
parison of the data-base approach with traditional file organiza-
tion and access methods, performance and management issues.
Existing data-base systems will be studied. (ICSS-320)
Credit 4

ICSS-846  Information Storage and Retrieval
Registration #0603-846
Topics include an overview of history, development and tradi-
tional approaches of information storage and retrieval, automatic
text analysis, automatic classification, file structures, search stra-
gies, probabilistic retrieval and system evaluation.
Credit 4

ICSS-850  Computability
Registration #0603-850
The theory of computation as it relates to computable functions is
examined. Topics include finite state machines, Turing machines,
recursive function theory, Post’s symbol manipulation systems
and the limitations of the concept of effective computability.
(ICSS-806)
Credit 4

ICSS-851  Computational Complexity
Registration #0603-851
This course is concerned with the mathematical analysis of
computer algorithms. Topics include matrix operations, combina-
torial algorithms, integer and polynomial arithmetic, NP-complete
problems and lower bounds on algorithms involving arithmetic
operations. (ICSS-850 or equivalent)
Credit 4

ICSS-852  Coding Theory
Registration #0603-852
Study of error-correcting codes and their applications. Topics
include algebraic structure of group codes, linear switching cir-
cuits, cyclic codes and the decoding problem. (ICSS-806)
Credit 4

ICSS-856  Theory of Parsing
Registration #0603-856
Application of theoretical concepts developed in formal language
and automata theory to the design of programming languages and
their processors, syntactic and semantic notation for specifying
programming languages, theoretical properties of some gram-
mars, general parsing, non-backtrack parsing and limited back-
track parsing algorithms. (ICSS-480)
Credit 4

ICSS-860  Compiler Construction
Registration #0603-860
Language definition, lexical analysis, syntactic analysis, storage
allocation and management, code generation, code optimization,
diagnostic generation and bootstrapping. (ICSS-480, ICSS-825)
Credit 4

ICSS-875  Minicomputer Systems and Applications
Registration #0603-875
A study of minicomputer hardware architectures; software orga-
nization, operating systems; input/output programming, interrupt
handling; debugging techniques, device interfacing and custom
applications. Hands-on experimentation with a minicomputer is
emphasized. (Proficiency in assembly language programming is
required)
Credit 4

ICSS-880  Systems Programming
Registration #0603-880
A study of systems program organization and systems program-
ing techniques. Topics include systems programming languages,
assemblers, macroprocessors, linkage editors and loaders, compiles and text processors. Programming projects will be required.
Credit 4

ICSS-885  Systems Programming Laboratory
Registration #0603-885
Systems programming techniques applied to the design and
implementation of a large systems program or module. Past pro-
jects have included floating point simulators, a small data-base
system, system utilities and a command language interpreter.
(ICSS-880)
Credit 4

ICSS-890  Seminar
Registration #0603-890
Current advances in computer science.
Credit 2-4

ICSS-895  MS Thesis
Registration #0603-895
Credit 4-8
School of Engineering Technology

Upper-Division Civil Engineering Technology

ITEC-420 Hydraulics
Registration #0608-420
Study of liquid flow in pipes and open channels, hydrostatic pressures and forces, stability, devices to measure pressure, velocity, and flow, pump selection, development of pump characteristic curves, and the introduction to design of sewer and water lines.
Class 3, Lab. 3, Credit 4

ITEC-428 Report Writing
Registration #0608-428
The principles of organizing data and information into clear and concise engineering memos, letters, and reports. The techniques of library research, and oral reports using video tapes of student presentations are also stressed.
Class 3, Credit 2

ITEC-432 Water & Wastewater Transport Systems
Registration #0608-432
Discussion of surface and groundwater sources. Introduction to well hydraulics. The hydraulic design of sanitary and storm sewer systems, and water distribution systems.
Class 2, Recitation 3, Credit 3

ITEC-434 Environmental Pollution
Registration #0608-434
The study of various forms of pollution including air, thermal, noise, erosion, pesticides, radiation, and visual pollution, with the investigation of the sources, measurement, methods of control, legislation, codes, and enforcing agencies. Several expert guest speakers will also lecture.
Class 3, Credit 3

ITEC-438 Principles of the Treatment of Water
Registration #0608-438 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.
Class 3, Lab. 2, Credit 4

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. The topics discussed include the design of a rapid sand filtration plant with water softening treatment.
Class 3, Lab. 2, Credit 3

ITEC-513 Computer Techniques in Civil Engineering
Registration #0608-513
Designed to complement Computer Techniques, ICSP-205, as an introduction to problem oriented languages such as COGO, STRESS, and other proprietory systems.
Lab. 2, Credit 1

ITEC-514 Land Planning
Registration #0608-514
The environmental and social aspects of land planning are covered, as well as the engineering and economic considerations. Topics included are zoning concepts, the Master Plan, subdivision planning and regulations, flood-plain controls, conservation of open space, protection of wetlands, transfer of development rights and agricultural districts. Local development issues will be studied, and either class attendance at a planning board hearing or a field trip is scheduled?
Class 2, Credit 2

ITEC-516 Analysis and Design of Reinforced Concrete Structures
Registration #0608-516
Introduction to the analysis of indeterminate flexural members and frames, emphasizing the method of moment distribution. Design of continuous reinforced concrete elements and frames. The accent is on building structures and the use of the ACI Code. The working stress method is briefly covered, but primary emphasis is given to the strength method.
Class 5, Credit 4

ITEC-520 Design of Waste Water Treatment Facilities
Registration #0608-520
Principles of wastewater treatment plant design; conceptual and hydraulic design of activated sludge and trickling filter plants are studied. Tertiary treatment facilities, such as nitrogen and phosphorous removal will be discussed.
Class 3, Lab. 2, Credit 4

ITEC-527 Soil Mechanics and Foundations
Registration #0608-527
The properties of soils, stresses and settlement in soils, seepage, slope stability, earth pressures on structures, determination of bearing capacity, types of foundations and their interaction with the supporting soil are explored.
Class 3, Lab. 2, Credit 4

ITEC-544 Contracts and Specifications
Registration #0608-544
A study of the contract documents; the relationship between the owner, engineer, and contractor; various types of contracts and specifications are studied as well as an introduction to engineering law.
Class 3, Credit 3

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; several guest speakers representing different segments of the civil engineering field.
Class 1, Credit 1

Civil Technology Electives

ITEC-550 Construction Safety
Registration #0608-550
General safe practices in construction operations. Safety standards, both voluntary and mandatory. Employers' responsibilities under the provisions of OSHA and state labor law. A portion of this course is audio-visual.
Class 3, Credit 3
ITEC-459 Environmental Engineering Project
Registration #0608-549
Fundamental concepts, principles and advanced techniques in the treatment of industrial and domestic wastewater. Laboratory study of certain aspects of water pollution control treatment processes. Field trips to water pollution control plants. Students are required to prepare a technical report based on laboratory study or actual treatment plant data. (ITEC-438, -520 and permission of instructor)
Class 2, Lab 3, Credit 4

ITEC-550 Construction Practices
Registration #0608-550
An introduction to basic construction management and organization with CPM scheduling, estimating, bidding, heavy construction techniques, methods, and equipment applications.
Class 3, Recitation 2, Credit 4

ITEC-552 Analysis and Design of Steel Structures
Registration #0608-552
An introduction to the analysis and design of steel structures. Emphasis is on low-rise buildings of the determinate type which are braced vs. lateral loads. The background of the AISC Code is covered, as well as practice in use of the AISC Manual, such as selection of beam and column sections, and the analysis and design of welded and bolted connections. Current practice in foundation and erection is discussed in addition to a brief study of contract and shop drawings.
Class 5, Credit 4

ITEC-555, 557 Wastewater Treatment Plants
Registration #0608-556, -557 Operation and Control I & II
A self-paced audio-visual course. Emphasis on the functional aspects of wastewater treatment plants' operation. Discussion of the significance of the results of laboratory analysis and their interpretation and application to the control of treatment processes. (ITEC-438 and consent of instructor)
Credit 1-4

ITEC-599 Independent Study
Registration #0608-599
A supervised investigation within a civil technology area of student interest. Consent of the instructor is required.
Credit 1-8

Construction
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 methods; floor and wall systems; and introduction to construction specifications and management.
Class 4, Credit 4

ITEC-444 Mechanical Equipment for Buildings
Registration #0608-444
Presentation of mechanical and electrical equipment used in building construction; the pertinent codes will be studied; emphasis will be given to energy aspects of equipment design and selection.
Class 3, Credit 3

ITEC-450 Construction Management
Registration #0608-450
Construction company organization, time and resource scheduling for construction operations (CPM); role of the construction manager; project finance; cash flow; bonding and insurance. (ITEC-500, -509, -460)
Class 4, Credit 4

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 equipment management, earthmoving and mechanical design.
Class 3, Credit 3

ITEC-470 Timber Design and Construction
Registration #0608-470
Application of structural design methods to timber; concrete forms, temporary bracing, shoring, ground support, framing and scaffolding.
Class 3, Credit 3

ITEC-500 Labor Relations
Registration #0608-500
Introduction to labor law, negotiations, arbitration, trade unions and jurisdictions; various aspects of labor management are studied, with and without organized labor. Several guest speakers representing government, private industry and organized labor also lecture.
Class 3, Credit 3

ITEC-508 Cost Estimates
Registration #0608-508
An introduction to the fundamentals of cost estimating and bidding construction projects; labor and material takeoffs, equipment costs, overhead and profit. (ITEC-422)
Class 3, Credit 3

ITEE-310 Electricity
Registration #0609-310
An introduction to electricity for photo management majors. Topics covered are basic circuit analysis and the D.C. operation of diodes, transistors, vacuum and gas tubes. Some electronic circuit analysis is covered.
Class 3, Lab. 3, Credit 4

ITEE-311 Electronics I
Registration #0609-311
Continuation of ITEE-310. Analysis of A.C. circuits is covered. Power supplies and circuits used in the 5s printer are analyzed. Additional circuits relating to photography are covered. (ITEE-310)
Class 3, Lab. 3, Credit 4

ITEE-312 Electronics II
Registration #0609-312
Continuation of ITEE-311. Digital circuits and transistors are covered. Circuits used in the 2610 and 2620 printers are analyzed. Electro-optic devices are discussed. (ITEE-311)
Class 3, Lab. 3, Credit 4

ITEE-401 Circuit Theory I
Registration #0609-401
An introductory course in the use of Laplace transforms to determine the complete response of circuits containing independent and dependent sources, resistance, inductance, and capacitance. Application of basic circuit theorems to the solution of transformed networks. (SMAT-420 concurrently)
Class 3, Lab. 2, Credit 4

ITEE-402 Circuit Theory 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-404 Control Systems I
Registration #0609-404
Analysis of closed loop control systems for stability, accuracy, response time; Routh's and Nyquist's stability criteria, gain and phase margin, static error coefficient, lead and lag compensating networks. (ITEE-402, SMAT-422)
Class 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; covers basic electrical circuits, network theorems, applications of Ohms and Kirchoff's laws in D.C. and A.C. circuits, power and energy concepts, efficiency, and metering.
Class 3, Lab. 3, Credit 4

ITEE-412  Electrical Principles for Design II
Registration #0609-412
A review of A.C. resonance in series and parallel circuits, three-phase circuits, rotating machines and their application; transformers, semiconductor theory, bridges, power supplies, and phase shifting circuits. (ITEE-411)
Class 3, Lab. 3, Credit 4

ITEE-414  Basic Electrical Principles
Registration #0609-414
A survey of important aspects of electricity including important laws of electrical networks for both A.C. and D.C.; emphasis is placed on such topics as power factor, efficiency, costs of electricity, lighting, line losses, breakers and fusing, transformers, motors and three-phase fundamentals. (SMAT-421)
Class 3, Lab. 3, Credit 4

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

ITEE-428  Linear Amplifier Design
Registration #0609-428
A review of A.C. resonance in series and parallel circuits, three-phase circuits, rotating machines and their application; transformers, semiconductor theory, bridges, power supplies, and phase shifting circuits. (ITEE-411)
Class 3, Lab. 3, Credit 4

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

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

ITEE-521  Electromagnetic Fields and Antennas
Registration #0609-521*
The time varying fields, Maxwell's equations, characteristic impedance and radiation patterns of the dipole antenna are explored. Design of antenna arrays for UHF-VHF and microwave applications are also discussed; microwave antenna design. (ITEE-520)
Class 3, Lab. 2, Credit 4

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

ITEE-526  Semiconductor Physics
Registration #0609-526*
Theoretical description of p-n junctions and semiconductor phenomena; transistor and FET models are developed to obtain parameters; solid state device characteristics are derived. (ITEE-428)
Class 4, Credit 4

ITEE-620  Application of Discrete and Integrated Circuits
Registration #0609-620
Circuit Elements
Selected topics in the application of discrete circuit components to linear and non-linear circuit design. Theory and application of integrated circuit op-amps in the design of active filters, analog computers, feedback control systems and function generators.
Class 3, Lab. 2, Credit 4

ITEE-532  Power Amplifier Design
Registration #0609-532
The design of Class A and B low-frequency power amplifiers is studied, including the use of feedback and heat sinking requirements. Principles of design for Class C RF amplifiers and Class D voltage regulators are also covered. (ITEE 428)
Class 3, Lab. 2, Credit 4

ITEE-534  Communication Systems I
Registration #0609-534
A review of A.C. resonance in series and parallel circuits, three-phase circuits, rotating machines and their application; transformers, semiconductor theory, bridges, power supplies, and phase shifting circuits. (ITEE-411)
Class 3, Lab. 2, Credit 4

ITEE-535  Communication Systems II
Registration #0609-535
Pulse modulation systems including pulse amplitude modulation, pulse width modulation and pulse position modulation; pulse code modulation as applied to voice and to digital data transmission; introduction to noise and its effect on communication system performance; introductory information theory; analysis and design of communication systems. (ITEE-534)
Class 4, Credit 4

ITEE-536  Control Systems II
Registration #0609-536*
Control systems for specific application and performance criteria; a study of control motors and components for D.C./A.C. control systems; application of control theory to the solution of practical system problems. (ITEE-404)
Class 3, Lab. 2, Credit 4

ITEE-538  Digital Computer Design I
Registration #0609-538
Digital computer design I
Design of logic circuits using 7400 series TTL gates; a study of TTL flip-flops, one shots and oscillators circuits; design of arithmetic circuits, shift registers and counters. (ITEE-424, 540)
Class 3, Lab. 2, Credit 4

ITEE-539  Digital Computer Design II
Registration #0609-539
Digital Computer Design II
A continuation of ITEE-538 with application of logic circuits to computer design. Multiplexers, semiconductor memories, ALUs and their applications to computers and microprocessors are considered. The basic operation of computers, and computer systems are examined. Machine language programming, indexing and indirect addressing and interrupt programming are introduced. Peripheral devices and interfaces are discussed if time permits. (ITEE-538)
Class 3, Lab. 2, Credit 4

*Courses which are offered at least once every three years and/or upon sufficient demand.
ITEE-542 Microprocessors
Registration #0609-542
An introductory course in Microprocessors emphasizing the Motorola 6800 and Intel 8085. The topics covered include the CPU, ROMS, RAMS, programming and interface IC’s. Practical applications of microprocessors are also considered. (ITEE-424)
Class 2, Lab. 4, Credit 4

ITEE-543 Minicomputers, Controllers and Peripherals
Registration #0609-543*
A study of popular minicomputers and most common peripherals that they use. The course includes the PDP-8, PDP-11, and NOVA minicomputers. Peripherals include TTY’s, MODEMS, tape drives, disk drives, cassettes, card readers, line printers, and D/A and A/D converters. Methods of interfacing these peripherals to minicomputers and microprocessors are emphasized. (ITEE-539)
Class 2, Lab. 4, Credit 4

ITEE-546 Industrial Electronics
Registration #0609-546
Design of SCR/Trac control circuits for D.C. and A.C. motors; control of lights and heating elements with D.C. power supplies and polyphase rectifier circuits; speed control of D.C. and A.C. motors; process control systems utilizing solid state electronic circuits. (ITEE-532)
Class 3, Lab. 2, Credit 4

ITEE-547 Digital Processing of Signals
Registration #0609-547
Analog signal processing including the use of microprocessors. Topics include transducers, A/D and D/A converters, microprocessor programming and I/O devices. Applications include bio-medical, automotive controls and communication signals.
Class 4, Credit 4

ITEE-548 D.C. and A.C. Machine Design
Registration #0609-548
The theory, principles of operation and application of A.C. and D.C. rotating machines; the characteristics of shunt, series and compound D.C. motors and generators are explored with torque-speed characteristics, power efficiency and applications of single phase and three phase motors. (ITEE-402)
Class 3, Lab. 3, Credit 4

ITEE-550 Power Systems I
Registration #0609-550
Basic elements of a power system, energy sources, substation configuration; load cycles, single phase circuits, balanced and unbalanced three phase circuits, power factor correction, and transmission line configurations and impedances are covered. (ITEE-402, SMAT-422)
Class 3, Lab. 3, Credit 4

ITEE-551 Protective Relaying
Registration #0609-551
The physical construction and characteristics of electromechanical relays, short circuit calculation and line, bus, transformer and motor-generator protection are studied. Solid state relays, instrument transformers, and telecommunications and supervisory control are included. (ITEE-402 or equivalent)
Class 3, Lab. 3, Credit 4

ITEE-552 Power System Stability
Registration #0609-552*
Voltage regulation and efficiency of transformers, per unit systems, symmetrical components, lightning protection, energy conservation, switching surges, and system voltage regulation are included. Equal area criterion of transient stability is covered. (ITEE-550)
Class 4, Credit 4

ITEE-554 Electronic Optic Devices
Registration #0609-554*
Basic photometry is discussed. Light emitting and light receiving devices are covered with circuits and applications. Optics is introduced with laser theory and fiber-optics.
Class 3, Lab. 2, Credit 4

ITEE-556 Transmission Lines and Filters
Registration #0609-556
General transmission line equation and approximations; lossless transmission line and analysis using the Smith chart; matching stub design for transmission lines; Butterworth filter design principles and applications. (ITEE-402)
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

Upper-Division Mechanical Engineering Technology

ITEM-301 Engineering Graphics
Registration #0610-301
A basic course in engineering drawing. Topics include lettering, line quality, use of instruments, free-hand sketching, orthographic projections, pictorials, sections, auxiliary views and dimensioning.
Recitation 6, Credit 2 or 3

ITEM-404 Applied Mechanics of Materials
Registration #0610-404
The basic concepts of strength of materials as applied to mechanical design are reviewed in depth. The course includes the study of the concepts of stress and strain, the stress-strain relationship and combined stress. Applications of these concepts to beams, shafts, and columns are covered. (ITEM-408 or equivalent)
Class 3, Credit 3

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

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

ITEM-407 Mechanical Engineering Technology Laboratory
Registration #0610-407
A course in mechanical laboratory techniques and the preparation of laboratory reports; experimental work in materials testing, strength of materials, experimental stress analysis, metallurgy, and metallography; instruction in the preparation of laboratory reports. (It is intended that students enroll concurrently in ITEM-404 and ITEM-414.)
Class 2, Lab. 4, Credit 4

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-411 Engineering Materials
Registration #0610-411
A study of the physical properties of materials; a survey of manufacturing processes including casting, molding, metal removal, metal forming, welding; field trips to local manufacturing installations; material testing lab inspection labs, and selected heat treating experiments are available. For non-mechanical majors.
Class 3, Recitation 2, Credit 4

*Courses which are offered at least once every three years and/or upon sufficient demand.
ITEM-414, 415  Materials Technology I, II
Registration #0610-414,415
A two-quarter course involving a study of materials, their structure and their characteristics. Topics covered include atomic and crystalline structure, phases and phase diagrams, physical properties, diffusion in metals, recovery, recrystallization and grain growth, age hardening and heat treatment of metals, corrosion and corrosion controls. The effect of process in terms of property changes of material will be discussed. Plastics, glasses, ceramic materials and their characteristics, processes and manufacturing will also be studied. Prerequisite for ITEM-415 is ITEM-414.

I. Class 3, Credit 3
II. Class 3, Lab. 2, Credit 4
ITEM-425  Statistical Quality Control
Registration #0610-425
The basic concepts of statistics and probability are studied as they apply to quality control, including the study of control charts, sampling procedures, and the planning, organizing, and installation of quality controls in the industrial setting.
Class 3, Recitation 2, Credit 4
ITEM-426  Quality Assurance
Registration #0610-426
A study of those factors involved in quality planning, the practicality of tolerances and specifications; planning, organizing and installing quality controls; training and supervision of quality control personnel; effective administration of the quality assurance function.
Class 4, Credit 4
ITEM-431  Production Management
Registration #0610-431
A study of modern industrial organization and how it is managed. Techniques of decision-making process will be studied in problem areas related to manufacturing.
Class 4, Credit 4
ITEM-436  Engineering Economics
Registration #0610-436
This course covers some of the factors involved in the engineering economy. Capital financing and budgeting, depreciation and valuation, risk and uncertainty, break-even studies, replacement costs, and selections between alternatives are typical of the topics covered.
Class 4, Credit 4
ITEM-437  Cost and Value Analysis
Registration #0610-437
A study of the decision theory and the nature of man-machine systems in analyzing manufacturing and design projects. Integration of economic factors with design and production criteria. Use of linear programming and computers in performing value engineering analysis. Techniques of estimating costs will be studied and used. (ICSP-200)
Class 3, Credit 3
ITEM-441  Thermodynamics and Heat Transfer
Registration #0610-441
The first and second laws of thermodynamics and their applications. Thermodynamic properties of working fluids including pure substances and ideal gases are studied. Thermodynamic processes, cycles and the basic concepts of heat transfer are included.
Class 4, Credit 4
ITEM-442  Heat Transfer
Registration #0610-442
A first course in heat transfer. The theory and application of the fundamentals of heat conduction, convection, and radiation. The design and applications of heat transfer apparatus.
Class 3, Lab. 2, Credit 4
ITEM-445  Thermofluid Apparatus
Registration #0610-445
A study of the application, specification, and operation of steam generators, prime movers, heat exchangers, compressors and pumps. Also, performance evaluation of such apparatus and thermal systems; strategies of energy conservation.
Lecture 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 and structures. Environmental tests for vibration and shock. Methods of vibration and noise analysis will be demonstrated. (SMAT-422)
Class 4, Credit 4
ITEM-461  Mechanics of Fluids
Registration #0610-461
A study of the fundamentals of fluid statics and dynamics. Applications of the principles of pumps, turbines, flow measurement, pipe flow, and fluid power. (ITEM-441, time permitting)
Class 3, Credit 3
ITEM-465  Thermofluid Laboratory
Registration #0610-465
Laboratory experiments in thermodynamics, fluid mechanics and heat transfer, including computer-aided data reduction. (ITEM-441, 461)
Class 1, Lab. 2, Credit 2
ITEM-470  Numerical Control Applications I
Registration #0610-470
The philosophy and use of numerical control in manufacturing. The course will review manual programming, examine different formats and applications of numerical control, and introduce computer assisted programming techniques available. Numerical control machine tools will be demonstrated.
Class 4, Credit 4
ITEM-471  Numerical Control Applications II
Registration #0610-471
An advanced course in applications of numerical control. Emphasis will be placed on computer-assisted part programming for contouring in two and three axes. (470) Application of advanced technologies such as CNC and DNC.
Class 3, Lab. 2, Credit 4
ITEM-472  Tool Engineering
Registration #0610-472
Machining and machine tools will be reviewed: the selection of tools for production; the specification of tools, jigs, and fixtures; production gauges; selection of tooling for automatic machines; determination of assembly tooling. Emphasis is placed on economic justification for tooling.
Class 3, Recitation 2, Credit 4
ITEM-475  Computer-Aided Design & Manufacturing
Registration #0610-475
A study of the hierarchical structure of computers applied to manufacturing; monitor and control manufacturing facilities. Four major manufacturing areas are examined: production management; engineering analysis and design; finance and marketing; and production planning, routing and scheduling.
Class 3, Lab. 2, Credit 4
ITEM-480  Methods Analysis
Registration #0610-480
A survey course for non-industry engineering majors. Principles and applications of basic methods and techniques to improvement of the worker-job time relationship. Job standards, predetermined time, time and motion study, human engineering in relation to work-space designed for efficient use of laboratory.
Class 3, Recitation 2, Credit 4
ITEM-490 Production Planning  
Registration #0610-490  
An introduction to product design, problems in factory planning, preparation of layout, quantitative tools used in solving layout problems, common problems in plant layout, and work simplification principles and practice. (ITEM-480)  
Class 3, Recitation 2, Credit 4

ITEM-491 Material Control  
Registration #0610-491  
The fundamental principles in the control of industrial production in relation to forecasting purchasing, inventory, production planning, routing, and scheduling the system of control material.  
Class 4, Credit 4

ITEM-492 Plant Layout  
Registration #0610-492  
The study of the arrangement and functional layout of processes and equipment to maximize production efficiency. Also covered are the principles of material handling.  
Class 3, Recitation 2, Credit 4

ITEM-499 Mechanical Technology Co-op  
Registration #0610-499  
Class 0, Credit 0

ITEM-500, 501 Systems Design Project I, II  
Registration #0610-500, 501  
An individual student project in systems design. The student integrates his program, co-op experiences, and independent studies in the solution of a system design project and presents his findings in written and oral presentations.  
Class 2, Lab. 4, Credit 4

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

ITEM-507 Design Practice  
Registration #0610-507  
Introduction to design codes such as ASME Boiler and Pressure Vessel Code, ASTM Standards, National Electrical Code, and individual study of a design problem; the study of the use of these engineering codes and standards in design.  
Class 3, Recitation 2, Credit 4

ITEM-508 Special Topics in Machine Design  
Registration #0610-508  
The study of selected topics such as clutches, brakes, couplings, belts, chains, lubrication and computer-aided design.  
Class 3, Lab. 2, Credit 4

ITEM-510, 511 Process Design I, II  
Registration #0610-510, 511  
The student is placed in a realistic manufacturing situation in which he selects, creates, or is assigned a product to manufacture. Use of his total program in the solution of the problem and its presentation. Oral and written report presentations.  
Class 3, Lab. 2, Credit 4

ITEM-514 Special Topics in Material Forming  
Registration #0610-514  
A study of the principles of material shaping; the effects of temperature, friction, and other factors affecting tool life, machinability and formability will be examined.  
Class 3, Lab. 2, Credit 4

ITEM-521 Logic Control Systems  
Registration #0610-521  
The analysis and design of logic control systems using Boolean algebra. Emphasis is placed on the control of machines with fluid and relay logic. Introduction to electronic programmable controls. The concepts of ordinary and timed sequence control and machine protection are covered. Logic control systems will be demonstrated in the lab.  
Class 3, Lab 2, Credit 4

ITEM-522 HVAC Control Systems  
Registration #0610-522  
An introduction to controls used in association with HVAC systems. The course integrates controls with HVAC processes to arrive at appropriate control and instrumentation systems. The course examines individual instruments, instrument and control systems, monitoring systems, and computer control.  
Class 4, Credit 4

ITEM-530 Instrumentation  
Registration #0610-530  
A basic approach to calibration and use of pressure, temperature, flow, humidity and liquid level measurement instruments. Techniques of test, calibration and proper use of instruments will be demonstrated. Principles of experimentation and computerized data reduction are examined.  
Class 4, Credit 4

ITEM-535 Analog Control Systems  
Registration #0610-535  
An introduction to the basic concepts of analog process control. The feedback control concept, system components, transfer functions of system components, frequency response technique of system design, and optimizing system performance. Actual system performance and system tuning procedures will be demonstrated.  
Class 4, Credit 4

ITEM-540 Thermal Technology  
Registration #0610-540  
Application of thermodynamics to internal combustion engines, compressors, steam cycles, refrigeration, and air conditioning. (ITEM-441)  
Class 3, Lab. 2, 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, solar-assisted heat pumps. Other alternative sources of energy are also discussed; wind energy, and solid waste.  
Class 4, Credit 4

ITEM-550 Topics in Machine Design  
Registration #0610-550  
Principles of dynamics and strength of materials as applied to electrical components and subsystems; topics include shaft and bearing design, vibration of rotors, material selection, lubrication, environmental and human factors considerations.  
Class 4, Credit 4

ITEM-599 Independent Study  
Registration #0610-599  
A supervised investigation within a mechanical technology area of student interest. Student must submit written proposal and have it approved prior to registering.  
Credit variable (1-4)

*Courses which are offered at least once every three years and/or upon sufficient demand.
Packaging Science

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

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

Class 4, Credit 4

IPKG-310 Methods of Evaluation
Registration #0607-310
Information about recognized standard testing procedures will be presented, and students will gain practical experience in the operation of various commonly used testing instruments which are used to determine physical properties of fibre, metal, plastic, and glass packaging materials. (IPKG-201)

Lab 4, Credit 2

IPKG-311 Packaging Materials I
Registration #0607-311
The manufacture, physical and chemical properties, and uses of commonly used packaging materials, components, and primary packages for consumer and institutional use, will be presented. 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 commonly used packaging materials, components, and primary packages for consumer and institutional use will be presented. Emphasis is on paper, paperboard, wood, and glass used in packaging applications. (IPKG-201)

Class 3, Credit 3

IPKG-315 Container Systems
Registration #0607-315
A study of packages which are in direct contact with the product. Structural design and physical and chemical compatibility of product and container will be analyzed and discussed for basic container types. Students will gain practice in the structural design and construction of prototype packages. (IPKG-311, 312)

Class 2, Lab 4, Credit 4

IPKG-401 The Packaging Industry
Registration #0607-401
An analysis of positioning of the packaging function in the contemporary American corporation. The role of the packaging professional in the corporate enterprise, and the interrelationship of packaging and other business functions will be considered in detail. (Packaging Science juniors only)

Class 2, Credit 2

IPKG-431 Packaging Production Systems
Registration #0607-431
A study of package forming and filling, closing, product/package identification, inspection, and other machinery commonly used in packaging, plus consideration of handling and storage/retrieval systems. The characteristics of such equipment, and maintenance programs will be considered. Students will gain practice in setting up complete production lines for packaging various products. (IPKG-311, 312)

Class 2, Lab. 4, Credit 4

IPKG-313 Packaging for Distribution
Registration #0607-313
An exploration of different shipping, storage, and use environments common to various products and packages. Structural design of packages for product physical protection, chemical compatibility as a factor in shelf life, and methods for testing and predicting these factors will be studied. (IPKG-311, 312)

Class 2, Lab. 4, Credit 4

IPKG-314 Packaging for Marketing
Registration #0607-314
The interrelationship between packaging and marketing, detailing how the retail consumer package can be used as a scientific marketing tool. The course concentrates on a systematic approach to developing an optimum package for a given product to meet the demands of the retail market. Advertising, marketing demographics, and the impact of color upon packaging will be considered. Students will gain practice in the development of a complete package system. (IPKG-431, 432)

Class 2, Lab. 4, Credit 4

IPKG-420 Packaging Management
Registration #0607-420
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. (This course is intended for seniors)

Class 3, Recitation 1, Credit 4

IPKG-424 Packaging Economics
Registration #0607-424
A study of the costs involved in the development, manufacture, and distribution of packages, in order to develop a working knowledge of packaging costs. Cost elements associated with development, tooling, materials, machinery, processing, and distribution will be discussed. The usefulness and validity of various value theories will be considered. (This course is intended for seniors)

Class 3, Credit 3

IPKG-520 Senior Thesis
Registration #0607-520
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-590 Independent Study
Registration #0607-590
Independent study, in consultation with the instructor, on any packaging-related topic.

Arranged, Credit variable 1-4

IPKG-598, 599 Independent Study
Registration #0607-598, -599
Independent study, in consultation with the instructor, on any packaging-related topic.

Arranged, Credit variable 1-4
Community /Junior College Relations

All courses taught through CCJCR are offered on demand with sufficient enrollment.

Note: Graduate courses applicable to the MS in business technology are listed under the College of Business.

IJCG-701 The Two-Year Colleges Registration #0604-701
The study of the philosophies, organizations, developments, finance, goals, curricula, and spirit of the two-year college.
Credit variable (1-3 credits)

IJCG-702 Teaching, Learning, Content, & Environment Registration #0604-702
Advising/counseling relationships, learning styles, student activities, motivations, developmental education, and the implications of the "open door" policy are investigated.
Credit variable (1-3 credits)

IJCG-703 Management of Learning Registration #0604-703
Strategies of curriculum planning and cognitive styles, goals, objectives, evaluation, measurement, and productivity are studied as they relate to the accountability of faculty, students, and administration.
Credit variable (1-6 credits)

IJCG-704 Instructional Techniques Registration #0604-704
To develop professional competence in direct applications and uses of various learning styles, including television, special audiovisuals, prepared lectures, seminars, computer assisted instruction, and programmed learning.
Credit variable (1-4 credits)

IJCG-750 Seminar Registration #0604-750
This is a series of interdisciplinary discussions led by course participants from different teaching disciplines and outside resource persons. The topics concern the challenges involved in teaching and educational planning, leading to a better understanding of the total learning by the two-year college students.
Credit 2

IJCG-840 Internship Registration #0604-840
An individual arrangement with an appropriate community or junior college will be made for those persons not having sufficient experience. This will provide definite teaching assignments and responsibilities, together with participation in other faculty functions, including advising, committee work, planning, and student evaluation on a full semester or term basis at a two-year college. Supervision, assistance, and evaluation will be provided by a mentor in the participating college and by the CCJCR.
Credit variable (3-6 credits)

IJCG-850 Special Projects Registration #0604-850
This course provides for independent study, investigation, or research activity in subject matter areas not formalized by the Center's program, but having specialized value. Proposals require approval by the director.
Credit variable (1-6)

Career Information

IJCC-741 The Nature of Work Registration #0615-741
Analysis of the changed meaning of work throughout history with emphasis on the 20th century. Different theoretical and practical approaches to job satisfaction and work motivation will be studied as well as recent efforts to redesign work and/or apply alternative time patterns. New work trends and the changed work-leisure relationship also will be explored.
Credit 3

IJCC-742 Career Decision Making Concepts Registration #0615-742
Based upon prior knowledge of basic sociological and psychological constructs, this course concentrates on the processes and influences involved in choices regarding careers. The relative and collective impacts of peers, teachers, friends and relatives, immediate family, and professional advisors are analyzed. Additional course goals include applications of processes such as socialization, acculturation, assimilation; status and role playing; and perception to related activities such as career education-orientation-advising. Current psychological research relating personality/self-concepts/motivation to career decision making will be studied. A special topic involves the problems of communicating information on emerging careers to individuals to effect real and valid perceptions. Two credits relate to the ability to apply career development processes. Three credits relate to an understanding of constructs, theory, and research.
Credit variable (2-5)

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

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

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

IJCC-747 Career Concepts: Services Registration #0615-747 Credit 3

These three courses form a single set and are separated only to facilitate registration and scheduling flexibility. Each of these three courses concentrates on particular careers. Production includes manufacturing, construction, mining, skilled trades, design and engineering related fields, and food processing and the field of agriculture, fisheries, etc. Commerce covers general business, banking and finance, sales and advertising, communications, hospitality and tourism, retail and wholesale distribution and related fields. Service includes allied health careers, education, government and civil service, law and criminal justice careers, and other service careers.

Each course is designed to present a foundation view of several types of a particular employer. Investigated will be systems of career opportunities, management, personnel policies, employer/employee relations, required training/educational levels, manpower long-range projections, philosophies, in-school education and training, competitive relationships, national/international affiliations, and civic/humanitarian expectations.

IJCC-748 Information Retrieval Systems in Career Planning Registration #0615-748
The primary goal is the ability to use several data based computer systems for the storage and retrieval of career information. This includes a sufficient understanding of the computer systems, languages and dictionaries for efficient utilization. Additional goals are an awareness of other systems based upon media and print materials, and the ability to evaluate various systems.
Credit 3
Two different purposes that depend on a common base are goals for this course. The common base is an understanding of the techniques, theories and limitations of manpower forecasting as it applies to numbers in current occupations and to the probabilities of emerging careers.

The two purposes are: (1) the ability to provide, as a generalist having a broad knowledge of different careers, assistance to discipline specialists in feasibility studies for new educational programs, and (2) to assist people in making decisions in those careers for which insufficient information exists. The ability to assist people in making decisions about the pursuit of a career that is projected to be available several years later will be studied in order to develop a uniform and responsible judgement in those areas where probability statements are extremely important.

Credit 4
Reserve Officers’ Training Corps

All courses are offered annually

First Year

**MMSM-201** The Military and American Society I
Registration #0701 -201
Introduction to the organization of the United States Army and the ROTC program; warfare; its nature, origin, conduct and future; voluntary leadership laboratory.
Class 1, Credit 1

**MMSM-202** The National Security Structure
Registration #0701 -202
U.S. Army and National Security Organization of the federal government with emphasis on the Congress, Executive Office of the President, and the Department of Defense. Public opinion and national security; an introduction to small unit organization and military rank; voluntary leadership laboratory.
Class 1, Credit 1

**MMSM-203** The Military and American Society II
Registration #0701 -203
The impact of the military upon American political, economic and social institutions; significance of military customs, courtesies and traditions; introduction to U.S. Army weapons; voluntary leadership laboratory.
Class 1, Credit 1

Second Year

**MMSM-301** Introduction to Basic Operations and Tactics
Registration #0701-301
Provides a knowledge of small unit leadership with emphasis on map reading and land navigation; leadership laboratory.
Class 2, Credit 2

**MMSM-304** Basic Operations and Tactics
Registration #0701 -304
Fundamentals and techniques of squad level tactics with emphasis on leadership, command and control, and tactical employment; leadership laboratory.
Class 2, Credit 2

**MMSM-305** Junior Officer Development
Registration #0701 -305
The functions, duties and responsibilities of a junior officer with an introduction to career planning; leadership laboratory to include field training exercise and military installation orientation visit.
Class 2, Credit 2

Third Year

**MMSM-401** Fundamentals of Instruction
Registration #0701 -401
Examination of principles and techniques that are utilized in the preparation and presentation of a complete period of instruction; leadership laboratory.
Class 3, Credit 3

**MMSM-402** Leadership in Small-Unit Operations
Registration #0701 -402
An extended course in leadership and management of resources on the tactical battlefield with heavy emphasis placed on sequential timing and economy of forces and resources; leadership laboratory to include field training exercise and military installation orientation visit.
Class 3, Credit 3

Fourth Year

**MMSM-403** Leadership and Management
Registration #0701-403
Provides future officers with the basic principles of leadership and management of human resources; motivation, morale, communication, individual and group behavior are discussed; leadership laboratory.
Class 3, Credit 3

**MMSM-503** World Change and Military Implications
Registration #0701-503
A study of the Army’s contribution to the total military structure; an introduction to military implications in the international system; readings in military history; leadership laboratory to include field training exercise and military installation orientation trip.
Class 3, Credit 3

**MMSM-504** Administration and Staff Operations
Registration #0701 -504
Staff organization, functions and responsibilities at battalion level and company administration; readings in military history, leadership laboratory.
Class 3, Credit 3

**MMSM-505** Advanced Leadership and Management
Registration #0701 -505
Further studies in leadership and management with emphasis on contemporary human problems and military justice; readings in military history; leadership laboratory.
Class 3, Credit 3

*Also offered during Summer, which enables a student to begin the third year courses with his/her class.*