1976

1976-1977 Undergraduate Course Description

Rochester Institute of Technology

COURSES

1976·77

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:

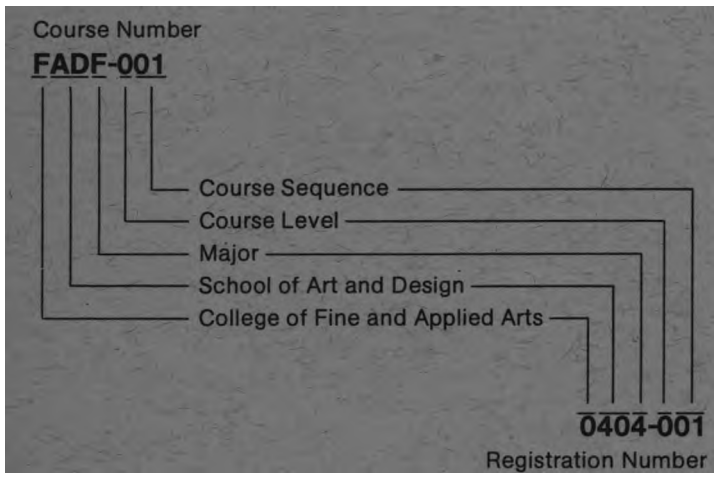
First letter: College offering the course

Second and Third letters: School or Department of that college

Fourth letter: Major field of interest

First number: Course level: 0 = Non-credit, 1 = Diploma; 2 or 3 = Lower Level Degree Courses; 4 and 5 = Upper Level Undergraduate Degree Courses; 6, 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 when you register for a course, because the Institute's computer cannot read the alpha-numeric number.

Courses of Study 1976-77

Produced by RIT Communications Group

Rochester Institute of Technology
Office of Admission
One Lomb Memorial Drive
Rochester, NY 14623
(716) 464-2831

Table of Contents

In this catalog you will find course descriptions for all course offerings given by the day colleges, schools and departments of the Institute for undergraduate or graduate credit. The listing does not include courses provided by the College of Continuing Education, nor those courses specifically for students of the National Technical Institute for the Deaf. These are described in the separate Continuing Education catalog and the NTID bulletin.

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

Rochester Institute of Technology
Office of Admission
One Lomb Memorial Drive
Rochester, New York, 14623
or telephone 716-464-2831.

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, funded 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 course for non-business majors. An introduction to the purposes and functions of accounting in a dynamic society. Emphasis is placed upon essential financial and managerial accounting concepts necessary for management planning and control.

Class 4, Credit 4

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, partnerships, and corporations. Determination of income realization and cost expiration for tax purposes. Valuation of current and fixed assets and liabilities. Funds and reserves. Statement of application of funds. Analysis of financial statements for credit, investment, and managerial purposes. (BBUA-210)

Class 4, Credit 4

BBUA-313 **Auditing**
Registration #0101-313
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)

Class 4, Credit 4

BBUA-331, 332 **Cost Accounting I, II**
Registration #0101-331, 332
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 the controller and his organization in furnishing the accounting data and reports required for efficient managerial planning and control. The case method is utilized extensively to assist in applications and techniques of cost accounting. (BBUA-211 or BBUA-308)

Class 4, Credit 4

BBUA-421 **Advanced Accounting**
Registration #0101-421
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. (BBUA-310)

Class 4, Credit 4

BBUA-442 **Tax Accounting**
Registration #0101-422
Presents basic tax law for an understanding of how it affects the taxpayer. Emphasizes federal income taxes, but also introduces social security, estate, and gift taxes. Includes problems requiring the use of published tax services. (BBUA-210 or 215)

Class 4, Credit 4

BBUA-423 **CPA Problems**
Registration #0101-423
A general review of accounting theory and practice designed both to assist the student in preparation for the CPA examination and to review and improve his 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-554 **Seminar in Accounting**
Registration #0101-554
A seminar series covering selected topics in accounting including management accounting, taxation, international accounting and accounting for non-profit organizations. Specific course topics to be announced when seminar is offered. (Permission of instructor)

Class 4, Credit 4/Qtr. (maximum 12 credits allowed)

Management

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

BBUB-301, 302 **Business Law I, II**
Registration #0102-301, 302
An introduction to legal principles and their relationships to business practices. Topical cases and examples are used as a guide to the observation of legal requirements, the avoidance of infractions, the utilization of professional services, and for familiarity with legal nomenclature.

Class 4, Credit 4

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
Application 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. (Senior standing)

Class 4, Credit 4

BBUB-407 **Legal Environment of**
Registration #0102-407 **Business Activity**
The impact and effect of law on any and all activities dealing with business or economic activity of individuals, business entities, governmental agencies, employers and employees. (BBUB-201)

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. (BBUQ-352 or BBUQ-411, ICSS-200)

Class 4, Credit 4

BBUB-450 **Multinational Management**
Registration #0102-450
Acquaints the student with the characteristics and impact of the multination enterprise. It explores in depth the process of leadership, motivation and performance appraisal in a cross-cultural setting. (BBUB-201 and BBUB-401)

Class 4, Credit 4

BBUB-531 **Labor Relations**
Registration #0102-531
Past and present of the American labor movement. Union philosophy and objectives, issues and approaches are discussed. (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.

Class 4, Credit 4

BBUB-535 **Planning and Decision Making**
Registration #0102-535
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 models of organization, the task, structure, and behavior. Current concerns such as centralization vs. decentralization, and the effects of automation are analyzed. (BBUB-201)

Class 4, 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)

Class 4, Credit 4/Qtr. (maximum 12 credits allowed)

Economics

BBUE-381 **Money and Banking**
Registration #0103-381
The evolution of money and monetary standards. American banking systems with emphasis on commercial banking practices and their relationship to the Federal Reserve Bank. Central bank activities in controlling the price and availability of credit in relation to national and international monetary policy. (BBUA-210, GSSE-302)

Class 4, Credit 4

BBUE-405 **Microeconomics**
Registration #0103-405
An advanced course in economic theory dealing with the contemporary analyses of price or value under conditions of free competition and various degrees of monopoly control, of income distribution, and of the level of income and employment. Business applications are given along with the exposition of the theory itself. (GSSE-302, BBUQ-292 or BBUQ-411)

Class 4, Credit 4

BBUE-406 **Macroeconomics**
Registration #0103-406
An advanced economics course designed to prepare students to understand the changing economic conditions with which their company and industry will be confronted. Evaluation of governmental monetary and fiscal policies and the criticisms thereof will be studied. (GSSE-302, BBUQ-292 or BBUQ-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

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-406)

Class 4, Credit 4

BBUE-443 **Recent Economic Policies**
Registration #0103-443
A seminar type course on recent monetary and fiscal policies in the United States. Topics will cover the economic background, nature and effects of the policies during the most recent ten 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 wage theory, supply and demand forces of labor, wages and unions, unemployment, inflation and public policy. (BBUE-405)

Class 4, Credit 4

BBUE-554 **Seminar in Economics**
Registration #0103-554
Investigation of advanced problems and policies in economics. Emphasis is on student reports and papers. (Permission of instructor)

Class 4, Credit 4

Finance

BBUF-441 **Financial Management**
Registration #0104-441
A management oriented approach to the finance function of the corporation. Application of decision making techniques in planning for the procurement and distribution of capital, directing its use, and evaluating management's action in providing a return on the firm's investment. (BBUA-210, GSSE-302)

Class 4, Credit 4

BBUF-502 **Money and Capital Markets**
Registration #0104-502
Analysis and description of the money and capital markets, secondary distributions, and government issues. (BBUE-381)

Class 4, Credit 4

BBUF-503 **Financial Problems**
Registration #0104-503
The analysis of financial problems and application of decision making techniques to the operation of the firm. (BBUF-441)

Class 4, Credit 4

BBUF-504 **International Finance**
Registration #0104-504
The balance of payments, foreign exchange rates and markets, gold standard, flexible exchange rates system, international capital movements, exchange restrictions, and international monetary experiences. (BBUE-381)

Class 4, Credit 4

BBUF-507 **Security Analysis**
Registration #0104-507
Analysis of classes of securities and issues. Description of the stock market and its operations. Derivation of value by quantitative techniques. (BBUF-441)

Class 4, Credit 4

BBUF-508 **Portfolio Management**
Registration #0104-508
Analysis of fundamental criteria involved in the construction and management of securities portfolios. Theory of yield and policies of financial institutions. (BBUF-507)

Class 4, Credit 4

BBUF-510 **Financial Institutions**
Registration #0104-510
Analysis of the factors influencing private financial institutions and their effect on the economy. Relationship of the Federal Reserve and Treasury Department to private financial institutions. (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)

Marketing

BBUM-263 **Marketing Principles**
Registration #0105-263
Specific topics covered include understanding consumer behavior, product policy and planning, pricing institutions and channel, logistics advertising, personal selling and sales promotion, market research, international marketing, organization and controlling marketing activities. (BBUA-210, GSSE-302)

Class 4, Credit 4

BBUM-420 **Consumer Behavior**
Registration #0105-420
A course focusing on the role of the ultimate consumer in the marketing process. Emphasis will be on understanding the psychological, cultural and socioeconomic influences in the consumer decision making process. (BBUM-263)

Class 4, Credit 4

BBUM-510 **Consumer Services Analysis**
Registration #0105-510
A course designed to examine the common attributes and problems of consumer service institutions. Topics to be covered: factors of market segmentation- customer needs; models of present and future service organizations, organizational concerns, and external environmental variables affecting consumer service industries. (BBUM-263)

Class 4, Credit 4

BBUM-511 **Consumer Services Seminar**
Registration #0105-511
A course designed to explore the current problems and opportunities of service industries, including an analysis of external environmental variables and their impact. (BBUM-510)

Class 4, Credit 4

BBUM-550 **Marketing Management Problems**
Registration #0105-550
A course designed to provide the student with an in-depth knowledge of middle and upper management level marketing problems. In addition, the student should become familiar with tools used by marketing managers at these levels. (BBUM-552, 553)

Class 4, Credit 4

BBUM-551 **Marketing Research**
Registration #0105-551
A study of research methods and procedures used in the marketing process. Topics include problem formulation, sources of market data, research methodology, data collection, data analysis, and the role of marketing research within the firm. (BBUM-263, BBUQ-352 or BBUQ-411)

Class 4, Credit 4

BBUM-552 **Advertising**
Registration #0105-552
The role of advertising as a vital function of the marketing field. Material will be studied from the point of view of the manner in which advertising contributes to the marketing mix, rather than from the creative aspects of production and copy. (BBUM-263)

Class 4, Credit 4

BBUM-553 **Sales Management**
Registration #0105-553
Course emphasizes the sales function of marketing management. It centers around the problems managers face in the direction, control, and supervision of sales activities. (BBUM-263)

Class 4, Credit 4

BBUM-554 **Seminar in Marketing**
Registration #0105-554
The objective of this course is to enable the student to bring together interests, learnings and experiences obtained in previous marketing courses. Specific course content will vary. (Permission of instructor)

Class 4, Credit 4 (maximum 12 hours credit)

BBUM-555 **International Marketing**
Registration #0105-555
Management problems of marketing in foreign countries. Topics to be considered include the economic, cultural, and political roots of marketing systems. (BBUM-263)

Class 4, Credit 4

BBUM-556 **Marketing Logistics**
Registration #0105-556
A study of physical supply and physical distribution activities. Topics include transportation, inventory control, materials handling, warehousing, order processing, protective packaging, product scheduling, facility location and customer service. (BBUM-263, BBUB-201)

Class 4, Credit 4

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

Class 4, Credit 4

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

RRUQ-291 , 292 Mathematics I, II
Registration #0106-291, 292
The mathematical background required for the increasing use of quantitative methods in management. Topics include set theory coordinate, geometry, functional relationships, and the fundamental concepts and methods of differential and integral calculus.

Class 4, Credit 4

BBUO-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 as presented in professional literature and government and business reports; and to develop an understanding of how statistical inference may be used as one method of evaluation for managerial decisions. (BBUQ-291)

Class 4, Credit 4

BBUQ-353 Statistics III
Registration #0106-353
An introduction to Bayesian decision theory, including discontinuous prior and posterior probability functions, regret functions, the value of sample information, and normal prior and posterior functions. (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
Statistical probability theory, regression and correlation, hypothesis testing, estimation and non-parametric techniques. (BBUQ-410)

Class 4, Credit 4

BBUQ-481 Mathematics
Registration #0106-481
Applications of quantitative methods in business decisions: linear and quadratic optimization techniques, using precalculus mathematics. Computer demonstrations will be used where possible. (BBUQ-352 or BBUQ-411)

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 man for food. Development of dietary standards and guides; application of nutritional principles in planning and analyzing menus for individuals of all ages. Survey of current health nutrition problems and food misinformation. (BFAM-215).

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-311)

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.

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

BFAD-520 Communication & Instructional Techniques
Registration #0107-520 (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 diet and dietetics in metabolic, gastro-intestinal, renal, musculoskeletal, cardiac, endocrine, febrile, and other diseases. (BFAD-213, SCHG-203, SBIG-212)

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-526 and senior standing)

Class 4, Credit 4

BFAD-550 Community Nutrition
Registration #0107-550
Survey of current community nutrition problems: Food misinformation, factors affecting food habits, income groups and rehabilitation nursing. Discussion and participation in community programs designed to solve nutritional problems. (BFAD-213, BFAD-526)

Class 4, Credit 4

BFAD-551 Management of Food Systems
Registration #0107-551 (Coordinated Dietetics Program)
Principles of management in organizational structure, supervision and evaluation of employee performance, and use of computers in food management. The functions of an administrative dietitian in planning, organizing, directing, coordinating, and controlling dietetic activities.

Class 1, Credit 4
Practicum in hospital by arrangement

BFAD-560, 561 Clinical Dietetics I & II
Registration #0107-560, 561 (Coordinated Dietetics Program)
A two-course sequence integrating Advanced Nutrition, Diet Therapy, Nutrition Seminar with the application of Dietetics to give nutrition care in a clinical (hospital) setting. Designed for senior students in the Coordinated Dietetics Program. Sequence offered in two consecutive quarters. (BFAD-213, SCHG-203, SBIG-212)

Class 4, Credit 8/quarter
Clinical hours by appointment

Food and Tourist Industries Management

BFAM-210 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

BFAM-215 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
Registration #0108-310
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. Emphasis on practical application to daily food selection and composition. (Not open to those who have completed BFAD-213)

Class 4, Credit 4

BFAM-311 Equipment in the Hospitality Industry
Registration #0108-311
Recognizing, analyzing and solving equipment and space problems in layouts of existing institutions and in designing new food service plans. Consideration of food service equipment; determination of needs, development of specifications, procedures of maintenance, sanitation, and safety. (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-311)

Class 2, Credit 2

BFAM-321 Food and Beverage Merchandising
Registration #0108-321
Written menu presentation for various types of commercial food services and other merchandising and promotional techniques for the food service industry. Presentation of beverages as related to bar management. (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 operations 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-332. (BFAM-215)

BFAM-331 Class 3, Lab. 6, Credit 5
BFAM-332 Class 2, Lab. 6, Credit 4

BFAM-411 Management Problems
Registration #0108-411
Analyzing and solving problems encountered by management in planning, organizing, directing, coordinating, and controlling the activities of a food service institution. Approaches to problem solving include solutions of authorities in the field and readings in literature: journals, books, case studies. (BBUB-201, 8BUB-401)

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-212, SCHG-216)

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. Special emphasis on experimental design for problem solving and on written and oral communication skills. (BFAM-415)

Class 2, Lab. 6, 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)

Class 4, Credit 4

BFAM-425 Introduction to the Tourist Industry
Registration #0108-425
Evolution of tourism as an industry geographically and culturally. The economic role of tourism, tourism demand, tourism organizations, planning and development. Managerial requirements.

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-competitve markets. (BBUM-263)

Class 4, Credit 4

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 the 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)

Class 1, Lab. 8, Credit 4

BFAM-517 **Ethnic Foods**
Registration #0108-517
Study of regional and international foods and food customs of peoples of various backgrounds.

Class 4, Credit 4

BFAM-554 **Seminar in Tourist Industries**
Registration #0108-554 **Management**
Selected management problems associated with hotels, motels, resorts and travel systems. Topics such as the areas and groups that constitute the source of tourism, attractions that draw them, conveyances and routings used, matters of rates, foreign exchange, passport requirements or other current management concerns will be covered.

Class 4, Credit 4

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**
Registration #0109-211 **Management**
This survey course is a basic orientation to the field of retailing. Emphasis i.s placed on the major store functions of merchandising, sales promotion, control, operations, and personnel. The activities of each of these areas and their interrelationships are considered.

Class 4, Credit 4

BRER-212 **Merchandising Concepts I**
Registration #0109-212
A detailed examination to the merchandise function with particular attention to the role of the store buyer. Topics include buying and pricing merchandise, operating statements, inventory valuation, shortages, merchandise planning and control. (BRER-211)

Class 4, Credit 4

BRER-213 **Merchandising Concepts II**
Registration #0109-213
A comprehensive study of retail mathematics associated with the merchandising function. Specific topics include markup, markdowns, retail method of inventory, turnover, the merchandise plan, and open-to-buy. (BRER-212)

Class 4, Credit 4

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

Class 1, Credit 1

BRER-410 **Retail Sales Promotion**
Registration #0109-410
A study of the sales promotion function of a retail store. Basic philosophies, planning, budgeting, use of media and market coverage are stressed. Two major activities, public relations and retail advertising are examined with emphasis on the retail advertising function. Students are introduced to techniques used in creating newspaper advertising. (BBUM-552)

Class 4, Credit 4

BRER-511 **Basic 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 furnishings.

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 influencina^tyles and merchandising of apparel throughout the ages and now 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

BRER-531 **Basic Interior Design**
Registration #0109-531
A study of the basic elements and principles of design. A variety of art media and techniques are explored as applied to interior design.

Lab 8, 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 ultilitarian 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 homes furnishings. Practical application to these principles to determine the level of good taste.

Class 4, Credit 4

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 courses, Business Administration

BBUA-713 **Basic Financial Accounting**
Registration #0101-713
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-714 **Basic Accounting Theory**
Registration #0101-714
A treatment of basic accounting theory and concepts and an analysis of the special problems that arise in applying these underlying concepts to financial accounting. Valuation of assets, liabilities and capital. Adjustments for price level changes. Analysis of financial statements for credit, investment, and managerial purposes. (Foundation courses)

Credit 4

BBUA-715 **Accounting Controls**
Registration #0101-715
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-716 **Advanced Public Accounting**
Registration #0101-716
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-714 or admission to M.S. program)

Credit 4

BBUA-717 **Basic Taxation Accounting**
Registration #0101-717
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. (Foundation courses or admission to M.S. program)

Credit 4

BBUA-718 **Seminar in Advanced Accounting and Theory**
Registration #0101-718
Analysis and evaluation of current accounting thought relating to the nature, measurement and reporting of business income and financial position. Concepts of income. Attention to special areas relating to consolidated statement, partnerships, consignments and installment sales. (BBUA-714 or admission to M S program)

Credit 4

BBUA-719 **Seminar in Accounting**
Registration #0101-719
Course content will differ by instructor and quarter. Topics covered: taxation, international accounting and accounting for non-profit organizations (Permission of Director)

Credit 4

BBUA-720 **Advanced Taxation Accounting**
Registration #0101-720
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-717 or admission to Master of Science in Accountancy)

Credit 4

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 organizational change from the structural, systemic, and humanistic perspectives. Text and reading of original sources supplemented by case analysis and/or research paper. (Foundation courses)

Credit 4

BBUB-742 **Business and Society**
Registration #0102-742
A study of the impact on the manager of the needs, demands and restrictions posed by employees, government, the consumer and other environmental forces. The course examines possible managerial responses within the framework of several definitions of "social responsibility." (Foundation courses)

Credit 4

BBUB-743 **Operations Management**
Registration #0102-743
An analytical approach to the theory and application of operations management. Combines quantitative models and qualitative considerations relating to forecasting, inventory management, quality control, and queuing analysis. Statistical reasoning and computer utilization are basic tools in problem solution. (Foundation courses)

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
Concepts of individual development. Overview of present individual and group procedures. Implications of current technological development for training, replacement, and advancement. (BBUB-741)

Credit 4

BBUB-747 **Systems Administration**
Registration #0102-747
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

BBUB-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

BBUB-750 **Personnel Systems**
Registration #0102-750
This course introduces the concept of personnel systems and allows a detailed examination of the system's 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

BBUB-751 **Legal Environment of Business**
Registration #0102-751
An introduction to legal principles and their relationship to business practices. The background and sources of law, law enforcement agencies and procedures. Topical 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

BBUB-758 **Seminar in Management**
Registration #0102-758
This course will take on different content depending on the instructor and quarter when offered. Topics which may be covered include management thought, systems theory and application and behavioral aspects of management. Specific content for a particular quarter will be announced prior to the course offering. (Permission of Director)

Credit 4

BBUB-759 **Integrated Business Analysis**
Registration #0102-759
A course intended to give experience in combining theory and practice gained in other course work. This integrative exposure is achieved by solving complex and interrelated business policy problems that cut across the several functional areas of marketing, production, finance and personnel. This course is aimed at the formulating and implementation of business policy as viewed by top management. The case method is used extensively. (All other core courses)

Credit 4

BBUB-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

BBUB-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: BBUB-770, BBUA-718, BBUF-723, BBUQ-784)

Credit 8

BBUB-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

Finance group

BBUF-722 **Financial Management**
Registration #0104-722
A broad coverage of business finance with emphasis on the analytical techniques of resource allocation and asset management. Covers securities and securities markets, capital structure, analysis of financial statements, financing business operations, cost of capital and capital budgeting. (Foundation courses)

Credit 4

BBUF-723 **Theory of Finance and Research**
Registration #0104-723
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-724 **Problems in Financial Management**
This course is designed to give the student greater depth in the basic concepts of financial management and greater facility in using the analytical techniques. Extensive use will be made of case material. Problem types to be considered include liquid asset management, capital budgeting, security valuation, methods of financing and dividend policy. (BBUF-722)

Credit 4

BBUF-725 **Securities and Investment Analysis**
Registration #0104-725
Study of securities and various investment media and their markets. Analysis of investment values based on financial and other data. Considers factors such as return, growth, and risk. (BBUF-722)

Credit 4

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

Credit 4

BBUF-745 **Economic Environment of American Business**
Registration #0104-745
Nature of the business firm. Theory of demand, costs and prices. Competition and monopoly. Production function and the marginal productivity theory of distribution. Saving and investment; the determination of the level of income. Federal Reserve operations; fiscal and monetary policies.

Credit 4

BBUF-757 **Seminar in Economics**
Registration #0104-757
Content will differ depending on the quarter and instructor. Topics which may be covered include international finance, monetary theory, labor economics and market structure. (Permission of Director)

Credit 4

BBUF-765 **Business Economics and Applied Econometrics**
Registration #0104-765
The course stresses model building, with emphasis on the economic foundations of the models. Econometric techniques are employed in the development and testing of aggregate, industry, and company models, with attention given to the feedback relationship from the aggregate (macro) model to the industry and company models. Forecasting and analysis of the industry and company models are employed. Simulation of the models under alternative policy assumptions is performed. Bank data, model-tools, and computer programs are supplied. (Foundation courses)

Credit 4

BBUF-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

BBUF-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

Marketing Group

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

Credit 4

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

Credit 4

BBUM-763 **Seminar in Consumer Behavior**
Registration #0105-763
A study of the market in terms of the psychological and socio-economic determinants of the buyer's behavior, including current trends in purchasing power and population movements. (BBUM-761)

Credit 4

BBUM-764 **Marketing Logistics**
Registration #0105-764
The study of an integrated system for the distribution of products from producer to consumer. The emphasis is on the physical flow of goods both between marketing institutions as well as within marketing institutions. Specific topics covered are unit geographic location, internal product flow, inter-unit transportation, and warehousing. (BBUM-761)

Credit 4

BBUM-766 **International Marketing**
Registration #0105-766
A study of the differences in market arrangements as well as in the legal, cultural, and economic factors found in foreign countries. Topics included are planning and organizing for international marketing operations; forecasting and analysis; interrelationships with other functions; and product, pricing, promotion, and channel strategy. (BBUM-761)

Credit 4

BBUM-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)

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

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, point estimation, and hypothesis testing. Applications are made to the managerial decision making situation.

Credit 4

BBUQ-782 **Statistical Analysis II**
Registration #0106-782
A continuation of topics from classical statistics including interval estimation, nonparametric tests, analysis of variance, regression and correlation analysis, time series, and index numbers. (BBUQ-781)

Credit 4

BBUQ-783 **Bayesian Decision Analysis**
Registration #0106-783
An introduction to decision theory for managerial decision situations with a strong emphasis on Bayesian decision analysis. Topics include modeling, principles of choice, the expected opportunity loss, the expected value of information, revision of discrete and continuous prior distributions, the expected value of sample information, optimal sampling, utility functions, and decision diagramming. (BBUQ-782) (Not open to Decision Science Majors)

Credit 4

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

BBUQ-786 Operations Research-
Registration #0106-786 Mathematical Programming
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

BBUQ-787 Operations Research-
Registration #0106-787 Probabilistic Models
An introduction to the use of probability in operations research models. Probabilistic techniques are applied to the problems of forecasting, capital budgeting, PERT, inventory, queueing and Markov processes. (BBUB-778)

Credit 4

BBUQ-789 Simulation
Registration #0106-789
An introduction to the various uses of simulation as a management tool for decision making. Models of varying levels of sophistication employing simulation programming languages are constructed. (Foundation courses)

Credit 4

BBUQ-792 Concepts in Computer Utilization
Registration #0106-792
An introduction to the use of computers in problem solving. Students are exposed to the BASIC programming language. Computer systems and their use in business are examined.

Credit 4

BBUQ-795 Seminar in Decision Sciences
Registration #0106-795
This course will take on different content depending on the instructor and quarter when offered. Topics which may be covered are: multi-variate analysis, simulation, operations research, linear programming and Bayesian techniques. Specific content for a particular quarter will be announced prior to course offering. (Permission of Director)

Credit 4

College

of Continuing

Education

Graduate courses in Applied and Mathematical Statistics

CASM-711 Fundamentals of Statistics I
Registration #0219-711
For those taking statistics for the first time. Covers the statistical methods used most in industry, business and research. Essential to 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

CASM-712 Fundamentals of Statistics II
Registration #0219-712
Continuation of CASM-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) (CASM-711 or equivalent.)

CASM-721 Quality Control: Control Charts
Registration #0219-721
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

CASM-731 Quality Control: Acceptance Sampling
Registration #0219-731
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

CASM-741 Techniques for Investigational Analysis
Registration #0219-741
Studies of special statistical techniques applicable to industrial, educational, accounting, medical, and business-type problems. Helpful to those doing research in these fields.

Topics: use of special probability papers, probit analysis, sensitivity testing, order statistics and extreme value applications, analysis of means, goodness of fit tests, and special plotting techniques. (CASM-712 or equivalent.)

Credit 3

CASM-751 Introduction to Decision Processes
Registration #0219-751
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 managerial strategies, practical applications. (Consent of the department.)

Credit 3

CAS M-761 Reliability
Registration #0219-761
A methods course in reliability practices: What a reliability engineer must know about reliability prediction, estimation, analysis, demonstration, and other reliability activities. Covers most methods presently being used in industry.

Topics: Applications of normal, binomial, exponential, and Weibull graphs to reliability problems; hazard plotting; reliability confidence limits and risks; strength and stress models; reliability safety margins; truncated and censored life tests; sequential test plans; Bayesian test programs. (CASM-712 or equivalent.)

Credit 3

CASM-801 Design of Experiments I
Registration #0219-801
How you design and analyze experiments in any subject matter area; what you do and why.
Topics: Basic statistical concepts, scientific experimentation, completely randomized design, randomized complete block design, nested and split plot designs. Practical applications to civil engineering, pharmacy, aircraft, agronomy, photoscience, genetics, psychology, and advertising. (CASM-712 or equivalent.)
Credit 3

CASM-802 Design of Experiments II
Registration #0219-802
Continuation of CASM-801
Topics: Factorial experiments: fractional, three level, mixed; response surface exploration. Practical applications to: medical areas, alloys, highway engineering, plastics, metallurgy, animal nutrition, sociology, industrial and electrical engineering. (CASM-801.)
Credit 3

CASM-811 Probability Theory and Applications I
Registration #0219-811
How to handle processes that have some chance element in their structure.
Topics: Review of basic concepts of mathematical theory; Markov sequences; Poisson processes, and discrete parameter random processes; applications. (CASM-822 or equivalent.)
Credit 3

CASM-812 Probability Theory and Applications II
Registration #0219-812
Continuation of CASM-811, with more on stochastic processes.
Topics: Algebraic methods useful for solving Markov chains, non-finite and continuous Markov chains, limiting distributions, and an introduction to queuing theory. (CASM-811 or equivalent.)
Credit 3

CASM-821 Theory of Statistics I
Registration #0219-821
Provides a sound theoretical basis for continuing study and reading in statistics.
Topics: constructs and applications of mathematical probability; discrete and continuous distribution functions for a single variable and for the multivariate case; expected value and moment generating functions; special continuous distributions. (Consent of the department.)
Credit 3

CASM-822 Theory of Statistics II
Registration #0219-822
Continuation of CASM-821.
Supporting theory for, and derivation of, sampling distribution models; applications and related material. (CASM-821 or equivalent.)
Credit 3

CASM-823 Theory of Statistics III
Registration #0219-823
Continuation of CASM-821, 822.
Point estimation theory and applications; the multivariate normal probability model, its properties and applications; interval estimation theory and applications. (CASM-822 or equivalent.)
Credit 3

CASM-841 Regression Analysis I
Registration #0219-841
A methods course dealing with the general relationship problem.
Topics: the matrix approach to simple and multiple linear regression; analysis of residuals; dummy variables; orthogonal models; computational techniques. (CASM-802 or equivalent.)
Credit 3

CASM-842 Regression Analysis II
Registration #0219-842
A continuation of CASM-841.
Topics: selection of best linear models; regression applied to analysis of variance problems; nonlinear estimation and model building. (CASM-841 or equivalent.)
Credit 3

CASM-851 Nonparametric Statistics
Registration #0219-851
Distribution-free testing and estimation techniques with emphasis on applications.
Topics: sign tests; Kolmogorov-Smirnov statistics; run tests; Wilcoxon-Mann-Whitney test; Chi-Square tests; rank correlation; rank order tests; quick tests. (CASM-712 or equivalent.)
Credit 3

CASM-853 Managerial Decision Making
Registration #0219-853
Continuation of CASM-751, statistical decision analysis for management.
Topics: utilities; how to make the best decision (but not necessarily the right one); normal and beta Bayesian theory; many action problems; optimal sample size; decision diagrams. Applications to marketing; oil drilling; portfolio selection; quality control; production; and research programs. (CASM-751 or equivlent.)
Credit 3

CASM-861, 862 Reliability Certification
Registration #0219-861, 862 Seminars I & II
The American Society for Quality Control (ASQC) offers Certification as a Reliability Engineer by written examination. 861-862 (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, analysis, apportionment, test and demonstration, math models growth; maintainability, parts selection, design review, human factors; and other selected reliability activities. (Consent of the department.)
Credit 3/Qtr.

CASM-871 Sampling Theory and Application
Registration #0219-871
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. (CASM-712 or equivalent.)
Credit 3

CASM-881 Bayesian Statistics I
Registration #0219-881
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; entropy and information; description of errors in measurements; analysis of experimental results. (CASM-712 or equivalent.)
Credit 3

CASM-882 Bayesian Statistics II
Registration #0219-882
Continuation of CASM-881: non-normal and contaminated distributions; decision making; discrimination; tests of significance and goodness of fit from the Bayesian point of view; sequential decisions; handling several variables: comparisons, measuring efficiency, straightline analysis. A potpourri of applications: rare events, reliability, radar, and other. (CASM-881.)
Credit 3

CASM-891, 892,893 Special Topics In Applied Statistics
Registration #0219-891, -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.

CASM-895 Statistics Seminar
Registration #0219-895
This course or sequence of courses, provides for one or more quarters of independent study and research activity by students other than those in the Plan C option. This course may be used by other departments at RIT (or other colleges) to provide special training in statistics for students who desire an independent study program in partial fulfillment of graduate degree requirements. (Consent of all departments involved.)

Credit 3

CASM-896, 897,898 Thesis
Registration #0219-896, -897, -898
For students working for the M.S. degree in Mathematical Statistics under Plan A. (Consent of the department.)

Credit 3/Qtr.

CASM-899 Individual Achievement Program
Registration #0219-899
For students accepted under the Plan C Option (Independent Study). The program to be followed will permit either:

(a) satisfactory achievement in the same subject matter the student would select under Plan A or Plan B; or

(b) satisfactory achievement through independent studies in the student's particular field of professional interest in statistics, such as mathematics, engineering, qualify control, or business.

Prerequisite: Consent of the department.

Credit 3-45 quarter hours to be earned and recorded in quarter hour segments as the candidate progresses in the plan of independent study set up with him.

CASM-830 Multivariate Analysis
Registration #0219-830
Deals with the summarization, representation, and interpretation of data sampled from populations where more than one characteristic is measured on each sample element. Usually the several measurements made on each individual experimental item are correlated and certainly one should not apply univariate analysis to each measurement separately. This course covers the use of the basic multivariate techniques. Computer problem solving will be emphasized. Topics will include multivariate: t-test, ANOVA, regression analysis, repeated measures, quality control and profile analysis. (CASM-801, 802.)

Credit 3

College of Engineering

Engineering

EENG-201 Introduction to Engineering I
Registration #0302-201
The basic objective of the lecture portion of the course is to introduce the student to the engineering profession and to the fields of electrical, industrial, and mechanical engineering. Problems at an introductory level are used to give the student an immediate sense of identification with engineering. The laboratory portion of the course is devoted to the fundamentals of graphical communication.

Class 3, Lab. 2, Credit 4

EENG-202 Introduction to Engineering II
Registration #0302-202
This course is offered in three distinct versions. The intent is to give the student greater in-depth understanding of one of the three engineering fields-electrical, industrial, mechanical-than was possible in the first course. Course format varies among the three versions.

Credit 4

Electrical Engineering

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, network topology, and Fourier analysis. (SMAM-253, SPSG-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-352 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. (SPSG-207, SMAM-306)

Class 3, Lab. 3, Credit 4

EEEE-471, 472 Electromagnetic Fields I, II
Registration #0301-471, -472
Vector analysis, electrostatics and dielectrics, conduction current fields, magnetics, time varying fields, Maxwell's equation and wave equations. Concepts of retarded potentials. (SMAM-308)

Class 4, Credit 4 - EEEE-471
Class 3, Lab. 3, Credit 4 - EEEE-472

EEEE-531 Electromechanical Energy Conversion
Registration #0301-531
A development of the basic relationships of field energy, magnetic force, torque and generated voltage in an electromechanical device. Expansion of these fundamentals into an understanding of the operational characteristics of the electrical machine. (EEEE-353)

Class 3, Lab. 3, Credit 4

EEEE-613 Introduction to Classical 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. (EEEE-430, SMAM-420)

Class 3, Lab. 3, Credit 4

EEEE-634 Introduction to Communications
Registration #0301-634
Modulation theory, including both amplitude and frequency modulation and demodulation systems. Pulse modulation systems, including pulse amplitude modulation, pulse width modulation and pulse position modulation. Introduction to random signals and noise, with emphasis on the determination of system performance. (SMAM-351, EEEE-430)

Class 4, Credit 4

EEEE-643 Electronics III
Registration #0301-643
Linear waveshaping. Digital circuits including the multivibrator family, gates, non-linear waveshaping. Introduction to switching theory: Boolean algebra, logic circuits, K-maps, counters, converters, sampling circuits. (EEEE-441)

Class 3, Lab. 3, Credit 4

Technical Electives

EEEE-532 Electrical Machines I
Registration #0301-532
The design and operating characteristics, both static and dynamic of transformers and synchronous and induction machines. (EEEE-353, 471)

Class 3, Lab. 3, Credit 4

EEEE-535 Introduction to Power Conditioning
Registration #0301-535
This course provides an introduction to the theory of thyristor circuits with emphasis on applications. The course builds upon the theory of static switching, SCR characteristics, triggering and commutation. This leads the way to the study of controlled and uncontrolled rectification and inversion, AC and DC line control and frequency conversion using thyristors. The laboratory is an integral part of the course where the experiments complement the classroom lectures by providing exposure to the device characteristics, testing and measuring techniques and various thyristor systems. (EEEE-441, EEEE-531 or concurrent registration for EEEE-531)

Class 3, Lab., 3, Credit 4

EEEE-536 Motor Application and Control
Registration #0301-536
A review of the speed torque characteristics of DC and AC motors. A study of the characteristics of mechanical loads and the transient response of electromechanical systems. A review of thyristor characteristics and the design of solid state motor control systems. (EEEE-430, 531, 645)

Class 3, Lab. 3, Credit 4

EEEE-590 Thesis
Registration #0301-590
A research or development 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

EEEE-614 Control Synthesis
Registration #0301-614
This course builds upon the classical analysis techniques introduced in EEEE-613. Practical experimental and mathematical approaches to obtaining transfer functions are developed. Resulting systems are modeled both analytically in the LaPlace domain and experimentally on the analog computer. System improvements by tachometer feedback, lead compensation, lag compensation and by lead-lag compensation are developed using Nyquist, Bode and Nichols chart methods and by root locus. Results are verified experimentally. Figures of merit are discussed and applied. (EEEE-613)

Class 3, Lab. 1, Credit 4

EEEE-621 Transmission Propagation and Waves
Registration #0301 -621
A course in guided and unguided wave propagation. Transmission lines, wave guides, antennas. Antenna arrays, radio-frequency and optical interference and diffraction. Aperture effects and beam-forming. (EEEE-472)

Class 3, Lab. 3, Credit 4

EEEE-645 Special Semiconductors
Registration #0301-645
The study of a variety of semiconductors which are not included in the required electronics course sequence. Included are the UJT, SCR, DIAC, TRIAC, VARACTOR, ZERO-CROSSING IC, VARIOUS PHOTO DEVICES, VARIOUS MOSFET types and their applications. (EEEE-643)

Class 3, Lab. 3, Credit 4

EEEE-650 Introduction to Logic and Switching
Registration #0301-650
Boolean algebra. Analysis and synthesis of combinatorial switching circuits. Analysis and synthesis of sequential switching circuits. Hazards in switching circuits for digital computers. (EEEE-643)

Class 4, Credit 4

EEEE-665 Digital Computer Workshop
Registration #0301-665
This course will stress the working structure, programming details, and interfacing characteristics of minicomputers in sufficient detail to enable one to use them in a varied set of engineering applications. (ICSP-205 or ICSP-220)

Class 3, Lab. 3, Credit 4

EEEE-666 Introduction to Microcomputers
Registration #0301-666
This course will discuss currently available microcomputer systems and will include such topics as programming methods, architecture, areas of application and a relative comparison of existing systems. The course will consist of lecture, seminar and some student projects. Enrollment will be limited to 15 and preference will be given to 5th year students with the required prerequisites. (EEEE-643, EEEE-665)

Credit 4

EEEE-670 Introduction to Microelectronics
Registration #0301-670
Hybrid and monolithic microelectronic technology. Processes in thick film and thin film circuit fabrication. Complementary nature of monolithic and film circuits. Impact of fabrication, testing and quality control on microcircuit design. (EEEE-643)

Class 4, Credit 4

EEEE-671 **Hybrid Microelectronics Design**
Registration #0301-671
An electronic design course utilizing the media 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. (EEEE-670)

Class 3, Lab. 3, Credit 4

EEEE-673 **Applied Electronic Design**
Registration #0301-673
A project-type lab-oriented course wherein the student will design, build, and test electronic circuits, system parts, or systems to specifications. The course is a modest attempt to simulate the industrial setting to better prepare the student to handle practical electronic design work by providing a supervised first attempt experience. (EEEE-643)

Class 3, Lab. 3, Credit 4

EEEE-675 **Analog/Hybrid Computation**
Registration #0301-675
An introduction to the concepts of digital logic as applied to analog simulation and computation. This will include the basic concepts of iterative analog computation, hybrid computation, interface hardware and software, and hybrid computer applications. Instruction and practice will be provided in the techniques of programming and operating the DES-30/TR48 analog/ hybrid computer. (EEEE-613)

Class 4,Credit 4

EEEE-679 **Active and Passive Filters**
Registration #0301-679
The first half of this course deals with the filter transfer functions, poles and zeros and 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. (EEEE-430)

Class 4, Credit 4

EEEE-687 **Power System Analysis**
Registration #0301-687
An introductory course dealing with basic power network concepts; matrix transformations and the use of the digital computer to solve them; parameters of power system equipment; the symmetrical component approach for handling balanced and unbalanced faults; load flow studies and the numerical techniques for solving them; and an introduction to system stability. (EEEE-531)

Class 4, Credit 4

EEEE-693 **Digital Data Communications**
Registration #0301-693
A course on the principles and practice of modern data communications systems. Topics covered include pulse amplitude modulation, frequency shift keying, phase-shift keying, pulse code modulation, digital error control, and frequency and switching. (EEEE-634)

Class 4, Credit 4

EEEE-695 **Introduction to Audio Engineering**
Registration #0301-695
A course based on topics from dynamics, acoustics and audio systems. Electrical-mechanical equivalents. Plane and spherical acoustic-waves. Radiators and resonators. Loudspeaker systems. Equalization methods in recording and playback. Elements of speech and hearing. (EEEE-430, SMAM-308)

Class 4, Credit 4

EEEE-696 **Communication Circuit Design**
Registration #0301-696
Design and operation of electronic circuits used in communication systems. Oscillators, amplifiers, modulators, matching networks, demodulators, transmitting and receiving systems. A project type laboratory is included. (EEEE-442)

Class 3, Lab. 3, Credit 4

Graduate courses in Electrical Engineering

The courses listed below are normally open only to students who have been formally admitted into the graduate E.E. programs. Students with a baccalaureate degree in engineering or science may be permitted to enroll in any of these courses as a special student if they have already completed the stated prerequisites for a particular course. Undergraduate students may be permitted to take some of these courses as undergraduate 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 graduate students on regular or provisional status.
Wherever 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.

EEEE-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 735, 736, 737.

Credit 4

EEEE-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. (EEEE-471, 472)

Credit 4

EEEE-705 **Electromagnetic Waves**
Registration #0301-705
Maxwell’s equations. Propagation of plane waves in unbounded regions. Reflection and refraction of waves. Total reflection, polarizing angle, multiple dielectric boundaries. Guided electromagnetic waves. Characteristics of common waveguides. Circular waveguides. Resonant cavities. Radiation and antennas. (EEEE-471, 472)

Credit 4

EEEE-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. (EEEE-704, 705)

Credit 4

EEEE-707 **Linear Systems**
Registration #0301-707
Linearity, superposition, impulse response, convolution. Fourier series and Fourier transform. LaPlace transform. Z transform. Matrices and linear equations. Solution of homogeneous equations, eigenvalues and eigenvectors. Functions of a matrix. This course is a prerequisite for many of the graduate E.E. courses and should be one of the first courses in a graduate student’s program.

Credit 4

EEEE-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 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. (EEEE-707)

Credit 4

EEEE-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. (Instructor's approval)

Credit 4

EEEE-711 Integrated Circuit Operational Amplifiers
Registration #0301-711
Differential amplifier small signal characteristics. Stages of an operational amplifier. Multistage operational amplifier. Phase compensation. Linear circuit applications. Operational amplifiers in non-linear circuits. Analog/digital, digital/analog and sampling networks. Waveform generators. Modulation and demodulation. The emphasis will be on the practical aspects. (EEEE-707 or instructor's approval)

Credit 4

EEEE-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.

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 and compensation of single and multiple-loop systems. (Elementary knowledge of LaPlace transforms)

Credit 4

EEEE-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, and state variables, matrices and matrix functions, controllability, observability and stability theory. (EEEE-611)

Credit 4

EEEE-714 Introduction to Nonlinear Control Systems
Registration #0301-714
An introduction to the physical nature and mathematical theory of nonlinear control systems' behavior using phase plane techniques, Liapounov Theory, describing function techniques and Popov's criterion. These are applied to both piecewise-linear and analytical nonlinear systems. (EEEE-713)

Credit 4

EEEE-715 Analysis of Nonlinear Control Systems
Registration #0301-715
Further development of Liapounov Theory including Aizerman's method, variable gradient methods and the Lure Forms. Perturbation methods, Variational techniques, Kryloff and Bogoliuboff method. Analysis of switching and relays. (EEEE-714)

Credit 4

EEEE-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. (EEEE-707)

Credit 4

EEEE-718 Statistical Design of Control Systems
Registration #0301-718
Brief review of probability. Statistical description of random processes. Mean square error analysis. Design of optimum linear control system for minimizing the mean square error with stationary random inputs with or without additive noise. Design with constraints.

Credit 4

EEEE-719 Sampled Data Control Systems
Registration #0301-719
Brief review of the theory of sampling and quantizing. Modified Z transform properties and application. Design and compensation techniques for sampled data control systems. Stability criteria. Synthesis of digital controllers. Multirate sampled data control systems. Computer control theory. (EEEE-713)

Credit 4

EEEE-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 maximum principle. Design of optimal linear systems with quadratic criteria. (EEEE-713)

Credit 4

EEEE-721 Thyristor Power Control and Conversion
Registration #0301-721
Thyristor family of semiconductors is becoming increasingly important 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 theory, triggering, commutations. Rectifiers: principles of controlled rectification, analysis of single- and three-phase controlled rectifiers. Inverters: series and parallel SCR inverters, design of inverters, sine-wave filters, forced commutated inverter, McMurray inverter. DC Systems: principles of dc-dc conversion, choppers, dc motor control, single-phase dc motor drives, three-phase dc motor drives, dual converter. Cycloconverter: frequency conversion using SCR's, phase-controlled cycloconverters, cycloconverter controls.
Modeling and Simulation of Thyristor Circuits: Thyristor models, approximations, digital simulation of choppers, inverters and cycloconverters, areas for further research.
Demonstration experiments will be set up. Also, individual projects by interested students will be encouraged.

Credit 4

EEEE-734 Communication Techniques
Registration #0301-734
Study of different modulation schemes. Linear modulation. Angle modulation. Heuristic discussion of noise in linear modulation and FM systems. Noise figure. Brief discussion of pulse modulation. (EEEE-707)

Credit 4

EEEE-735 Digital Data Transmission
Registration #0301-735
Pulse code modulation and pulse amplitude modulation. Carrier systems, FSK and PSK systems. DCPSK system. Signal space representation of data signals and discussion of signal space. (EEEE-702, 734)

Credit 4

EEEE-736 Information Theory
Registration #0301-736
An introduction to the fundamental concepts of information theory: entropy, equivocation, transinformation and redundancy. Coding for binary channels. Measurement of signal parameters in the presence of noise. Bandwidth vs. accuracy. (EEEE-702)

Credit 4

EEEE-737 Random Signals and Noise
Registration #0301-737
Random processes. Correlation functions. Spectrum of periodic functions and periodic random processes. Orthogonal series for a random process. Spectral densities. The Gaussian random process. Noise through a linear system. Physical sources of noise. Noise figure. Statistical decision theory. (EEEE-702)

Credit 4

EEEE-738 Physical Basis of Integrated Circuits
Registration #0301-738
A study of semiconductor physics to develop an understanding of the operation of various devices such as bi-polar transistors and MOS transistors. The emphasis will be on the development of models useful in circuit analysis and design. Fabrication and characteristics of integrated circuits will be discussed.

Credit 4

EEEE-740 Digital Integrated Circuits
Registration #0301-740
Monolithic IC fabrication process. Components, properties, models and equations. Different types of digital IC's. Applications of digital IC's to circuits as well as systems. Emphasis will be on the TTL family and problems most often faced by the practicing designer. (EEEE-650 or EEEE-750, 751. 751 may be taken concurrently)

Credit 4

EEEE-742 Computer Methods in Electrical Engineering
Registration #0301 -742
A study of numerical methods for the solution of problems in electrical engineering with special emphasis on approximation techniques. The method of moments and computer solutions of problems in antennas and microwave networks are studied. (SMAM-611)

Credit 4

EEEE-743 'Minicomputer Fundamentals
Registration #0301-743
A course designed to provide engineers with a practical knowledge of minicomputers. Stress will be placed on basic architecture, software fundamentals, interfacing characteristics, and interrupt structures and control of I/O devices.

Credit 4

EEEE-744 Microprocessors
Registration #0301-744
This course aims to provide an understanding of basic microprocessor architecture, develop an understanding of microcomputer programming techniques and software aids, and to illustrate methods of interfacing microcomputers to digital systems. Typical microprocessor applications which illustrate conventional logic replacement, hardware and software design trade-offs and design flexibility will be discussed. Most discussions will be based upon the Intel 8080 and the Motorola M6800. (EEEE-743)

Credit 4

EEEE-750 Switching Circuits I
Registration #0301-750
A study of combinational logic circuits and related topics. Switching algebra. Minimization of switching functions using algebraic, Karnaugh map, and Quine-McCluskey methods. Multiple output minimization. NAND circuits. Design examples. Decomposition of switching functions. Threshold logic circuits.

Credit 4

EEEE-751 Switching Circuits II
Registration #0301-751
A study of sequential logic circuits and applications. Iterative networks. Analysis and synthesis of synchronous and asynchronous, fundamental and pulse mode, sequential circuits. Application of sequential circuits to shift registers, and counters. (EEEE-750)

Credit 4

EEEE-752 Switching Circuits III
Registration #0301-752
This course will study finite state models of sequential circuits (sequential machines) and fault detection in logic circuits. Topics discussed will include decomposition and interconnection of sequential machines, state identification experiments, tests for detection of faults and their diagnosis in combinational and sequential logic circuits. (EEEE-750 and 751)

Credit 4

EEEE-772, 773,774 Special Topics in Electrical Engineering
Registration #0301 -772, -773, -774
This is a variable credit, variable topics course which can be in the form of regular courses or independent study under faculty supervision.

Credit variable (maximum 4 per course number)

EEEE-800, 801 Graduate Paper
Registration #0301-800, -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

EEEE-890 Research and Thesis Guidance
Registration #0301-890
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 #0302-790
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

EIEI-401 Introduction to Operations Research I
Registration #0303-401
An introduction to the methodology of problem solving. Investigation of mathematical programming techniques including linear programming, special types of linear programming problems and dynamic programming. (SMAM-308 or consent of instructor)

Class 4, Credit 4

EIEI-402 Introduction to Operations Research II
Registration #0303-402
A survey of elementary mathematical models within the field of systems and industrial engineering. Areas of study include queuing theory, network analysis, replacement theory, and inventory theory. (EIEI-401 or consent of instructor)

Class 4, Credit 4

EIEI-415, 516 HumanFactorsI.iI
Registration #0303-415, 516
A survey of human factors from 1) physiological constraints of the human; 2) behavorial/psychological characteristics of the human; and 3) the psychomotor skills ability of the human. Emphasis is placed on practical applications of each area.

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 simple man-machine systems.

Class 3, Lab. 2, Credit 4

EIEI-422 Systems and Facilities Planning
Registration #0303-422
Review of firm economics and market relationships, mass production economies, the plant location problem. The plant location problem: factors influencing layout (products, equipment, manpower, movement of materials, service factors), materials handling systems and factors influencing its design, methods of layout evaluation.

Class 4, Credit 4

EIEI-450 Applied Human Factors
Registration #0303-450 Design of Experiments
An applied approach to the problem of how one goes about running a study or experiment in human factors.

Class 4, 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. Comparison of theoretical techniques and actual practice is encouraged through case studies.

Class 4, Credit 4

EIEI-482,483 Production Control I, II
Registration #0303-482, -483
Fundamental principles of the control of industrial production. The relation of market demands, profits, facilities, economic flow of processes, utilization of machines, labor, costs.

Class 4, Credit 4

EIEI-503 Simulation
Registration #0303-503
A continuation of Operations Research II. Areas of study include waiting line models. Markov chains and application, simulation and its application to mathematical models. (EIEI-402 or consent)

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.

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, analysis of variance, and regression.

Class 4, Credit 4

EIEI-512 Reliability
Registration #0303-512
Concept of reliability, basic failure laws, reliability measurement, structural analysis of reliability, repair problems, surveillance problems, maintenance problem.

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.

Class 4, Credit 4

EIEI-540 Introduction to Operations Research IV
Registration #0303-540
An introduction to some more advanced topics in operations research and industrial engineering. Areas of study include game theory, Markov chains and their applications, network analysis, including PERT.

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; flow graphs.

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-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 on-going problems in the Rochester community.

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 in Industrial Engineering

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

Credit 4

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

Credit 4

EIEI-680 Engineering Planning and Control
Registration #0303-680
A course designed to introduce the student to the basic concepts of long range planning control, and project management. Topics will include budgeting, planning cycles, planning models, and related topics. Related topics will depend on the interest and direction of the class and may include such areas as aggregate planning models (linear decision rule, management coefficient model, search decision rule).

Credit 4

EI**EI-685** **Patent Law**
Registration #0303-685
The course will be primarily directed towards the patent laws of the United States, however, comparisons to the patent laws of other countries will be addressed as appropriate. The course will cover the broad categories of obtaining a patent, the exploitation of a patent, the corporation and patents as well as other patent-related items. Major topics to be specifically addressed include what is patentable under U.S. law, the concept of prior art, techniques used in the preparation of patent applications, the prosecution of a patent application at the U.S. Patent Office, the licensing of patents, the enforcement of patent rights through litigation, the benefits of patents, specific problems involving intellectual property within a corporate environment, trademarks, copyrights, and trade secrets. Emphasis will be placed on practical situations involving the handling of inventions within the corporation and on behalf of an individual inventor.

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

EIEI-710 **Systems Simulation**
Registration #0303-710
Methods of modeling and simulating man-machine systems with emphasis on model validation, design of simulation experiments, variance reduction techniques, random number generation, distribution generation.

Credit 4

EIEI-715,716 **Statistical Analysis for**
Registration #0303-715, -716 **Engineers I and II**
A basic two-quarter course in probability and statistics designed to give the student a foundation for further study in areas such as design of experiments, stochastic systems, and simulation.

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

EIEI-730 **Biotechnology and Human Factors I**
Registration #0303-703
Basic functional anatomy and physiology. Human body systems. Anthropometry. Applications on the design for man and man-machine systems. Work physiology. Industrial biomechanics.

Credit 4

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

Credit 4

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

Credit 4

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

Credit 4

EIEI-734 **Systems Safety Engineering**
Registration #0303-734
Accident study of the human component in occupational systems. Product systems safety analysis. Approaches in accident prevention.

Credit 4

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

Credit variable (maximum 4 per course number)

Mechanical Engineering

EMEM-332 **Mechanics II (Dynamics)**
Registration #0304-332
Rectilinear and curvilinear motion using vector calculus. Work, power, and energy. Impulse, momentum, and impact. Mechanical vibrations. Special problems. For students majoring in Electrical and Industrial Engineering. (SMAM-305 and EMEM -336)

Class 4, Credit 4

EMEM-335 **Strength of Materials**
Registration #0304-335
Relation between stress and strain, deflection of beams, shafts and columns. Combined stresses, stress and strain at a point and theories of failure are covered. (EMEM-336)

Class 3, Lab. 2, Credit 4

EMEM-336 **Statics**
Registration #0304-336
This basic course in statics of rigid bodies integrates the mathematical subjects of vector algebra and simultaneous linear algebraic equations with the physical concepts of Newton's Law of Statics and Reaction. (SMAM-253, SPSG-205)

Class 3, Lab. 2, Credit 4

EMEM-337 **Strength of Materials I**
Registration #0304-337
This basic course in statics of deformable bodies integrates the mathematical subjects of vector algebra, differential equations, and theory of a continuum with the fundamental physical considerations which govern the mechanics of solids in equilibrium. Topics covered include mechanics of deformable bodies, forces and moments transmitted by slender bodies, stress and strain, and temperature effects on stress-strain relations. (EMEM-336)

Class 3, Lab. 2, Credit 4

EMEM-338 **Strength of Materials II**
Registration #0304-338
A continuation of Strength of Materials I to include torsion, bending stresses, deflection due to bending, and stability considerations. (EMEM-337)

Class 3, Lab. 2, Credit 4

EMEM-343 **Materials Processing**
Registration #0304-343
A study of the application of machine tools and fabrication processes to engineering materials in the manufacture of products. Topics covered include such metal fabrication processes as cutting, forming, casting, and welding. Plastics are covered from the standpoint of thermosetting and thermo plastic processing. Forming, drying, and firing of ceramics are considered.

Class 3, Lab. 3, Credit 4

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.

Class 3, Lab. 2, Credit 4

EMEM-401 **Mechanical Engineering Laboratory I**
Registration #0304-401
A basic laboratory course stressing the fundamentals of experimentation. Topics covered include problem identification, determination of experimental variables, design of experimental apparatus and experimental procedures,execution of the experiment, collection and analysis of data, study of error and error analysis, and correlations with theory.

Class 2, Lab. 4, Credit 4

EMEM-413 **Thermodynamics I**
Registration #0304-413
A basic course in the mathematical and physical concepts of thermodynamics. The course presents a rigorous treatment of the zeroth, first and second laws of thermodynamics and their application to gases, liquids and two-phase mixtures. (SMAM-306, SPSG-206, SPSG-207)

Class 3, Lab. 2, Credit 4

EMEM-414 **Thermodynamics II**
Registration #0304-414
A continuation of Thermodynamics I stressing application of the basic principles to various energy conversion processes. (EMEM-413)

Class 3, Lab. 2, Credit 4

EMEM-415 **Fluid Mechanics I**
Registration #0304-415
Fluid statics. Ideal fluid-continuity, momentum and energy equations in integral and differential form, Bernoullis equation. Open channel flow, viscous fluid-its characteristics, dimensional analysis, flow through pipe. (SMAM-308, EMEM-413)

Class 3, Lab. 2, Credit 4

EMEM-431 **Thermodynamics**
Registration #0304-431
A fundamental course in thermodynamics to meet the needs of students in the electrical engineering program. The course is taught from the microscopic point of view using the techniques of statistical mechanics. Topics covered include kinetic theory, transport parameters, classical Maxwell-Boltzmann statistics, quantum statistics and applications to gases, liquids, and solids.

Class 4, Credit 4

EMEM-439 **Dynamics**
Registration #0304-439
This basic course in the dynamics of rigid bodies integrates the mathematical subjects of vector algebra, ordinary and partial differential equations, simultaneous linear algebraic equations, and tensor notation with the physical concepts of Newton's laws of dynamics and reaction. Newton's universal law of gravitation, and Euler's equations of motion of a rigid body. Applications include kinematics of a particle, kinematics of a rigid body, dynamics of a particle, dynamics of a system of particles, and dynamics of rigid bodies. (EMEM-337)

Class 3, Lab. 2, Credit 4

EMEM-440 **Mechanical Systems Analysis**
Registration #0304-440
The course is a basic introduction to automatic control systems. Topics include writing and solving differential equations for physical systems, vibration theory review, transfer functions and signal flow graphs, and feedback system response. System stability analysis using Routh-Hurwitz criterion, root locus method and Bode diagram. Introduction to compensation and system design. Analog computer laboratory. (EMEM-678)

Class 3, Lab. 2, Credit 4

EMEM-502 **Mechanical Engineering Laboratory II**
Registration #0304-502
Two four-hour periods per week are provided during which the student applies the experimental techniques learned in EMEM-401 to the engineering systems studies in the theory courses. The student groups propose, design, execute, and analyze a sequence of experimental projects utilizing equipment in the power laboratory, the materials laboratory, and the systems laboratory. Formal presentation of the results will be required for some of the experiments performed. (EMEM-401)

Lab. 8, 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, fins, heat exchangers, boiling and condensation, and numerical and graphical techniques. (EMEM-413, EMEM-415)

Class 3, Lab. 2, Credit 4

EMEM-532 **Introduction to Machine Design**
Registration #0304-532
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)

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-661 **Fluid Mechanics II**
Registration #0304-661
A continuation of Fluid Mechanics I with introduction to one dimensional compressible flow, life and drag, potential flow around a cylinder, qualitative discussion of Navier-Stokes equations. Couette and Poiseuille flows, laminar and turbulent boundary layer on flat plate. (EMEM-415)

Class 4, Credit 4

EMEM-678 Mechanical Vibrations
Registration #0304-678
Harmonic and nonharmonic vibration of systems with one degree of freedom, vibration of systems with several degrees of freedom, generalized coordinates and Lagrange's equations, vibration of elastic bodies. (EMEM-439)

Class 4, Credit 4

Technical electives in Mechanical Engineering

EMEM-632 Advanced Mechanical Systems Design
Registration #0304-632
Optimization of system response to deterministic inputs. Various mechanical systems in use will be analyzed and studies will be made to improve them. Both the analog and the digital computer are used. (EMEM-672)

Class 4, Credit 4

EMEM-635 Industrial Heat Transfer
Registration #0304-635
The course is intended to acquaint students with the design of heat transfer equipment with an emphasis on heat exchangers. Each student is required to submit an individual or group project on a practical heat transfer problem to reinforce his classroom experience. (EMEM-514)

Class 4, Credit 4

EMEM-650 Gas Dynamics
Registration #0304-650
An advanced course in fluid mechanics covering topics such as introduction to continuum mechanics; small disturbances in ideal, compressible, inviscid media; one-dimensional isentropic flow; and normal shockwaves. (EMEM-415)

Class 4, Credit 4

EMEM-651 Viscous Flow
Registration #0304-651
An advanced course in fluid mechanics covering topics such as introduction to continuum mechanics; some exact solutions to the Navier-Stokes equation; boundary layer concepts; and introduction to turbulent flow. (EMEM-415)

Class 4, Credit 4

EMEM-652 Fluid Mechanics of Turbomachinery
Registration #0304-652
Building on a background in thermodynamics and fluid mechanics, this course will develop the basic relationships for energy transfer between a rotor and a fluid. Application of the fundamentals of turbomachine fluid mechanics will be to such devices as radial flow and axial flow turbines. Both compressible and incompressible fluid machinery will be considered. (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 air conditioning systems. Students are expected to do a design project. (EMEM-414)

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.

Class 4, Credit 4

EMEM-667 Introduction to Air Pollution
Registration #0304-667
An exploratory study of atmospheric dynamics, source emission, sulphurous and photochemical smog, aerosols, and pollution control including devices, air quality standards and enforcement.

Class 4, Credit 4

EMEM-669 Introduction to Water Pollution
Registration #0304-669
Water supply requirements and waste water volumes; transportation and waste water systems; physical, chemical and biological processes for treatment of waste water and sludges, unit processes; hydraulics and design of sewers; reuse of water.

Class 4, Credit 4

EMEM-670 Thermal Stresses
Registration #0304-670
Thermal stresses in bars, rings, beams, plates, and shells. Energy methods. Introduction to dynamical problems and to viscoelastic stress analysis.

Class 4, Credit 4

EMEM-672 Selected Machine Elements
Registration #0304-672
This course should treat some of the machine elements discussed in EMEM-532 to a larger extent and introduce machine elements not previously discussed and of a more complex nature. Optimization techniques can be applied. (EMEM-532)

Class 3, Lab. 2, Credit 4

EMEM-675 Probabilistic Approach to Design
Registration #0304-675
This course should be a first course in probability theory. The statistical nature of design variables, usually ignored, is considered. Reliability ("probability of survival after a certain period") is to be stressed as opposed to the conventional "factor of safety" concept.

Class 3, Lab. 2, 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-532)

Class 3, Lab. 2, 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)

Lab. 4, Credit 4

EMEM-679 Mechanical Systems Analysis II
Registration #0304-679
A continuation of EMEM-440. Review of stability analysis techniques. Nyquist stability criterion. Design and compensation of feedback control systems. Nonlinear system analysis. Introduction to state variable time-domain analysis of control systems. Students will be required to undertake team projects involving the design, analysis and fabrication of a device or system incorporating control and feedback principles. (EMEM-440)

Class 3, Lab. 2, Credit 4

EMEM-680 Advanced Thermodynamics
Registration #0304-680
This course provides a general, postulative approach to macroscopic thermodynamics by means of a mathematical formalism developed around axioms concerning equilibrium and stability. Applications of the formalism to chemical, electrical, magnetic, and stressed solid systems are considered. (EMEM-414)

Class 4, Credit 4

EMEM-683 Statistical Thermodynamics
Registration #0304-683
The fundamentals of thermodynamics are developed from a statistical model of discrete particles. Topics covered include kinetic theory, elementary transport parameters, Maxwell-Boltzmann statistics, Fermi-Dirac and Bose-Einstein statistics with applications to gases and vapors. (EMEM-414)

Class 4, Credit 4

EMEM-684 Advanced Dynamics
Registration #0304-684
Newton's equations of motion for a system of masses, their solution, momentum, energy. Systems with variable mass, rocket equations, Variational principles of mechanics, stability of motion, gyroscopes. (EMEM-439, SMAM-308)

Class 4, Credit 4

EMEM-685 Advanced Strength of Materials
Registration #0304-685
Curved beams, beams on elastic foundations, thick-walled cylinder, energy methods. (EMEM-439)

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-690 Environment and the Engineer
Registration #0304-690
This course will study the role of the engineer in society and in particular his responsibility in the analysis and solution of the problems facing the environment in an increasingly technological society. Problems to be studied from a "case study" standpoint will include such things as air, water, and noise pollution, thermal pollution, and the effects of population growth. The course will include field trips, outside expert speakers, and each student will be expected to participate in the in-depth study of one problem of particular interest to him and to submit a formal report to the class. Use of the digital and analog computing facilities as a systems simulation tool will be encouraged.

Class 4, Credit 4

EMEM-694 Stress Analysis I
Registration #0304-694
Complex stress in two and three dimensions including Mohr's circle and polynomial solution for principal stresses. Theories of failure and experimental verification for ductile and brittle materials. Fracture mechanics fundamentals. Energy methods for structural analysis. Virtual work, Maxwell-Belti theorem, Castigliano's theorems. Applications including blending, shear, charge of section and complex loading. (EMEM-338)

Class 4, Credit 4

EMEM-695 Solid Waste Management
Registration #0304-695
A study of the practices and processes of solid waste disposal. In addition to the technical aspects, special emphasis is placed on the socio-political, economic, and environmental aspects of solid waste management. Course format is that of an engineering design case study.

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. Steady state reactor theory and reactor control.

Class 4, Credit 4

EMEM-697 Stress Analysis II
Registration #0304-697
A continuation of Stress Analysis, EMEM-694. The course will include topics such as stress concentrations, fatigue, contact stresses, wear, brittle fracture, viscoelastic behavior, dynamic stress analysis, impact, and a continuation of experimental stress analysis.

Class 4, Credit 4

Graduate courses in Mechanical Engineering

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, and radiation.

Credit 4

EMEM-699* Applied Mechanics System Analysis
Registration #0304-698*
Methods currently employed in component and system analysis of the static and dynamic behavior of rigid and elastic bodies. The topics will include a review and advanced studies of vector statics and dynamics of rigid and elastic bodies and systems.

Credit 4

EMEM-800 Applied Engineering Analysis I
Registration #0304-800
Use of matrices including matrix algebra, matrix inversion, diagonalization of a matrix, eigenvalues and eigenvectors. Application of matrices to the solution of sets of linear ordinary differential equations. Introduction to solving partial differential equations by separation of variables using orthogonal functions. (SMAM-308 or EMEM-692)

Credit 4

EMEM-801 Applied Engineering Analysis II
Registration #0304-801
Continued discussion of separation of variables, Bessel functions, etc., LaPlace transform methods for solving linear partial differential equations. Introduction to complex variables, and their use in LaPlace transform inversion. (EMEM-800)

Credit 4

EMEM-802 Applied Engineering Analysis III
Registration #0304-802
Introduction to optimization techniques: calculus of variations, Hamilton's principle, Ftayleigh-Ritz method; Volterra and Fredholm integral equations with applications. (EMEM-801)

Credit 4

EMEM-806 Numerical Analysis
Registration #0304-806
Numerical methods for solving algebraic and transcendental equations, finite difference methods, error and convergence analysis, numerical methods -of solutions of initial value and boundary value problems in engineering. Extensive use of computer is anticipated. (Graduate standing)

Credit 4

*These courses are provided for students who have been out of school for a number of years and feel it necessary to revive or update their educational background.

EMEM-810 Introduction to Continuum Mechanics
Registration #0304-810
Cartesian tensors and indicial notation. Analysis of the stress and deformation in a continuous media. Introduction to the linear theory of elasticity and the mechanics of fluids. (SMAM-308 or EMEM-692)

Credit 4

EMEM-811 Theory of Elasticity
Registration #0304-811
Formulation of elasticity problems. Plane strain, plane stress solutions by potentials. Torsion. Thick cylinders, disks, and spheres. Advanced problems of bending of beams. Curved beams. The semi-infinite medium and related problems. Stability problems. (EMEM-810)

Credit 4

EMEM-812 Theory of Plates and Shells
Registration #0304-812
Theory of thin plates for small deflections. Rectangular and circular plates with various boundary conditons. Elliptic and triangular plates. Membrane theory of shells. Cylindrical shells. Pressure vessels. Shells of revolution. (EMEM-811)

Credit 4

EMEM-813 Energy Methods in Mechanics
Registration #0304-813
Energy principles: Virtual work, Betti theorem, Castigliano's theorems, Rayleigh-Ritz method. Statics of structures: beams, frames, rings, and columns. Matrix methods. Dynamics of structures: free and forced vibrations for structures with one degree of freedom, many degrees of freedom. Continuous structures. (EMEM-811)

Credit 4

EMEM-814 Advanced Mechanics of Materials
Registration #0304-814
Theories of failure. Thick walled cylinders and shrink fits. Rotating discs. Contact problems. Fatigue and creep. Introduction to plasticity and to limit analysis.

Credit 4

EMEM-815 Experimental Stress Analysis
Registration #0304-815
Experimental methods of analysis of structural machine members, including strain gages and instrumentation, photoelastic methods, brittle coating, Moire fringe method, holographic techniques; and the hydrodynamic, electrical, and membrane analogs. Laboratory tests of models. (EMEM-694 or equivalent)

Credit 4

EMEM-816 Finite Elements I
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-818 Finite Elements II
Registration #0304-818
Variational principles for linear and nonlinear elements. Three-dimensional element derivations using natural coordinate systems. Solid elements, tetrahedron and hexahedron: Various thin shell elements. Computer workshops with use of various programs demonstrating the above theory.

Credit 4

EMEM-820 Analytical Mechanics
Registration #0304-820
Brief review of vectorial mechanics with emphasis on the dynamics of rigid bodies and applications to systems of degrees. Introduction to continuum using the limiting case of a system with an infinite degree of freedom. (Graduate standing, or departmental approval)

Credit 4

EMEM-821 Vibration Theory and Applications I
Registration #0304-821
Vibration of discrete multi-mass systems using matrix methods, and their application to the translation of real vibratory systems to mathematical models suitable for computer solutions. (EMEM-800)

Credit 4

EMEM-822 Vibration Theory and Applications II
Registration #0304-822
Vibrations of continuous media including beams, frames, plates and shells. Use of variational methods such as Hamilton's principle ad Rayleigh-Ritz for approximations. Applications to practical problems. Introduction to wave propagation. (EMEM-800)

Credit 4

EMEM-823 Applied Vibrations I
Registration #0304-823
Nature of various types of vibration problems, and procedures for assessing their significance. Diagnosis of selected practical problems, including experimental techniques such as strain gages, displacement sensors, and an introduction to holography. The development of meaningful analytical models, based on either test data for problem diagnosis, or on layout drawings for design analysis. Prediction of natural frequencies, mode shapes, and vibration response amplitudes for discrete mass systems using Newton's Law of Motion, and introduction to problems associated with continuum systems of bars, plates, and shells. Practical problem solving workshop sessions will consolidate the above topics.

Credit 4

EMEM-824 Applied Vibrations II
Registration #0304-824
Analysis of vibrations of linear continuous systems, involving beams, frames, plates, and shells. Solution by classical methods or by approximate methods, as expedient. Finite-element analysis of vibration and stability problems. System analysis techniques such as mobility and receptance methods. Applications of methods discussed to important practical problems. Problem solving workshop.

Credit 4

EMEM-825 Lubrication
Registration #0304-825
Incompressible lubrication in one-dimensional and finite journal bearings, hydrodynamic gas bearings, hydrostatic bearings, squeeze film and dynamic loading, rolling elements, thrust bearings, sliding bearings. Design considerations. (EMEM-661 Fluid Mechanics II)

Credit 4

EMEM-826 Materials, Principles and Selection
Registration #0304-826
A study of the principles of material behavior as applied to design. Application of these materials according to these principles is stressed. Ferrous and non-ferrous materials are covered. Among the possible topics are strength, hardness, corrosion, fatigue, economy, forming, wear resistance, dimensional stability, heat treating, welding, and machining. (EMEM-344)

Credit 4

EMEM-828, 829 Special Topics in
Registration #0304-828, -829 Applied Mechanics
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-830 Conduction Heat Transfer
Registration #0304-830
The formulation of conduction heat transfer problems. Solutions to steady state and unsteady state problems by separation of variables, LaPlace transforms and numerical methods. Emperical methods for forced convection. Heat exchangers.

Credit 4

EMEM-831 **Radiation Heat Transfer**
Registration #0304-831
Nature of thermal radiation, radiation properties of surfaces and gases, radiant energy interchange in an enclosure filled with absorbing, emitting and scattering media. Application to industrial problems involving simultaneous conduction, convection, and radiation. (EMEM-514)

Credit 4

EMEM-832 **Convective Heat Transfer**
Registration #0304-832
Principles of natural and forced convection, the differential and integral equations of hydrodynamic and thermal boundary layers and their approximate solutions. Convective heat transfer systems such as flows inside tubes, outside tubes, and over external surfaces. Empirical relations. Applications to heat exchangers. (EMEM-661)

Credit 4

EMEM-835 **Thermodynamics**
Registration #0304-835
An advanced study of thermodynamic equilibrium and stability. The thermodynamics of chemical reactions, combustion and flame phenomenon, phase change, stressed solids and other topics depending on the interest of the students. An introduction to irreversible thermodynamics.

Credit 4

EMEM-836 **Statistical Thermodynamics**
Registration #0304-836
The relationship between macroscopic thermodynamic properties and microscopic behavior of matter. Calculation of macroscopic thermodynamic properties using Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics. Determination of transport properties from kinetic theory of gases.

Credit 4

EMEM-840 **Fluid Dynamics**
Registration #0304-840
Selected topics from hydraulics, hydrodynamics, compressible flow, viscous flow, hydrodynamic instability and turbulence, depending on the interests of the students. (EMEM-415)

Credit 4

EMEM-841 **Gas Dynamics**
Registration #0304-841
Governing equations of compressible isentropic flow through nozzles and diffusers. Perturbation techniques and sound waves. Sub-sonic and supersonic flow, mach cones. Theory of characteristics, rarefaction and compression waves. Normal shock waves in a converging/diverging nozzle and in front of a moving piston. Hugoniot relations across a shock. The shock tube. One-dimensional flow with fraction, Fanno line flow.

Credit 4

EMEM-848, 849 **Special Topics in Thermo**
Registration #0304-848, -849 **Fluid Systems**
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-851 **Automatic Control Systems I**
Registration #0304-851
A first course in control systems analysis at the graduate level. Topics include mathematical modeling and response of lumped-parameter systems, stability analysis and multi-variable techniques. Bode and root-locus analysis of feedback systems. Compensation is introduced. Physical systems and analog computer used for lecture demonstrations throughout the course. Level of mathematical rigor is sufficiently above “classical" undergraduate controls course to allow those with previous undergraduate background to take this course.

Credit 4

EMEM-852 **Automatic Control Systems II**
Registration #0304-852
A continuation of EMEM-851. Topics include Nyquist plots and stability theorem, Nichols charts, compensation, state-space formulation of multi-variable systems and non-linear systems. Students will undertake individual projects requiring both analytical and experimental work. Individual use of analog and digital computers is encouraged. (EMEM-851)

Credit 4

EMEM-854 **Optimal Control Systems Design**
Registration #0304-854
An advanced study of feedback systems in terms of optimal and adaptive control. Variational calculus, the maximum principle, Hamilton-Jacobi theory, criteria for optimal design, constrained and unconstrained optimization, examples of optimal systems control. Introduction to the adaptive problem, gradient methods and examples of adaptive or self-optimizing control systems. (EMEM-851, 852, 800)

Credit 4

EMEM-857 **Advanced Topics in Systems Analysis**
Registration #0304-857
A project-oriented course examining a spectrum of feedback systems and problems. Systems to be studied include mechanical, electromechanical, optical, biomedical, and systems associated with transportation: hybrid propulsion systems, car-driver interaction, vehicular traffic flow and high-speed vehicle guidance systems. (Subject to instructor’s approval)

Credit 4

EMEM-858, 859 **Special Topics in**
Registration #0304-858, -859 **Systems Analysis**
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-861 **Engineering Hydrology**
Registration #0304-861
A study of the dynamics of the physical processes involving the waters of the earth. Included in the course will be: the meaning of hydrology, the hydrological cycle, transport processes, physical composition of the atmosphere, physical composition of oceans and lakes, planetary fluid mechanics, circulation of the atmosphere, and precipitation.

Credit 4

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

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)

College of

Fine and Applied Arts

School of Art and Design

FADC-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

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

Credit 6

FADC-411,412,413 Communication Design
Registration #0402-411, -412, -413
A professional elective, providing the opportunity to carry on further the objectives of FADC-401, 402, 403.

Lab. 6, Credit 3

FADC-501,502,503 Communication Design
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 include media application in solving human needs, community, and environmental problems.

Lab. 27, Credit 9

FADC-511,512,513 Communication Design
Registration #0402-511, -512, -513
A professional elective, providing the opportunity to carry on further the objectives of FADC-501, 502, 503.

Lab. 6, Credit 3

FADC-520 Professional Design Business Practices
Registration #0402-520 and Ethics
Ethical principles will be discussed along with sound business practices; setting up in business; invoicing and costing; and designer and the law; professional associations.

Class 3, Credit 3

FADE-301 Environmental Design—Exhibit
Registration #0403-301
Introduction to the integration of graphics, structure, three-dimensional form and space in the design of an exhibit system. (Foundation program or equivalent)

Lab. 6, Credit 3

FADE-302 Environmental Design—Product
Registration #0403-302
Introduction to the design process of developing a simple utilitarian product for a specific use. (Foundation program or equivalent)

Lab. 6, Credit 3

FADE-303 Environmental Design—Interior
Registration #0403-303
Introduction to the planning of interior space for a particular activity. (Foundation program or equivalent)

Lab. 6, Credit 3

FADE-320 Design Technology—Graphic
Registration #0403-320 Visualization
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

FADE-321 Design Technology—Mechanical Drawing
Registration #0403-321
Elements of descriptive geometry, architectural and engineering drafting for the delineation of design concepts.

Lab. 6, Credit 3

FADE-322 Design Technology-Materials
Registration #0403-322 and Processes
Introduction to basic processes and materials through lectures, discussion, projects, and visits to manufacturing facilities. The basic properties most significant to designers will be emphasized (achievable forms and textures, types of finish, methods for joining, etc.).

Class 3, Credit 3

FADE-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

FADE-402 Environmental Design—Product
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

FADE-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. (FADE-301, 302, 303 or equivalent)

Lab. 12, Credit 6

FADE-411,412,413 Design Applications
Registration #0403-411, -412, -413
Projects in industrial design, display interiors, and packaging, developed through visuals, materials, and processes.

Lab. 6, Credit 3

FADE-501 Environmental Design—Product,
Registration #0403-501 Package, Graphics
Comprehensive design of inter-related product, package and graphic identity elements for consumer safety and convenience as well as the marketing function.

Lab. 18, Credit 9

FADE-502 Environmental Design—Interior,
Registration #0403-502 Product Systems
Design of component interior and product systems for particular environments or facilities.

Lab. 18, Credit 9

FADE-503 Environmental Design—Thesis
Registration #0403-503
Directed design project allowing individual program emphasis. (FADE-401, 402, 403)

Lab. 18, Credit 9

FADE-511,512,513 Design Applications
Registration #0403-511, -512, -513
A continuation of course FADE-411, 412, 413 with additional emphasis on professional procedures, function, structure, and processes as they apply to the field. (FADE-411,412, 413)

Lab. 6, Credit 3

FADF-205,206, 207 Creative Sources
Registration #0404-205, -206, -207
This course is designed to make the student aware of his environment, his physical being and his experiences as tools for creative problem solving. This will be accomplished through lectures, individual and group assignments and demonstrations.

Class 1, Lab. 1, Credit 2

FADF-210, 211, 212 Drawing
Registration #0404-210, -211, -212
A basic foundation in drawing as a form of creative expression. Through the use of organic and inorganic materials attention is given to individual response to "seeing" as interspersed with all sensory conditioning. The figure is utilized in the analysis of action, structure, and gesture through quick sketches.

Lab. 9, Credit 4

FADF-221, 222, 223 Photo Design I
Registration #0404-221, -222, -223
The elements of design and color and their structural use as related to problems in two- and three-dimensional applications.
Lab. 6, Credit 2

FADF-230, 231, 232 Design
Registration #0404-230, -231, -232
The elements of design and color and their structural relationship as applied to problems in two dimensions.

Lab. 6, Credit 3

FADF-240, 241, 242 Design
Registration #0404-240, 241, 242
The elements of design and color and their structural relationship as applied to problems in three dimensions.

Lab. 6, Credit 3

FADF-261, 262, 263 Drawing (Craft Majors)
Registration #0404-261, -262, -263
Drawing in a variety of media. Introduction to line, form, and color as elements of pictorial expression. Organic and inorganic materials are used.

Lab. 6, Credit 2

FADF-321, 322, 323 Photo Design II
Registration #0404-321, -322, -323
Emphasis upon problems which are related to visual phenomena, fundamentals, and communications.

Lab. 3, Credit 2

FADP-301, 302, 303 Advanced Drawing
Registration #0405-301, -302, -303
Three quarter core course for Fine Arts program in Painting and Printmaking. Initial emphasis placed upon objective mastery of form and space from a variety of sources. Study of the human figure including skeletal structure and superficial anatomy. Further development of drawings as a conceptual means with expanded media.

Lab. 6, Credit 3

FADP-313 Medical Illustration Carbon Dust Technique
Registration #0405-313-80
Introduction to carbon dust illustration techniques. Beginning sequence of illustrative techniques leading to mastery of medical illustration. Emphasis upon a professional approach.

Lab. 6, Credit 3

FADP-320 Color
Registration #0405-320
One quarter course dealing with the examination of basic color phenomena by visual comparison. Study of differences between light and pigment. Class problems exploring such relationships as intensity, vibration, temperature, after-image, spatial effects and image-ground distortion.

Class 2, Lab. 3, Credit 3

FADP-401, 402,403 Painting
Registration #0405-401, -402, -403
Beginning sequence of advanced painting leading to major course of study in the fine arts. Formal values in painting related to individual expression in studio production. Examination and exploration of concepts underlying contemporary art in study sessions directed by the fine art staff. Advanced drawing incorporated into studio procedure. (FADP-301, 302, 303)

Lab. 12, Credit 6

FADP-411,412, 413 Painting
Registration #0405-411, -412, -413
A professional elective, providing the opportunity to carry on further the objectives of FADP-401, 402, 403.

Lab. 6, Credit 3

FADP-420 Illustration
Registration #0405-420
One quarter course exploring the art of the illustrator; his relation to audience, publishers, and media. Studio problems will develop and expand basic concepts of all illustration from children's books to that of heavy industry.
Studio sessions will be devoted to illustrative problems that reflect the class study for that period. Class critiques at appropriate times.

Class 3, Lab. 3, Credit 3

FADP-421,422,423 Medical Illustration Applications
Registration #0405-421, -422, -423
Development of range and mastery of medical illustration techniques. Laboratory sessions scheduled in Bio-Medical Illustration. (Lab orientation sessions to be scheduled in operating room facilities.)

Lab. 6, Credit 5, Fall
Lab. 12, Credit 8, Winter, Spring

FADP-501, 502, 503 Painting
Registration #0405-501, -502, -503
Second year of advanced painting completing a major course of study in the fine arts. Concentrated studio production focused upon individual creative solutions. Staff directed sessions examining the relation of the artist to his culture and society. Advanced drawing incorporated into studio procedure. (FADP-401, 402, 403)

Lab. 18, Credit 9

FADP-511, 512,513 Painting
Registration #0405-511, -512, -513
A professional elective, providing the opportunity to carry on further the objectives of FADP-501, 502, 503.

Lab. 6, Credit 3

FADP-531, 532,533 Advanced Medical Illustration*
Registration #0405-531, -532, -533
Advanced Medical Illustration techniques. Graphic design related to illustrative and photographic practice. Lab sessions to be scheduled in operating room facilities.

Lab. 18, Credit 6

•Jointly sponsored between RIT and the University of Rochester

FADR-401,402, 403 Printmaking
Registration #0406-401, -402, -403
Design projects applied to the techniques of lithography, wood block, and etching. (FADP-301, 302, 303)

Lab. 12, Credit 6

FADR-411, 412,413 Printmaking
Registration #0406-411, -412, -413
A professional elective, providing the opportunity to carry on further the objectives of FADR-401, 402, 403.

Lab. 6, Credit 3

FADR-501, 502, 503 Printmaking
Registration #0406-501, -502, -503
Continuation of third-year practices. Opportunity is presented for a major concentration of a particular medium. (FADR-401, 402, 403)

Lab. 18, Credit 9

FADR-511, 512,513, Printmaking
Registration #0406-511, -512, -513
A professional elective, providing the opportunity to carry on further the objectives of FADP-501, 502, 503.

Lab. 6, Credit 3

FADS-411, 412,413 Sculpture
Registration #0407-411, -412, -413
Three quarter course developing 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 on the sophomore, junior, and senior level.

Lab. 6, Credit 3

School for American Craftsmen

FSCC-200 Ceramics Materials and Processes
Registration #0409-200
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. Survey of pottery.

Lab. 15, Credit 5

FSCC-251, 252, 253 Craft Elective I
Registration #0409-251, -252, -253
An elementary course in design and techniques in ceramics.

Lab. 6, Credit 3

FSCC-300 Ceramic Materials and Processes
Registration #0409-300
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.

Lab. 15, Credit 5

FSCC-351, 352, 353 Craft Elective II
Registration #0409-351, -352, -353
A sequential course of study based upon the experiences of the prerequisite, providing opportunity for more advanced projects. (FSCC-251, 252, 253)

Lab. 6, Credit 3

FSCC-400 Ceramics Materials and Processes
Registration #0409-400
Sequential course for three quarters, treating problems of maintenance and construction of equipment. Summary of kiln types, fuels, and construction. Materials and sources of supply. Development of bodies and glazes for specific purposes. Problems requiring new uses, adaptations, and applications. Independent study, papers, reports.

Lab. 15, Credit 5

FSCC-500 Ceramics Techniques and Thesis
Registration #0409-500
Sequential course for three quarters, treating problems related to ceramic production culminating in a research and thesis project.

Lab. 24, Credit 8

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

Class 3, Credit 3

FSCF-325, 326 American Art
Registration #0410-325, -326
A course in American Art from the Colonial period to the present. Lectures, independent study, discussion groups, assigned gallery visits, papers, reports.

Class 3, Credit 3

FSCF-327 Contemporary Tendencies in Art
Registration #0410-327
The development of the arts in the 20th century, and current characteristics and goals of expression in architecture, sculpture, and painting. Lectures, independent study, discussion groups, assigned gallery visits, papers, reports.

Class 3, Credit 3

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 puntying the piece.

Lab. 15, Credit 5

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

FSCG-400 Glass Materials and Processes
Registration #0411-400
Sequential course for three quarters, introducing materials and their source of supply. An introduction to the mixing of batch glass. The formulation of various glass batches with an in-depth analysis of color and fuming techniques. The development of special glass batches for unique and specific purposes. At this stage the student will have developed a personal direction and rapport with glass.

Lab. 15, Credit 5

FSCG-500 Glass Techniques and Thesis
Registration #0411 -500
Sequential course for three quarters, introducing problems related to glass fabrication, culminating in a research and thesis project. The student is expected to organize and present an exhibition of his work in a manner to reflect a continuity and growth of style.

Lab. 24, Credit 8

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 through jewelry design and production in various metals. 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

FSCM-251, 252, 253 Craft Elective I
Registration #0412-251, -252, -253
An elementary course in design and techniques in metalcrafts.

Lab. 6, Credit 3

FSCM-300 Metalcrafts Materials
Registration #0412-300 and Processes
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

FSCM-351, 352, 353 Craft Elective II
Registration #0412-351, -352, -353
A sequential course of study based upon the experience of the prerequisite, providing opportunity for more advanced projects. (FSCM-251, 252, 253)

Lab. 6, Credit 3

FSCM-400 Metalcrafts Materials
Registration #0412-400 and Processes
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

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

FSCT-200 Textile Materials and Processes
Registration #0413-200
Sequential course for three quarters, providing fundamentals of fabric design, yarn calculation, and pattern drafting. Analysis of equipment and problems. Practice in basic weaves. Experiment in design and weaving of sample warps of drapery, linens, upholstery, and suiting fabrics. Study of qualities and color combinations of various yarns. Yardage weaving. Printing procedures: silk screen techniques.

Lab. 15, Credit 5

FSCT-251, 252, 253 Craft Elective I
Registration #0413-251, -252, -253
An elementary course in design and techniques in textiles.

Lab. 6, Credit 3

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

FSCT-351, 352, 353 Craft Elective II
Registration #0413-351, -352, -353
A sequential course of study based upon the experiences of the prerequisite, providing' opportunity for more advanced projects. (FSCT-251, 252, 253)

Lab. 6, Credit 3

FSCT-400 Textile Materials and Processes
Registration #0413-400
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

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

FSCW-200 Woodworking Materials
Registration #0414-200 and Processes
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

FSCW-241, 242,243 Mechanical Drawing
Registration #0414-241, -242, -243
A beginning course, covering the fundamentals of drafting, oriented to the needs of the interior and furniture designer.

Lab. 2, Credit 1

FSCW-2J51, 252, 253 Craft Elective i
Registration #0414-251, -252, -253
An elementary course in design and techniques in woodworking.

Lab. 6, Credit 3

FSCW-300 Woodworking Materials
Registration #0414-300 and Processes
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

FSCW-351, 352, 353 Craft Elective II
Registration #0414-351, -352, -353
A sequential course of study based upon the experiences of the prerequisite, providing opportunity for more advanced projects. (FSCW-251, 252, 253)

Lab. 6, Credit 3

FSCW-400 Woodworking Materials
Registration #0414-400 and Processes
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, requiring student research in comparative construction methods. Independent study, papers, reports.

Lab. 15, Credit 5

FSCW-500 Woodworking Techniques
Registration #0414-500 and Thesis
Sequential course for three quarters, allowing each student, with the approval of the instructors, either 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

Graduate courses, Fine and Applied Arts

Courses for the Education concentration of the M.S.T. 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**
Registration #0401 -701, -702 **in Art Education**
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

FADA-820 **Seminar in Art Education**
Registration #0401-820
Evalution 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 reseach. A final project on some intensively studied aspect of art education is required.

Lab. 25, Credit 3

FADA-860 **Practice Teaching in Art**
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

Communication Design

FADC-780 (MFA) **Communication Design Studio**
Registration #0402-780

FADC-750 (MST)
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. Media Center facility available for extension of studio problems.

Lab. 9-27, Credit 3-9

Environmental Design

FADE-780 (MFA) **Design Applications**
Registration #0403-780

FADE-750 (MST)
Registration #0403-750
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.

Lab. 9-27, Credit 3-9

Painting

FADP-780 (MFA) **Painting**
Registration #0405-780

FADP-750 (MST)
Registration #0405-750
The pursuit of the pertinent, the ecstatic, the beautiful, by a small group of those dedicated to the art.

Lab. 9-27, Credit 3-9

Printmaking

FADR-780 (MFA) **Printmaking**
Registration #0406-780

FADR-750 (MST)
Registration #0406-750
Advanced techniques in etching, lithography and woodcutting, as well as in many experimental areas including color processes, photo-etching, photo-lithography, vacuum-forming, combination printing and calligraphy. 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. 9-27, Credit 3-9

Thesis

FAD(C, E, P, or R)-890 **Research and Thesis**
Registration #040(2, 3,5 or 6)-890 **Guidance**
The development of a thesis project instigated by the student and approved by a faculty committee and the Graduate Faculty Chairman. Primarily creative production, the thesis must also include a written report.

Credit 12:

School for American Craftsmen
Design, Techniques and Research Problems

A program structured on the basis of individual needs, interests, and background as they may be determined through faculty counseling. This sequence of courses will lead to the production of a thesis project, suggested by the student and approved by the faculty. This applies to all craft areas.

FSCC-780 (MFA) **Ceramics**
Registration #0409-780

FSCC-750 (MST)
Registration #0409-750

FSCG-780 (MFA) **Glassblowing**
Registration #0411 -780

FSCG-750 (MST)
Registration #0411-750

FSCM-780 (MFA) **Metalcrafts and Jewelry**
Registration #0412-780

FSCM-750 (MST)
Registration #0412-750

FSCT-780 (MFA) **Weaving and Textile Design**
Registration #0413-780

FSCT-750 (MST)
Registration #0413-750

FSCW-780 (MFA) **Woodworking and Furniture**
Registration #0414-780 **Design**

FSCW-750 (MST)
Registration #0414-750

Lab. 9-27, Credit 3-9

FSC(C, G, M, T or W)-890 **Research and Thesis**
Registration #040(9,11,12,13 or 14)-890 **Guidance**
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

College of General Studies

Criminal Justice

GCJC-201 Fundamentals of the Criminal
Registration #0502-201 Justice System
The principles of the criminal justice system; administration and management within various agencies, including the relationship of the police to the courts; the courts to the probation, correction and parole functions. Consideration will also be given to special problems within the branches of the criminal justice system such as: using of force, improper evidence collection and admission, discretionary decision making, riots, strikes, natural disasters, narcotic traffic, sexual deviance, and vice control.

Class 3, Credit 4

GCJC-203 Introduction to Criminology
Registration #0501-203
A survey of the major forms of contemporary crime with emphasis on definition of crimes and criminality, the extent of crime, criminal typologies, and fundamental aspects of the social control of crime.

Class 3, Credit 4

GCJC-204 Introduction to Public
Registration #0501-204 Administration
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

GCJC-206 Administrative Concepts in Law
Registration #0501-206 Enforcement
The course is intended to provide the student review 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 and/or improved-administratively.

Class 3, Credit 4 (1976-77)

GCJC-207 Fundamentals of Corrections
Registration #0501-207
This 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. Strategies for rehabilitation and their effectiveness will be surveyed.

Class 3, Credit 4

GCJC-301 Fundamental Concepts and Patterns
Registration #0501 -301 of Criminal Law
This course will investigate assumptions and conceptions of law, crime, and social issues. It will concentrate on the history of various criminal justice systems as compared to contemporary criminal justice systems, the dynamics of criminal law reform, and its relationship to constitutional law.

Class 3, Credit 4

GCJC-302 History of Organized Crime
Registration #0501 -302 in America
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.

Class 3, Credit 4

GCJC-303 Law Enforcement and Society:
Registration #0501 -303 The Police Function
The social and historical origins of the various police systems; police culture, role and career; policein the legal system;social and legal restraints on police practices; police discretion in practice; police and the community; police organization and community control mechanisms.

Class 3, Credit 4

GCJC-304 The Judicial Process
Registration #0501-304
An examination of judicial systems (criminal and juvenile) from indictment through sentencing, their functions and operation, their internal and external relationships, and their impact upon the community. Emphasis will be placed on field visits, group projects, and research.

Class 3, Credit 4

GCJC-401 Scientific Methodology
Registration #0501-401
An elementary 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 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; the second 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.

Class 3, Credit 4

GCJC-403,404 Field Experience and Seminar
Registration #0501-403, -404
Under the guidance of an instructor, the student is placed in a cooperating criminal justice agency in order that he may gain first-hand experience with their organization, programs, and methods of work. Closely supervised work at the agency is supplemented by meetings with the student's Field Placement instructor to discuss experiences and resolve placement problems encountered on-the-job. These meetings will be supplemented by assigned professional readings. (Offered in Winter and Spring Quarters of Junior Year)

Class variable, Credit 9

GCJC-407 Behavior Modification in Corrections
Registration #0501-407
A course surveying 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 technique, as well as social and ethnical implications.

Class 3, Credit 4

GCJC-408 Constitutional Law and Criminal
Registration #0501-408 Justice
The course is intended to provide the student with a basic understanding of constitutional law and its relationship to criminal justice. The course will deal with specific Supreme Court decisions.

Class 3, Credit 4

GCJC-409 Legal Rights of Convicted Offenders
Registration #0501-409
This course is designed to present an in-depth study of the substantive and procedural law as it affects convicted offenders. Considerable attention is devoted to the study of constitutional rights and privileges; how they apply to convicted offenders, and the methods employed to secure these rights.

Class 3, Credit 4

GCJC-410 Corrections Administration
Registration #0501-410
This course presents the history and development of the principles of management and organizational theory as they have developed in the field of corrections, i.e., prisons, probation, parole, and other community correctional programs.

Class 3, Credit 4 (1976-77)

GCJC-411 Issues in Corrections
Registration #0501-411
This course is a sequel to Fundamentals of Corrections. It presents a critical evaluation of the contemporary correctional programs in the United States. Programs discussed include: jails, prisons, probation, parole, half-way houses, study release, work release, prison furloughs and various community-based correctional techniques.

Class 3, Credit 4

GCJC-505 White Collar Crime
Registration #0501-505
An examination of the extent and character of white collar crime, with special emphasis upon political and financial variables and differentiating conditions.

Class 3, Credit 4

GCJC-506 Evidence
Registration #0501-506
Rules of evidence of particular interest in criminal justice. The course will study the introduction of physical and testimonial evidence into a criminal trial.

Class 3, Credit 4

GCJC-509 Juvenile Justice
Registration #0501-509
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

GCJC-514 Planning and Change in the
Registration #0510-514 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.

Class 3, Credit 4

GCJC-516 Family Court Administration
Registration #0501-516
A course designed to explore the management of the criminal process, specifically the operation of family court systems. Included will be discussion of the inter-relationships of the components of the system, as well as the relationships among the various factors.

Class 3, Credit 4

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.

Class 3, Credit 4

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.

Class 3, Credit 4 (1976-77)

GCJC-520 Law and Discretion in Criminal
Registration #0501-520 Sentencing
The 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-to delude, but not necessarily restricted to: fines, imprisonment, Probation and suspended sentence.

Class 3, Credit 4

GCJC-522 Victimless Crime and the Law
Registration #0501-522
The course is designed to study those crimes traditionally classified as "victimless" crimes: rape, alcoholism, etc.

Class 3, Credit 4

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. Primary emphasis will be given to the interdependence between socio-economic instability and crime, underdevelopment and crime, urban crisis and social mobility, unequal opportunities and racial strife. The course will be a comparative study on America's and the world's problems of violence, crime and urban crisis.

Class 3, Credit 4

GCJC-525 Industrial Security Administration
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.

Class 3, Credit 4

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 function 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.

Class 3, Credit 4

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. This course requires Fundamental Concepts and Patterns of Criminal Law (GCJC-301) as a prerequisite.

Class 3, Credit 4

GCJC-528 Etiology of Crime
Registration #0501 -528
Analysis of the sociological, psychological, and psychiatric views of the etiology of crime and other forms of deviant behavior; studies in conformity, moral development, family psychopathology and the assumption and maintenance of deviant roles; comparative studies of deviance in different cultural, ethnic and sexual groups; mental disorders in relation to crime and delinquency.

Class 3, Credit 4

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 self-moiivated student, with a creative orientation, the opportunity to develop an autonomous and personal sense of academic growth and achievement.

Class variable, Credit variable

Social Work

GSWS-301 Introduction to the Field of Social Work
Registration #0516-301
Designed to introduce various aspects of the social work profession to give the student basic knowledge of major social welfare programs, such as public assistance. To sensitize the student to people's needs, especially the needs of members of society who differ from himself and to begin building social work attitudes of objectivity, inquiry, empathy and non-judgement.

Class 3, Credit 4

GSWS-302 Social Welfare: History
Registration #0516-302
Designed to explore social welfare institutions and processes along with their history and philosophy and their relationship to other social institutions in the United States. Emphasis is on the role of social work in various interrelated 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.

Class 3, Credit 4

GSWS-303 Social Welfare: Profession and Issues
Registration #0516-303
Examines the profession of social work. It will look at the values in social work practice, as stated in the Code of Ethics, and examine the issues of licenses, advocacy and the Hatch Act, and professional organizations.

Class 3, Credit 4

GSWS-304 Social Welfare: Organization and Systems
Registration #0516-304
An in-depth study of the organization of social welfare services. To include: analysis of agency structure, i.e., Board, staff, budget, client need and services; the pyramiding of agencies into umbrella systems; power groups, vested interests and coalitions. The role and function of the social worker in this milieu will be explored.

Class 3, Credit 4

GSWS-305 Social Work Field Study
Registration #0516-305
Designed to introduce the student to the social work community and a wide spectrum of agencies. Class sessions will be scheduled once a week for a block of three hours, and will be taught entirely off campus. It is meant to follow Introduction to Social Work, and to illustrate social work in practice, not in theory.

Class 3, Credit 2

GSWS-411,412,413 Methods of Social Work I, II, III
Registration #0516-411, -412, -413
Methods of Social Work is a three-quarter sequential course offered concurrently with field experience. Concurrent field experience requires a part-time placement in a community agency as part of the course requirement of Methods I (GSWS-411). Methods II and III (GSWS-412, 413) are offered concurrently with Field Instruction I and II (GSWS-421, 422).

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.

Class 3, Credit 4/Qtr.

GSWS-421,422 Field Instruction I, II
Registration #0516-421, -422
Under the guidance of an instructor, the student is placed in a cooperating social, governmental, or education agency in order that he may gain first-hand experience with their organization, programs, and methods of work. Closely supervised work at the agency is supplemented by periodic consultations with the instructor.

Credit 5/Qtr.

GSWS-430 Hispanic Culture for Social Workers
Registration #0516-430
This course, designed with a social work emphasis, will attempt to objectively portray the life of both Mexican-Americans and Puerto Ricans and other Spanish speaking groups in a predominantly Anglo society.

Class 3, Credit 4

GSWS-431 Black Perspectives
Registration #0516-431
This seminar is designed to study the social structure of the Black or African community and their social movements directed towards social change. Aspects of Black or African life and culture will be dealt with and emphasis is placed on the various ideologies among Blacks.

Class 3, Credit 4

GSWS-510 Current Treatment Modalities
Registration #0516-510
A course focusing upon current advanced treatment modalities. To include behavior modification, transactional analysis, parent effectiveness training, Gestalt and reality therapy. Other modalities will be considered.

Class 3, Credit 4

GSWS-515 Gerontology
Registration #0516-515
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.

Class 3, Credit 4

GSWS-520 Social Work from a Pan-Afrikan Perspective
Registration #0516-520
This course is designed to analyze past, present and future social welfare policies, programs and practices 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 effects and predictable effects on Black people.

Class 3, Credit 4

GSWS-521 The Advocacy Role in Social Work
Registration #0516-521
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

GSWS-522 Community Organization
Registration #0516-522
principles of organization theory and practice and their application to the social planning process at the local, state, regional and national levels. Emphasis on contemporary social, political and economic systems, and their relationship, both formal and informal, to the social planning process.

Class 3, Credit 4

GSWS-531 **Research Methods**
Registration #0516-531
Introduction to the methodology of research in behavioral and social sciences. Stress will be laid on the use of theoretical leads, formulation of hypotheses, collection of data, measurements, statistics, tests, and evidence evaluation. Instruction and practical demonstration is provided in techniques ranging from simple case studies to computer utilization.

Class 3, Credit 4

GSWS-535 **Seminar and Project**
Registration #0516-535
For social work seniors who have completed field experience.
A study of a variety of professional areas to be defined by students, with staff participation. Each student's input will be based upon the field experience and its related work, and academic experience to strengthen areas of professional and personal concern. Includes a research project and may include “supervision" of a freshman in the first field experience.

Class 3, Credit 4/Qtr.

Social Work Electives

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.

CSWS-450 **Group Work Methods**
Registration #0233-450
A course designed to help a person understand the basic dynamic components inherent in all groups and to become a more able and knowledgeable leader of groups. The course will investigate the scope, technique and function of the group work concept as practiced in such diverse places as social service agencies, business, correctional institutions, church groups, and community activities.

Class 3, Credit 4

CSWS-460 **Alcoholism Disability-Physiology**
Registration #0233-460 **and Psychology**
The chemistry of ethanol, methanol and alcohol and their effects on the body and mind as well as signs, symptoms, addiction and withdrawal. The presentation of normal and abnormal personality development in the adolescent and later years and the psychological mechanisms lending support to alcohol use in our society.

Class 3, Credit 4

CSWS-461 **Alcoholism—Interventive Skills**
Registration #0233-461 **and Techniques**
Teaches a variety of Interventive skills to alcoholism care givers dealing with the alcoholic, his family and community. Emphasis is placed upon the method of use of these skills. Role play, video tape and case study will be included.

Class 3, Credit 4

CSWS-462 **Alcoholism—Rehabilitation Modalities**
Registration #0233-462 **and Community Resources**
Analysis of the psychological symptoms and diagnosis of the alcoholic and current methods of rehabilitation. Explores structure, function and use of community resources.

Class 3, Credit 4

CGES-401 **Psycho-Social Aspects of Deafness**
Registration #0227-401
This course provides a broad overview of the effects of deafness on the individual, its relation to his social and intellectual development, and an appreciation of the hearing impaired as a person. It provides basic information regarding the nature of sound, anatomy of hearing, and the causes and types of deafness.

Class 3, Credit 4

CSWS-470 **Growth and Development of the**
Registration #0233-470 **Pre-School Child**
The course seeks to examine the basic factors contributing to the growth and development of the pre-school child. Emphasis is put on those factors leading to his personality development as described by Freud and Erikson, his behavioral patterns as described by S-R theory, and those factors leading to the development of “intelligence” and creativity.

Class 3, Credit 4

CSWS-471 **Day Care Programming**
Registration #0233-471
Essential to the total development of the child are the activities provided to stimulate that development. The course is so designed that newcomers as well as those having worked in child care can appreciate the interrelationships between the various disciplines and developmental tasks. The element of proper planning is introduced.

Class 3, Credit 4

CSWS-472 **Day Care—Materials and the Classroom**
Registration #0233-472
Participants will be given instruction in the use of a variety of program materials and skills to meet the needs of the day care child. Included will be use of dramatics, dance, crafts, arts, music, rhythm, paper boy activities, etc. In addition, creative use of audiovisual equipment will be taught and community resources will be identified.

Class 3, Credit 4

CSWS-473 **Day Care—The Emerging Profession**
Registration #0233-473
This course will explore various aspects of the emerging profession of day care with specific emphasis on history and development, philosophy roles of various staff members-teacher, teacher aides, supervisor, administrator, board of directors, and their relationship with one another. In addition, the course will explore working with the family, community relationships, referrals, community resources, and the development of goals and objectives in day care programming.

Class 3, Credit 4

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.

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

*NOTE: Subject to the approval of the Intercollege Curriculum Committee, GLLC-220 will become a required course in Winter Quarter 1976-77, replacing all other lower division language courses.

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 inter-personal, family, social and rehabilitation modes of communication.

Class 3, Credit 4

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.

GLLC-431,432 Spanish I, II
Registration #0502-431, -432
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 get in contact. Proficiency in Spanish would satisfy this requirement.

Class 3, Credit 4/Qtr.

GLLC-501 Effective Speaking
Registration #0504-501
The development of the techniques of oral communications as an aid to self-confidence in modern social and business situations. Weekly practice talks with emphasis on organization, clarity, vocal expression, poise, interest, and appropriateness.

Class 3, Credit 5

GLLC-511 Modern Applications of
Registration #0502-511 Language Theory
The history and theory of communication from basic human communication through the mass media extensional systems.

Class 3, Credit 5

GLLC-514 Mass Communication
Registration #0502-514
Content will cover the theoretical and practical aspects of the mass communications with particular emphasis on its consequent effect on human behavior.

Class 3, Credit 5

GLLL-320 Literature and Myth
Registration #0504-320
A study of the uses of myth in literature, emphasizing a selected group of commonly accepted archetypes and motifs which appear in a variety of literary forms.

Class 3, Credit 4

GLLL-321 Oral Interpretation
Registration #0504-321
The examination of our literary heritage to encourage the appreciation of the artistry of literature composed to be read aloud.

Class 3, Credit 4

GLLL-322 Literature and the Visions of Man
Registration #0504-322
A study of major modern and contemporary writers with special emphasis on the visions of man's human condition.

Class 3, Credit 4

GLLL-323 The Cycle of Life in Literature
Registration #0504-323
A study of the literary uses of myths connected with the cycle of life.

Class 3, Credit 4

GLLL-324 Guilt and Expiation
Registration #0504-324
Masterpieces of world literature, ancient to modern, are selected to introduce literary forms (drama, prose, fiction, poetry) in various literary modes (Classical, Romantic, Realistic).

Class 3. Credit 4

GLLL-325 Thematic Approach to Western
Registration #0504-325 Literature
A survey of the major literary genre concerned with certain recurring thematic subjects-love, conflict, religion, evil, death, and the individual-which emphasizes plot, character, setting, style, and theme of respective works.

Class 3, Credit 4

GLLL-326 Literature in its Critical Perspectives
Registration #0504-326
An analysis of short stories, poems, plays, and the novel from various critical perspectives.

Class 3, Credit 4

GLLL-328 Modern Criticism of Literature
Registration #0504-328
Critical approaches to literature to provide the student with a standard of judgment in literature.

Class 3, Credit 4

GLLL-330 Voyage Literature
Registration #0504-330
The treatment of the voyage in literature from Homer to the present.

Class 3, Credit 4

GLLL-331 Genres of World Literature
Registration #0504-331
Survey of the primary genres of world literature: drama, novel, short story and poetry.

Class 3, Credit 4

GLLL-332 Survey of Western Literature
Registration #0504-332
A chronological survey of the major literary genres of the Classical, Medieval, Renaissance, Neo-Classical, Naturalism-Realism, and Modern periods, employing the analytical study of the individual works.

Class 3, Credit 4

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

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

GLLL-336 Man and His Fictions
Registration #0504-336
The study of literature as one among the many fabrications of man which help him to define and come to terms with himself, time, the world, and other human beings in the world.

Class 3, Credit 4

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

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

GLLL-504 Shakespeare: Comedy and History
Registration #0504-504
A generous sample of Shakespeare's comedy and history plays is investigated to reveal their literary excellence and their theatrical power.

Class 3, Credit 5

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 through the 19th century. Particular attention will be given to the ideas of the writers under consideration and their effect on modern American philosophy.

Class 3, Credit 5

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

GLLL-509 Black Literature
Registration #0504-509
Black Literature is a historical survey of significant black writers from Revolutionary times until the present day.

Class 3, Credit 5

GLLL-513 Ecological Awareness in Literature
Registration #0504-513
A chronological examination of man's attitude toward his environment. Emphasis on his worship, use, and abuse of nature.

Class 3, Credit 5

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

GLLL-516 Literature and Protest
Registration #0504-516
Selected works by writers such as Sophocles, Dante, Dickens, Camus and Vonnegut as important works of art that reflect man's condition and implicitly prophesy against particular evils in attitudes or institutions of their times.

Class 3, Credit 5

GLLL-517 Literature of the Bible
Registration #0504-517
A study of several books from the Old and New Testaments selected to show the range and variety of literary forms in the Bible.

Class 3, Credit 5

GLLL-518 Creative Writing II
Registration #0504-518
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

GLLL-522 Mark Twain and the
Registration #0504-519 American Dream
Focus will be on the bittercomic writings of the last part of Twain's career.

Class 3, Credit 5

GLLL-524 Contemporary Film
Registration #0504-524
A study of contemporary world films, to be drawn from those presently showing in the Rochester area (theaters, television, film festivals). Emphasis will be on both technical and aesthetic aspects of the films.

Class 3, Credit 5

GLLL-526 The American Dream: Success
Registration #0504-526 or Collapse?
A multi-disciplinary look at the tenets of the American Dream and the question of its present success or collapse.

Class 3, Credit 5

GLLL-527 Shakespeare: Tragedy and Romance
Registration #0504-527
A generous sample of Shakespeare's tragedy and romance plays is investigated to reveal their literary excellence and their theatrical power.

Class 3, Credit 5

GLLL-528 Great World Novels
Registration #0504-528
An examination of a major novel by Dickens, Dostoyevsky, Joyce and Faulkner to explore the particular genius of each writer and his contributions to the modern novel.

Class 3, Credit 5

GLLL-529 Literature and Man's Religious
Registration #0504-529 Experience
An interdisciplinary course which attempts to explore the complexity and variety of man's personal religious quest and its conflicts as these are portrayed by psychologists and literary artists.

Class 3, Credit 5

GLLL-530 Religions of the East: Hinduism,
Registration #0504-530 Buddhism, Taoism
A study of the major religions of the East.

Class 3, Credit 5

GLLL-531 Literature of the 1920's and 1930's
Registration #0504-531
A study of American writers of the 20th century with particular attention to the beginnings of realism, naturalism and symbolism.

Class 3, Credit 5

GLLL-532 The American Man and
Registration #0504-532 His Environment
An interdisciplinary ecology course, chronologically examining American attitudes and solutions to environmental problems.

Class 3, Credit 5

GLLL-533 The Modern Movement in Literature
Registration #0504-533
Examination of the philosophy and literary achievements of modernism through the works of Mann, Joyce, Proust, Beckett, Faulkner and Borges.

Class 3, Credit 5

GLLL-534 Modern American Fiction
Registration #0504-534
A study of the American Novel from 1900 to 1957.

Class 3, Credit 5

GLLL-535 Technology and American Literature
Registration #0504-535
A study of 19th and 20th century short fiction and novels criticizing the impact of technology upon society.

Class 3, Credit 5

GLLL-536 Short Fiction
Registration #0504-536
The short story as a particular form of literature: definition, characteristics and aims.

Class 3, Credit 5

GLLL-538 The Nightmare of Technology: Studies in
Registration #0504-538 19th Century British Writing
Study of British prose and poetry on the effects of industrialism and the social problems in 19th century England.

Class 3, Credit 5

GLLL-539 **Art Nouveau and Aestheticism**
Registration #0504-539
A multi-disciplinary study of the relationship between the Art Nouveau and Aesthetic movements in late 19th century Europe. Attention will be devoted to parallel movements in literature, painting, and the crafts.

Class 3, Credit 5

GLLL-540 **Hero Image in the Theatre**
Registration #0504-540
An evolutionary survey of the image of the theatrical hero from Ancient Greece to the mid-20th century, with emphasis on the changes which take place in the hero image and the reasons for such character changes.

Class 3, Credit 5

GLLL-541 **Literature and Cinematic Adaptation**
Registration #0504-541
The analyses of both the literary and cinematic qualities and characteristics of common works, with the emphasis on their similarities and differences and their resultant strengths and weaknesses as creative endeavors.

Class 3, Credit 5

GLLL-542 **Literature of Violence**
Registration #0504-542
An evaluation of the promoting forces, the types, and the effects of violence as it occurs in literary themes from different periods and backgrounds.

Class 3, Credit 5

GLLL-545 **Deaf Studies in Literature**
Registration #0504-545
A study of the literature of deafness, with special emphasis on literary works which identify and illuminate "the deaf experience."

Class 3, Credit 5

GLLL-546 **Philosophy of Justice**
Registration #0504-546
Examination of dissent and private conscience in collision with the claims of order and stability in a democratic society.

Class 3, Credit 5

GLLL-547 **Advanced Exposition**
Registration #0504-547
An intensive review of basic expository writing skills with emphasis on regular writing assignments.

Class 3, Credit 5

GLLL-548 **Modern Poetry**
Registration #0504-548
A close examination of poems of important English and American poets of the 19th and 20th centuries, including several living poets.

Class 3, Credit 5

GLLL-549 **Women in Literature**
Registration #0504-549
Literature in all genres by and about women from the Greeks to the present. The course will emphasize the stereotypes which literature has helped to preserve and the power of women both to embody and to work against the stereotypes, through their artistic and intellectual accomplishments.

Class 3, Credit 5

GLLL-550 **Jonathan Swift and the**
Registration #504-550 **Age of Satire**
Vicious satirical writings of Jonathan Swift and other early 18th century authors (Alexander Pope, John Dryden, John Gay) will be read and analyzed, focusing on the intrigue and dark scandals marking the political and religious environment of the age.

Class 3, Credit 5

GLLL-551 **English Literature Other**
Registration #0504-551 **than British and American**
The course will cover short stories and novels written in English by Australian, African, Asian, and West Indian authors. The selections will be discussed against the background of the social, political, and cultural milieu in which the authors worked.

Class 3, Credit 5

GLLL-555 **The American Spirit in Literature ||**
Registration #0504-555
This course is a survey of the development of American culture from the Civil War to the early 20th century.

Class 3, Credit 5

GLLL-560 **Art of the Cinema**
Registration #0504-560
A critical examination of certain films as an integral part of modern culture.

Class 3, Credit 5

GLLZ-200 **Basic Communications**
Registration #0518-200
Students will gain an understanding of deafness, plus basic skills which will permit communication with a segment of the deaf population. (This course cannot be applied to General Studies requirements.)

Class 3, Credit 4

GLLZ-201,202 **Manual Communication I, II**
Registration #0518-201, -202
A course designed to provide the student with the basic vocabulary of frequently used signs and the American manual alphabet.

Class 3, Credit 4

Science and Humanities

GSHF-210 **Introduction to the Performing**
Registration #0505-210 **Arts: Music**
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

GSHF-211 **Introduction to the Performing**
Registration #0505-211 **Arts: Film**
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

GSHF-213 **Introduction to the Visual Arts**
Registration #0505-213
To develop ability in perceiving worth in objects of art through consideration of fundamental concepts in fine arts, including organization, subject matter and principles of aesthetics.

Class 3, Credit 4

GSHF-503 **Survey of American Architecture**
Registration #0505-503
A survey of American architecture from the 17th century to the present. Stress will be placed on a visual as well as an historical and social analysis of American building art.

Class 3, Credit 5

GSHF-511 **Modern European Architecture**
Registration #0505-511
A critical analysis of European building from the engineering architecture of the late 19th century through the architecture of today.

Class 3, Credit 5

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

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

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

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 relations to his society and to the Baroque style, and on his humanistic world view.

Class 3, Credit 5

GSHF-520 Picasso
Registration #0505-520
The life and work of one of the most influential artists of our century.

Class 3, Credit 5

GSHF-521 The Arts Under Communism, Fascism and Nazism
Registration #0505-521
The course will analyze the control the totalitarian regimes of Russia, Italy and Germany exercised over every form of artistic activity.

Class 3, Credit 5

GSHF-524 Survey of English Architecture from the Medieval Period to the Present
Registration #0505-524
An on-site examination of the stylistic development of English architecture from the year 1000 to the present. Emphasis will be placed on the study of the evolution of aesthetics and structure in English building art together with an analysis of the work of major English architects.

Class 3, Credit 5

GSHF-525 Major Symphonies
Registration #0505-525
A non-specialized humanistic approach to the understanding of the men, ideas, and times during which major musical compositions were created.

Class 3, Credit 5

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

GSHF-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

GSHF-532 African Tribal Art
Registration #0505-532
After an investigation of the world of "primitive" man and the function of art in a tribal environment, this course will focus on preliterate societies of subsaharan Africa.

Class 3, Credit 5

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

GSHH-302 Modem European History
Registration #0507-302
The major social, political, and intellectual movements of modern Europe.

Class 3, Credit 4

GSHH-303 Latin American History: From Independence to the Modern Period
Registration #0507-303
Survey of historical development of Latin America from independence through the 1960's.

Class 3, Credit 4

GSHH-308 Man and Society
Registration #0507-308
The study of man and society as an insight into current social and individual problems.

Class 3, Credit 4

GSHH-310 The Future as History
Registration #0507-310
Through historical analysis, the course will show that the past has caused the problems of today, and that historical courses must be understood if these problems are to be solved.

Class 3, Credit 4

GSHH-311 Ethnic History
Registration #0507-311
The course will analyze the historical establishment and maintenance of minority patterns in inter-people relations derived from the migration of European peoples to Africa, to the Americas, to Southeast Asia, and intra-European countries.

Class 3, Credit 4

GSHH-313 Communism, Fascism and Democracy in Their Theoretical Foundations
Registration#0507-313
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

GSHH-316 The History of the World Since 1945
Registration #0507-316
Survey of the major events of world history since 1945: Europe, Africa, Asia, and the United States.

Class 3, Credit 4

GSHH-319 Religious and Cultural Movements and the Shaping of Modern Society
Registration #0507-319
The influence of religion on our society will be the focus of the course.

Class 3, Credit 4

GSHH-320 The Unification of Europe: Achievements and Perspectives
Registration #0507-320
The European crises of this century, the American involvement in them, and the first attempts for reunification.

Class 3, Credit 4

GSHH-325 America's Greatest Presidents
Registration #0507-325
A historical survey of the American Presidency through a review of the records of the eleven chief executives generally acknowledged by historians as the best: Washington, John Adams, Jefferson, Jackson, Polk, Lincoln, Cleveland, Theodore Roosevelt, Wilson, Franklin Roosevelt and Truman.

Class 3, Credit 4

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

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

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

GSHH-518 The Advance of Communism
Registration #0507-518
An examination of the rapid expansion of Communism from the Russian Revolution of 1917 to present time including the rise of Communism in China, Yugoslavia and Eastern Europe, and Cuba. Emphasis will be placed on the causes which favored such an expansion as well as a review of the various avenues by which countries have become communistic.

Class 3, Credit 5

GSHH-519 United States-Latin American
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

GSHH-520 Crime, Violence and Urban Crisis
Registration #0507-520 in the 20th Century
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

GSHH-522 20th Century American
Registration #0507-522 Diplomatic History
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

GSHH-523 Religion in Society
Registration #0507-523
This course will examine religion in the West-Christianity, Judaism and atheism-as an integral and interrelated aspect of the totality of society.

Class 3, Credit 5

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

GSHH-525 Culture and Counterculture in
Registration #0507-525 Historical Perspective
This course will examine the cultural, social, political and economic conflicts which were prominent during the 1960's in America and around the world.

Class 3, Credit 5

GSHH-526 The United States and The Third World
Registration #0507-526 Revolutions in the 20th Century
One of the dominant features of the 20th century has been the revolution of rising expectations in the countries of the third world. This course will study the underlying causes of these revolutions and the reaction of the United States government to this revolutionary ferment in Latin America, Asia, and Africa.

Class 3, Credit 5

GSHH-528 History of Popular Culture
Registration #0507-528 in America
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

GSHH-529 Military History
Registration #0507-529
An analysis of the causes and nature of war.

Class 3, Credit 5

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

Class 3, Credit 5

GSHH-531 The Black Experience in America
Registration #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

GSHH-532 Civil Liberties in American History
Registration #0507-532
The course will teach the history of civil liberties in America. Emphasis will be placed on the current state of civil liberties.

Class 3, Credit 5

GSHH-533 China, Russia and United States
Registration #0507-533 Since 1949
This course is a follow-up of the other two courses on Russia, and on the advance of Communism.

Class 3, Credit 5

GSHH-534 Ethnicity: A World in Retrospect
Registration #0507-534
Analysis of the establishment and maintenance of minority patterns in inter-people relations derived from the migration of Europeans to Africa, the Americas, Southeast Asia, and within Europe itself.

Class 3, Credit 5

GSHH-535 The United States and Latin American
Registration #0507-535 Revolutions Since 1900
A study of the key revolutions from Mexico in 1910 to Peru in 1968 and the effect on American foreign policy.

Class 3, Credit 5

GSHH-536 History of Mexico
Registration #0507-536
The historical development of Mexico since 1821 including the independence movement, the liberal-conservation clash, and the revolution of 1910.

Class 3, Credit 5

GSHH-537 Russia: Imperial and Communist
Registration #0507-537
Analysis of the last days of Czarist Russia and the accession of the new Communist regime.

Class 3, Credit 5

GSHH-538 Social Justice and the Constitution
Registration #0507-538 in American History
Analysis of how well the constitution has met the social, economic, and political expectations of citizens in the past.

Class 3, Credit 5

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

Class 3, Credit 5

GSHH-541 Modern Germany
Registration #0507-541
A study of Germany in the 19th and 20fh centuries.

Class 3, Credit 5

GSHH-542 Mussolini's and Hitter's Intrigues
Registration #0507-542 in America
Analysis of the ethnic, national, and international implications of Fascist and Nazi propaganda in the U.S. from 1922 to 1945.

Class 3, Credit 5

GSHH-543 20th Century European
Registration #0507-543 Diplomatic History
An appraisal of the crises of diplomacy, the quest for a higher level of political organization in Europe, totalitarianism, and contending political ideologies.

Class 3, Credit 5

GSHH-544 19th Century European
Registration #0507-544 Diplomatic History
The origins of World War I will be stressed in terms of great power rivalries.

Class 3, Credit 5

GSHH-545 Revolutionary Leaders in Latin
Registration #0507-545 America
In this course three movements will be studied: the rise of Juan Peron in Argentina in the 1940's; Fidel Castro's revolution in Cuba; and Salvador Allende's electoral victory in Chile in 1970. By studying these three "revoluntionary" 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

GSHH-546 The Immigrant in American History
Registration #0507-546
This course traces the history of ethnic and racial minorities in the United States.

Class 3, Credit 5

GSHH-547 History of Social Discrimination
Registration #0507-547
A study of the 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

GSHH-550 The Ascent of Man
Registration #0507-550
This course will be an analysis of the human, intellectual, religious, political, scientific and historical development of the Western man.

Class 3, Credit 5

GSHH-560 History of Exorcism, Sorcery,
Registration #0507-560 Magic and Alchemy
The course analyzes the secret sciences of demoniac possession, exorcism, astrology, cheiromancy, cartomancy and alchemy.

Class 3, Credit 5

GSHN-210 The Face of the Land
Registration #0508-210
The course is concerned with those selected aspects of geology that pertain to surface features of the earth. The aim of the course is to acquaint the student with landforms he can recognize in the field or from a car on the highway.

Class 3, Credit 4

GSHN-211 Science and Human Values
Registration #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

GSHN-501 Astronomy
Registration #0508-501
A non-mathematical study of the motions and origins of the solar systems as they relate to space investigation. Characteristics of the stellar system with particular emphasis on the evolution of man's knowledge of galaxies. Direct telescopic celestial observation is not a part of this course.

Class 3, Credit 5

GSHN-502 Social Consequences of Technology
Registration #0508-502
An attempt to identify, understand, and probe the causes of current technological problems.

Class 3, Credit 5

GSHN-503 Technology and the Individual
Registration #0508-503
A study of the effects on the life of the individual due to the acceleration of technological change.

Class 3, Credit 5

GSHN-504 Energy and the Environment
Registration #0508-504
Examined will be the important interrelations between energy and the world it serves.

Class 3, Credit 5

GSHP-210 Introduction to Philosophy
Registration #0509-210
An introduction to some of the major problems in philosophy with readings from both classical and contemporary sources.

Class 3, Credit 4

GSHP-211 Introduction to Moral Philosophy
Registration #0509-211
An introduction to moral philosophy through an analysis, comparison and evaluation of the main theories that have been offered as systematic ways of making moral decisions. Readings in both classical and contemporary sources.

Class 3, Credit 4

GSHP-212 Introduction to Biblical Studies
Registration #0509-212
An introduction to the basis of Jewish and Christian beliefs through the Old and New Testaments and related texts.

Class 3, Credit 4

GSHP-302 Greek and Roman Philosophy
Registration #0509-302
A study of classical philosophy from the time of Socrates to the Christian era.

Class **3,** Credit 4

GSHP-502 **Philosophy of Religion**
Registration #0509-502
A critical examination of such religious concerns as the nature of religion, the existence of God, the problem of evil, and life after death.

Class 3, Credit 5

GSHP-504 **Logic**
Registration #0509-504
An introduction to the basic principles of logic. The main emphasis will be on deductive logic (traditional and modern), but some attention will be paid to inductive logic as well.

Class 3, Credit 5

GSHP-509 **Problems About Moral Discourse**
Registration #0509-509
Careful analysis and evaluation of various contemporary views concerning the meaning and function of moral language and the question whether or not moral judgments can be rationally justified. The course is designed for students who have had some previous exposure to philosophical analysis.

Class 3, Credit 5

GSHP-510 **Comparative Religions**
Registration #0509-510
A study of major Western, Asiatic and African religions.

Class 3, Credit 5

GSHP-511 **Introduction to 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

GSHP-512 **Philosophy of Science**
Registration #0509-512
An examination of the nature of the scientific enterprise, its presuppositions, its logic, its claims to reliability, and its relationships to society and to problems of human values.

Class 3, Credit 5

Social Science

GSSA-201 **Introduction to Anthropology**
Registration #0510-201
This course focuses on cultural rather than physical anthropology, is holistic in its approach, and will touch on all aspects of anthropology as the science of man. The course is a survey designed for non-anthropology majors.

Class 3, Credit 4

GSSA-204 **Introduction to Cultural**
Registration #0510-204 **Anthropology**
This course introduces the student to the basic concepts and principles of cultural anthropology. Particular attention is given to how culture impacts on technical careers.

Class 3, Credit 4

GSSA-205 **Deafness in American Culture**
Registration #0510-205
Using principles of cultural anthropology, this course investigates the cultural patterns of deaf Americans and how those patterns relate to those of other cultural systems in America.

Class 3, Credit 4

GSSA-210 **Introduction to Social Science:**
Registration #0510-210 **Anthropology**
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

GSSA-530 **Man Builds/Man Destroys**
Registration #0510-530
A study of the nature, method and scope of environmental responsibility confronting mankind in the eco-system of this planet earth.

Class 3, Credit 5

GSSE-210 **Introduction to Economics**
Registration #0511-210
A study of selected essential concepts of economics, combined with a discussion of some of the current economic problems of the American society, and the policies adopted to solve them. No prior familiarity with economics is required.

Class 3, Credit 4

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 (microeconomics), the economic problems of the nation (macroeconomics), and international economic relations.

Class 3, Credit 4/Qtr.

GSSE-501 **Contemporary Economic Systems**
Registration #0511-501
An investigation of the functioning of modern capitalist and non-capitalist economies, and their problems. The USA and USSR are used as the main models, with aspects of other economies also included.

Class 3, Credit 5

GSSE-503 **Personal Finance**
Registration #0511-503
An introduction to basic problems and techniques of managing personal finances, based on the study of such main topics as budgeting, the use of credit, insurance and investments.

Class 3, Credit 5

GSSE-511 **Economics and Politics of**
Registration #0511 -511 **Consumer Protection**
An analysis of the economics and politics of consumer protection.

Class 3, Credit 5

GSSM-210 **Introduction to Political Science**
Registration #0513-210
An introduction to the complex issues of politics, political behavior, and types of governmental structures.

Class 3, Credit 4

GSSM-211 **American Politics**
Registration #0513-211
To promote an understanding of the American political system and some of the major contemporary problems related to it.

Class 3, Credit 4

GSSM-212 **American Political Development**
Registration #0513-212
An examination of the development of the American political system from the Constitutional Convention to the emergence of the Civil War.

Class 3, Credit 4

GSSM-213 **Introduction to Political**
Registration #0513-213 **Economy**
The course will emphasize resource allocation between private and public goods, the costs and benefits of education, organizing and financing of medical and hospital services, problems of tax structure and tax reform, monopoly power and antitrust system, policies toward American agriculture, issues of urban housing and transportation, control of environmental quality.

Class 3, Credit 4

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.

Class 3, Credit 4

GSSM-501 **American Foreign Policy**
Registration #0513-501
An analysis of trends and events in United States diplomacy from 1890 to the present, and an examination of the instruments and procedures pertinent to the development of foreign policy.

Class 3, Credit 5

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

GSSM-504 **Twentieth Century America**
Registration #0513-504
The major political, social and economic developments affecting the U.S. in the 20th century.

Class 3, Credit 5

GSSM-507 **International Relations**
Registration #0513-507
The basic concepts and theories of international relations, American foreign policy, and major developments in the contemporary world arena.

Class 3, Credit 5

GSSM-508 **Government and Politics**
Registration #0513-508 **of the Soviet Union**
Designed to examine the Soviet political system with emphasis on ideology, Party apparatus, and governmental institutions.

Class 3, Credit 5

GSSM-510 **Comparative Politics**
Registration #0513-510
Designed to provide a mode of analysis for the study of political systems in the U.S., Great Britain, France, Federal Republic of Germany, and the U.S.S.R.

Class 3, Credit 5

GSSM-512 **Urban Politics**
Registration #0513-512
For students interested in a general understanding of the capacity of urban government in solving urban problems.

Class 3, Credit 5

GSSM-513 **Foreign Policy of the**
Registration #0513-513 **Soviet Union**
A chronological and analytical study of Soviet foreign policy since its inception.

Class 3, Credit 5

GSSM-514 **Theories of Political Systems**
Registration #05013-514
A comparative examination of contemporary political theories viewed from the perspective of the earlier theories out of which they evolved. Emphasis is placed upon the value of theory, its practical application and its limitations.

Class 3, Credit 5

GSSM-520 **Politics in China**
Registration #0513-520
This course is designed to provide the students with the political dynamics of the People's Republic of China. Major emphasis will be given to the historical background, major aspects of the political system, and the foreign relations of China.

Class 3, Credit 5

GSSP-203 **Psychology of Childhood**
Registration #0514-203 **and Adolescence**
A systematic, integrated, and interpretive study of a growing person. Includes physical, cognitive, social, moral and emotional development.

Class 3, Credit 4

GSSP-210 **Introduction to Psychology**
Registration #0514-210
A selection of topics drawn chiefly from social and clinical psychology, learning, motivation, and personality with some reference to neuropsychology when relevant.

Class 3, Credit 4

GSSP-501 **Industrial Psychology**
Registration #0514-501
Consideration of principles, application and current research in industrial psychology, with particular reference to personnel selection, training, motivation, morale, performance appraisal, leadership and communication.

Class 3, Credit 5

GSSP-503 **Abnormal Personality**
Registration #0514-503
Description and theories of the nature and development of behavioral disorders. Contemporary treatment procedures will also be discussed.

Class 3, Credit 5

GSSP-504 **Attitude Formation and**
Registration #0514-504 **Persuasion Techniques**
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

GSSP-508 **Psychology of Learning**
Registration #0514-508
A study of experimental investigation with emphasis upon the nature of the problems, procedures and theoretical significance of basic learning processes. This course will focus on selected topics related to human learning.

Class 3, Credit 5

GSSP-509 **Psychology of Perception**
Registration #0514-509
A study of methods and research findings primarily in the field of visual perception together with an evaluation of theoretical interpretations.

Class 3, Credit 5

GSSP-510 **Social Psychology**
Registration #0514-510
The course will attempt to give a general overview of those areas of social psychology currently under the most intensive investigation, and likely to be of most interest to the student.

Class 3, Credit 5

GSSP-511 **Humanistic Psychology: An**
Registration #0514-511 **Introduction**
Emphasis on the value and worth of the individual with concern for the person's perception of the here-and-now in coping with life.

Class 3, Credit 5

GSSP-512 **Psychology of Personality**
Registration #0514-512
A consideration of theories of personality classification and development.

Class 3, Credit 5

GSSP-513 **Psychology of Motivation**
Registration #0514-513
The nature and development of motive and emotion and the role of these processes in adjustment. Covers concepts and theories of motivation.

Class 3, Credit 5

GSSP-514 **Behavior Modification**
Registration #0514-514
A study of the dynamics and control of human behavior.

Class 3, Credit 5

GSSP-515 Psychology of Human Adjustment
Registration #0514-515
This course will take a look at various conceptions of adjustment to see what their diverse implications are for human behavior.

Class 3, Credit 5

GSSP-517 Death and Dying
Registration #0514-517
This course will view America's last taboo subject from a social-psychological perspective. After dealing with topics such as the leading causes of death, attitudes toward death, suicide, and American funeral practices, it will focus on such questions as how people can better cope with their own mortality and that of loved ones, and how people can help others face death, and help themselves and others during periods of bereavement.

Class 3, Credit 5

GSSP-518 Psychology of Aging
Registration #0514-518
The Psychology of Aging course will present a psychological overview of human aging with some study of the dynamic problems of the elderly in contemporary society. Psychological aspects of adulthood and aging will be emphasized within the perspectives of an interdisciplinary approach.

Class 3, Credit 5

GSSP-519 Psychology of Altered States
Registration #0514-519 of Consciousness
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.

Class 3, Credit 5

GSSS-202 Introduction to Social Science
Registration #0515-202
An introductory examination of causes, patterns, and consequences of human behavior, individually and in groups, drawing upon the findings of contemporary social science.

Class 3, Credit 4

GSSS-210 Introduction to Sociology
Registration #0515-210
An introduction to the structure, function and development of human societies, with special attention to modern industrial societies in general and U.S. society in particular.

Class 3, Credit 4

GSSS-502 Contemporary Social Problems
Registration #0515-502
Contemporary problems of human living in society will be studied with recourse to local conditions and resources as aids to learning.

Class 3, Credit 5

GSSS-504 Intergroup Relations: American
Registration #0515-504 Racial and Ethnic Minorities
A sociological analysis of relations between ethnic, racial, and religious groups.

Class 3, Credit 5

GSSS-505 Juvenile Delinquency
Registration #0515-505
Problems of juvenile delinquency in the United States: etiology, extent and significance of the problem. This course features an indepth study of family court and its procedures as well as modern methods of prevention, treatment and control.

Class 3, Credit 5

GSSS-511 Population & Society
Registration #0515-511
Study of demographic variables of mortality, fertility, and migration as they affect the rise and quality of population.

Class 3, Credit 5

GSSS-512 Urbanization: Urban Man
Registration #0515-512 and Society
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.

Class 3, Credit 5

GSSS-517 Sociology of Deviant Behavior
Registration #0515-517
Examination of conditions under which deviance develops and changes over time. Study of individual deviance, deviant subcultures, and the transformation of a deviant identity.

Class 3, Credit 5

GSSS-518 Social Protest Movements
Registration #0515-518
The course will examine that pervasive phenomenon of modern life, the social protest movement from a sociological perspective.

Class 3, Credit 5

GSSS-519 Women's Studies:
Registration #0515-519 Selected Topics
An analysis of selected factors that contribute to our understanding of the present status of women.

Class 3, Credit 5

GSSS-520 Educational Sociology
Registration #0515-520 (Undergraduate)
The development of sociological and sociopsychological types of knowledge that have relevancy 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.

Class 3, Credit 5

GSSS-521 Sociological Seminar
Registration #0515-521
A course of minimum procedural as well as substantive structure which approaches, from a sociological perspective, matters of contemporary concern.

Class 3, Credit 5

GSSS-522 Medical Sociology
Registration #0515-522
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.

Class 3, Credit 5

GSSS-523 Sociology of the Black or
Registration #0515-523 Afrikan Experience
This seminar is designed to study the social movements directed towards social change. Aspects of Black or Afrikan life and culture will be dealt with and emphasis is placed on the various ideologies among Blacks.

Class 3, Credit 5

GSSS-524 Applied Sociology
Registration #0515-524
This course is an effort to provide the student with useful sociological knowledge applicable to solutions of practical problems. The inventory of problems is not fixed beforehand, and the specific course content reflects the problems either already encountered by students or very likely to represent a significant portion of their anticipated professional concern upon graduation.

Class 3, Credit 5

GSSS-531 Marriage
Registration #0515-531
Contemporary trends in courtship patterns, male-female relationships and marital systems.

Class 3, Credit 5

GSSS-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, premarital and marital sexual behavior, and alternative sexual behavior.

Class 3, Credit 5

GSSS-570 **The Homophiles and Their Society**
Registration #0515-570
This course will examine the world of the homosexual, and an analysis of the diverse types to be found in it.

Class 3, Credit 5

Open Elective or Independent Study
The student has the freedom to select any course within the Institute or to create an independent study project. An independent study course enables the interested student and his faculty sponsor to coordinate their efforts on subject and topics that range beyond the normal sequence of course elections. The student may, for example, participate in a volunteer community human service experience.

Credit variable

Graduate courses in General Studies

GLLL-701 **Art of the Cinema**
Registration #0504-701
A critical examination of certain films as an integral part of modern culture. 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

GSHF-703 **American Architecture**
Registration #0505-703
An examination of American architecture from the 17th century to the present designed for the graduate level of study. Emphasis will be placed on American building art in the late 19th and 20th century.

Class 3, Credit 5

GSHF-705 **Practice and Theories of Art Criticism**
Registration #0505-705
A course for the art oriented graduate student centering on the student's search for a supportable and reliable basis for making value judgments about works of art as well as introducing him to major historical and philosophic concepts of art criticism.

Class 3, Credit 5

GSHF-707 **Cubism to the Present**
Registration #0505-707
Cubism as a way of seeing and as an expression of 20th century thinking. Differences and similarities with art forms of earlier eras and other cultures.

Class 3, Credit 5

GSHF-708 **Oriental Art**
Registration #0505-708
A survey outlining the development of art in India, China and Japan and examining the philosophical circumstances that distinguish Eastern artistic traditions.

Class 3, Credit 5

GSHF-710 **Art, Music and Ideas**
Registration #0505-710
An introduction to and analysis of those ideas, philosophies and human attitudes that are associated with and expressed in major works of art from Giotto and des Prez to Stravinsky, Picasso and Wright.

Class 3, Credit 5

GSHF-711 **20th Century American Art**
Registration #0505-711
An investigation of American art from the Civil War to the present. Emphasis will be placed on the visual arts but many references will be made to the music and architecture.

Class 3, Credit 5

GSHF-712 **Arts and Crafts in Tribal Societies**
Registration #0505-712
A study of the function of "primitive" art and the techniques of its production, including the use of clay, stone, fibers, bark, wood, bronze, gold, etc. Hair-styling, body painting and scarification will also be discussed.

Class 3, Credit 5

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

GSHF-720 **English Architecture**
Registration #0505-720
An on-site examination of the stylistic development of English architecture from the year 1000 to the present. Emphasis will be placed on the study of the evolution of aesthetics and structure in English building art together with an analysis of the work of major English architects.

Class 3, Credit 5

GSHH-701 **History of American Educational Thought and Practice**
Registration #0507-701
Traces the history of American education from the pre-Civil War years to the present.

Class 3, Credit 5

GSHH-703 **History of the Renaissance**
Registration #0507-703
The course will analyze the revival in society, literature, the arts, architecture, and political thought that occurred in Europe from 1300 to 1600. Major emphasis will be given European efflorescence associated with the ideal of Renaissance art and life.

Class 3, Credit 5

GSHP-704 **Ethics and Philosophy of Education**
Registration #0509-704
To develop insights into various philosophies of education through a critical examination of their origins and viewpoints.

Class 3, Credit 5

GSSP-701 **Developmental Psychology**
Registration #0514-701
The course seeks to investigate the broad developmental patterns of normal human behavior, with emphasis on the growth of cognitive, personality, and culturally patterned behaviors.

Class 3, Credit 5

GSSP-702 **Educational Psychology**
Registration #0514-702
This course is designed to furnish the students with an understanding of the basic psychological processes underlying the educational process, and to apply them to concrete situations that may arise for persons doing teaching.

Class 3, Credit 5

GSSS-701 **Educational Sociology**
Registration #0515-701
The development of sociological and socio-psychological types of knowledge that have relevancy for or logical connection with educational processes. Based on substantive material about social phenomena making up the social order in which school systems are operating and by which they are influenced.

Class 3, Credit 5

College of Graphic Arts and Photography

School of Photographic Arts and Sciences

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

PPHB-211 Survey of Biomedical
Registration #0901-211 Photography
Career opportunities, typical biomedical photography settings, types of photography performed. Ethical, professional, and personal relationships with patient, physicians, research and staff personnel.

Class 1, Credit 1

PPHB-301,302,303 Biomedical Photography II
Registration #0901-301, -302, -303
Further study and practice of theory and principles used in Biomedical Photography, including photomacrography, photomicrography, operating room techniques, infrared and ultraviolet light, biological field studies.

Class 2, Lab. 10, Credit 5

PPHB-331, 332, 333 Preparation of Biomedical
Registration #0901 -331, -332, -333 Visuals
Study of basic principles of effective visual communication and design. Student will produce slide and motion picture presentations and exhibition displays.

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

PPHB-501, 502,503 Senior Thesis Production
Registration #0901-501, -502, -053
An investigation, planning, organization and production of an audiovisual presentation, a learning package and informational program for a biomedical communications client.

The biomedical communications package will be reviewed for appropriateness of design and content.

Class 2, Lab. 8, Credit 4

Filmmaking

PPHF-207, 208, 209 Introduction to Film
Registration #0902-207, -208, -209 Making and Television
Film as a means of communication. Involves students in the basic aesthetic principles, production, processes and techniques governing modern film making as it relates to dynamics to all basic phases of motion picture production in the Super 8mm format and are engaged in a variety of production projects, individual and crew, each quarter. Special regard is given to Art and Design students in relation to film making; comparison and contrast of film with other forms of artistic expression; seeing and representing movement through cinematography and editing; the non-representational abstractionist movement in film making; animation, titles and storyboards as art work; set and costume design. Students furnish film and processing; equipment is furnished. The spring quarter (PPHF-209) is devoted to the television medium. (The previous two quarters, PPHF-207, 208 are NOT prerequisites for the TV quarter.) Students will learn how to communicate with the medium, producing programs of their own design within a fairly wide latitude. Course includes work as a crew member on the production of programs designed by the other students-in the class. The commonalities and differences as regards film and television will be emphasized.

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

PPHF-401 Introduction to Film Making and
Registration #0902-401 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 technical and theoretical knowledge 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.

Class 2, Lab. 6, Credit 4

PPHF-402 Introduction to Non Fiction
Registration #0902-402 Film Production
Film making as a means of interpretation and expression with an emphasis in the non-fictional narrative film, 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-401 or a satisfactory equivalent)

Class 2, Lab. 6, Credit 4

PPHF-403 Introduction to Fiction and Dramatic
Registration #0902-403 Documentary 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 documentaries. Included will be the non-fictional narrative and 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-402 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, cultural, and theoretical context. Each quarter will emphasize a different film form: 407 fiction feature, 408 documentary, 409 experimental and animation. No prerequisites. Admission during any quarter of the academic year.

Class 3, Credit 3

PPHF-421,422 Scrlptwriting
Registration #0902-421, -422
Students of film making experience all phases of professional creative and technical writing pertinent to visual translation for theatrical, documentary and experimental film production. Students consider the aesthetic and technical evolution of visual-dynamic stories, themes and ideas within the developmental framework of research, preliminary and formal treatments, master scene screenplay and shooting script-storyboard, breakdown script and preproduction management. Special attention to concepts as point of view, transition of action and continuity of theme and structure^ characterization, mise en scene, pace, dialogue and narration. Other major concerns are the scriptwriter as total film maker and production collaborator: comparative visions for film and other forms of expression; evolution of cinematic language; scriptwriter's responsibility in relation to subject matter and audience; perspective on the film industries and their artistic, economic and political realities in relation to the scriptwriter; business, law and copyright. Winter and Spring Quarter.

Class 2, Lab. 2, Credit 3

PPHF-501 Visualization and Commercial
Registration #0902-501 Film Production
A general review of professional production methods and the theory and practice of visualizing an expressive film continuity. Basic synchronous sound recording and single system camera use is included. (PPHF-403 or permission of the instructor)

Class 2, Lab. 6, Credit 4

PPHF-502 Film Planning and Studio
Registration #0902-502 Operations
Introduction to studio crew work and editing systems for professional film. Budgeting and an elementary view of the economics of production are also included. Film writing is introduced and related to production planning. (PPHF-501 or permission of the instructor)

Class 2, Lab. 6, Credit 4

PPHF-503 Film Project with
Registration #0902-503 Synchronous Sound
A short (3-5 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. (PPHF-502)

Class 2, Lab. 6, Credit 4

PPHF-507,508,509 Television Production
Registration #0902-507, 508, 509
Use of the television medium to communicate with audiences. Course emphasizes the producing and directing of informational programs of the student's design and includes work as a crew member on other students' productions: lighting, camera operation, video switching, audio control. A secondary emphasis is put on television as a social, legal and technical phenomenon. All materials are furnished except expendable graphic supplies.

Class 2, Lab. 8, Credit 4

General Photography

PPHG-200 Photography
Registration #0903-200
A ten-week summer course for students entering the transfer program in Photographic Illustration and Professional Photography. This is equivalent to Photography PPHG-201, 202, 203.

Credit 12

PPHG-201,202,203 Photography
Registration #0903-201, -202, -203
A program in basic photography with emphasis on craftsmanship, theory, and visual communications. The major aim is to enable the student to form a broad foundation of understanding and skills necessary for advanced study in photography available in upperclass programs. The completion of this foundation year allows the student to select a more specific program culminating in a Bachelor of Fine Arts or a Bachelor of Science degree.

Class 3, Lab. 12, Credit 7

PPHG-207, 208,209 Still Photography
Registration #0903-207, 208, 209
In the first quarter the students become familiar with the 35mm camera, processing and printing. The work is restricted to black-and-white photography. The aesthetics and basic understanding of photographic practice is covered.

The second and third quarters deal with more advanced techniques and principles of photography.

Class 1, Lab. 6, Credit 3

PPHG-210 Materials and Processes
Registration #0903-210 of Photography
A ten-week summer course for students entering the transfer program in Photographic Illustration and Professional Photography. This course is equivalent to PPHG-211, 212, 213 Materials & Processes of Photography.

Credit 6

PPHG-211,212,213 Materials and Processes
Registration #0903-211,212,213 of Photography
A basic study of the technology of photography, with emphasis on applications to real photographic problems. Learning experiences include workshop projects, demonstrations,-lectures, discussions, and reviews of readings. Among the topics studied are image formation and evaluation, photosensitive materials, exposure, processing, tone reproduction, visual perception, color theory, variability, quality control, and photographic effects. An independent study project is required.

Class 2, Lab. 1, Credit 3

Photographic Illustration

PPHL-301,302,303 History and Aesthetics
Registration #0904-301, -302, -303 of Photography
Covering the "History and Aesthetics of Photography" from 1839 to the present, with special emphasis on the development of photographic seeing, and its related effect on other media. A survey of the numerous processes and how their development affected the image-making of their particular period, i.e. daguerreotypes, callitypes, ambrotypes, etc. Student projects designed to illuminate phases of photographic history best understood by personal visual exploration.

Class 3, Credit 3

PPHL-311, 312, 313 B.F.A. Photography II
Registration #0904-311, -312, -313
This is a common core course which is required of all second year illustration students.

Emphasis is placed on an integrated learning experience as an essential foundation to upperclass study in the various photographic disciplines. The course, therefore, is not taught as a complete body of knowledge, but rather as an open-ended investigation into many areas of technique and image-making.

The course should aid the student to make a selection in one of the four major areas of specialization offered to upperclass B.F.A. degree candidates.

Class 3, Lab. 9, Credit 6

PPHL-401,402,403 Photography as a Fine Art I
Registration #0904-401, -402, -403
The third-year course for students majoring in photography as a fine art places emphasis on expanding the individual's ability and understanding of photography as a light-sensitive medium for communicating ideas. This is done through exploration of traditional as well as non-silver print-making techniques. The course is intended to develop an awareness and sensitivity to shared concepts among other disciplines in arts. (PPHL-303)

Class 2, Lab. 8, Credit 4

PPHL-411, 412,413 Photojournalism I
Registration #0904-411, 412,413
Journalistic photography for mass media publication with emphasis on the development of specialized skills in projects dealing with various aspects of reportage and all related editorial problems from caption writing, law and history, to organizational structures, printing processes, layout and design. Special emphasis is placed on the story as a total concept from inception to finished layout. Research and origination of material as well as the study of publications is explored. (PPHL-313)

Class 2, Lab. 8, Credit 4

PPHL-421, 422,423 Nature Photography
Registration #0904-421, -422, -423
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 man's attitudes toward and impact on his environment. (PPHG-203)

Class 2, Lab. 8, Credit 4

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

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

PPHL-440 News Writing and News
Registration #0904-440 Reporting
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 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-impositions of unnecessary limitations. Development of awareness to the other arts is continued. (PPHL-403)

Class 2, Lab. 8, Credit 4

PPHL-511, 512, 513 Photojournalism II
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. (PPHL-413)

Class 2, Lab. 8, Credit 4

PPHL-521, 522,523 Color Photography
Registration #0904-521,-522, -523 Workshop
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

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)

Class 2, Lab. 8, Credit 4

Photographic Processing and Finishing Management

PPHM-201, 202, 203 Basic Principles
Registration #0905-201, -202, -203 of Photography
The program of study is designed to provide photographic marketing students with a thorough knowledge of the basic photographic process in order that they may have an understanding of how 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

PPHM-300 Machine Processing
Registration #0905-300
A ten-week summer course which provides an opportunity for students who have completed basic photography to gain an understanding of all aspects of machine processing. 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.

Credit 12

PPHM-301, 302, 303 Machine Processing
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. Student will be involved with automated processing and finishing on a full production basis. (PPHS-201, 202, 203, or 21 credit hours of basic photography)

Class 1, Lab. 8, Credit 4

PPHM-310 Survey of Machine Processing
Registration #0905-310
Provides the non-photographic processing and finishing major with an opportunity to become knowledgeable in the operational procedures and services of a processing and finishing laboratory.

Class 2, Credit 2

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

Class 4, Credit 4

PPHM-501, 502, 503 Training and Supervision of
Registration #0905-501, -502, -503 Photographic Processing and Finishing Laboratory Personnel

provides an opportunity for the processing and finishing management students to experience supervisory and training techniques as they prepare and use training aids and techniques in the actual supervision of the various work areas in the processing and finishing laboratory. (PPHM-303)

Class 1, Lab. 8, Credit 4

PPHM-511, 512,513 Advanced Machine
Registration #0905-511, -512, -513 Processing

This course taken during the last year of study provides the student , with an opportunity to study in depth, on an independent basis, those areas of processing and finishing which the student finds most interesting. This course may also be used to strengthen those areas of interest in which the student feels a weakness.

Lab. 12, Credit 4

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 communications. 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. (PPHG-203)

Class 3, Lab. 11, Credit 6

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 materials and processes. 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, internegative making, transparency duplicating, and the use of special processing techniques are used to emphasize theory.

Class 2, Lab. 4, Credit 3

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.

Class 2, Lab. 8, Credit 4

PPHP-408 Scientific and Technical Application
Registration #0906-408 of Photography

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.

Class 2, Lab. 8, Credit 4

PPHP-409 Corporate and Special Interest
Registration #0906-409 Publications

A survey of this type of publication with particular emphasis in the photographic problems involved. Skill building assignments to improve competence and an introduction into the problems of the art director, editor, printer, layout man, and writer form the basis of the course content.

Class 2, Lab. 8, Credit 4

PPHP-411,412,413 Sensitometry
Registration #0906-411, -412, -413

Provides the professional photographer with technical tools for solving photographic problems. Topics include statistical concepts, process control methods, sensitometry, densitometry, tone reproduction systems, color reproduction systems, and image evaluation. (SMAM-212, PPHG-203)

Class 3, Lab. 3, Credit 4

PPHP-421,422,423 Advertising Photography
Registration #0906-421, -422, -423

A course built strictly to the standards of professional photography. Only those students who seriously aspire to be professional craftsmen 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 own natural ability and interests. Approximately half of the photography will be in color. (PPHP-303 and/or PPHL-313)

Class 2, Lab. 7, Credit 4

PPHP-431 Forensic Photography
Registration #0906-431

The use of photography in forensic application for business and industry, surveillance, photographic evidence, forgery detection, safety. (PPHG-203)

Class 2, Lab. 6, Credit 4

PPHP-441, 442, 443 Advanced Color Printing
Registration #0906-441, -442, -443

This course is designed to give the student an advanced study in color techniques and theory in relation to quality and creative use of photographic materials. The student may choose subjects for independent study such as the Dye Transfer Process, quality control methods in printing and processing and special masking. PPHP-311 or some previous experience is required.

Lab. 8, Credit 4

PPHP-501, 502,503 Industrial Photography
Registration #0906-501, -502, -503 Seminar

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 of PPHP-409, or permission of the instructor)

Class 2, Lab. 3, Studio 5, Credit 4

PPHP-511,512,513 Photographic Process
Registration #096-511,-512, -513 Control

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 (PPHP-413, or permission of the instructor)

Class 2, Lab. 6, Credit 4

PPHP-521, 522, 523 Advanced Color Seminar
Registration #0906-521, -522, -523

This course is designed to give the advanced student an opportunity to work relatively independently to either develop his portfolio and/or to explore specific areas of interest in-depth, either in the picture making areas or in image/materials manipulation techniques. It combines the individual initiative aspects of independent study with the advantages of shared class critiques, lectures and other profession related experiences. (PPHP-303 and PPHP-313, or PPHL-313 and permission of instructor)

Class 2, Lab. 6, Credit 4

PPHP-541, 542, 543 Portrait Photography
Registration #0906-541, -542, -543
Portraiture with the professional photographer's approach. Black and white and color retouching are included and instruction is given in special printing and finishing techniques. (PPHG-203)

Class 2, Lab. 6, Credit 4

PPHP-551,552,553 Special Topics in
Registration #0906-551, -552, -553 Photography
A seminar approach offered on demand when adequate numbers of students and faculty desire to investigate specialized topics not normally offered in the regular curriculum. Available to upper level students.

Credit variable

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, and for others who desire a background in photographic science and instrumentation at an introductory engineering level. Students planning entrance at the third year take both courses concurrently.

PPHS-200 Fundamentals of Photographic
Registration #0907-200 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 photosensitive systems, characteristics of radiation, introduction to sensitometry and tone reproduction, and applied photography.

Credit 9

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.

Class 3, Lab. 3, Credit 4

PPHS-210 Fundamentals of Photographic
Registration #0907-210 Science II
An intensive course presenting the subject matter normally taken by Photographic Science and Instrumentation students during their second year. Topics include basic photographic and instrumentation optics, the chemistry of non-conventional black-and-white and color processing, and a continuation of the topics covered in PPHS-200. (PPHS-200 or PPHS-203)

Credit 9

PPHS-301 Applied Processing
Registration #0907-301
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-207, PPHS-202)

Class 2, Lab. 6, Credit 4

PPHS-302 Advanced Sensitometry of Black-and-White
Registration #0907-302 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-303 Photographic Instrumentation
Registration #0907-303
Introduction to the use of photographic recording methods to obtain space and time information from object fields; principles for selection of camera, lens parameters, recording material and recording rate; the use of time and space references to facilitate date retrieval. Laboratory work in planning and executing a time-lapse, normal or high-speed data recording project using 16mm cine apparatus. (PPHS-203)

Class 2, Lab. 6, 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. (SM AM-205, SPSP-313, PPHS-203)

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; figures of merit; sinusoidal response functions; information and information capacity; characteristics of instruments used for small-scale image measurements. Laboratory work in microdensitometry and optical image formation. (SMAM-305, PPHS-203, SPSP-313)

Class 3, Lab. 6, Credit 5

PPHS-403 Principles of Color Photography
Registration #0907-403
Theory of color mixing. Sensitometry and densitometry of the three dye layers. Analysis of photographic speeds of color materials. Color reproduction. Study of additive and subtractive color systems. Physical behavior of the dyes in color systems. Systems of color specifications (Munsell and CIE systems). Masking in color photography. Relationship between integral and analytical densities. Practical methods of analyzing non-ideal color films. Laboratory; includes printing from color negatives, direct duplicating, printing from internegatives, determination of the equivalent neutral densities. (SMAM-305, SPSP-313, PPHS-203)

Class 3, Lab. 6, Credit 5

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 emulsions and developer solutions at the intermediate level. Topics in physical, organic, and analytical chemistry necessary to the continued study of photographic science. (PPHS-301, SCHG-207)

Class 3, Lab. 3, Credit 4

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-403, PPHS-413)

Class 2, Credit 2 (Winter and Spring)

Class 2, Lab. 6, Credit 4 (Fall)

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

PPHS-521,522,523 Image Systems and Evaluation
Registration #0907-521, -522, -523
An analytical approach to analysis and evaluation of photo-optical and other image recording systems; objective and subjective evaluation techniques and their correlation. The use of convolution, correlation, autocorrelation, and Fourier methods in the analysis of the image recording systems. Laboratory work in the design of photo-optical systems. (PPHS-403, SMAM-305, SPSP-313)

Class 2, Lab. 6, Credit 4 (Fall)
Class 2, Credit 2 (Winter & Spring)

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

Class 3, Credit 3

Graduate courses
(Fifth year of five-year program)

PPHS-700 Principles of Photographic Science
Registration #0907-700
A course intended for students who have completed their undergraduate programs in engineering, or the sciences and who now wish to prepare themselves for entry into the graduate program in Photographic Science and Instrumentation. It is an intensive course, assuming working knowledge of mathematics, physics, and chemistry, and includes radiation theory and radiometry, properties of radiation-sensitive materials, chemistry and kinetics of photographic processing, sensitometry, tone reproduction, principles of color measurement, and color photographic systems. (Preliminary admission to MS program in Photographic Science or consent of Graduate Coordinator)

Credit 15 (Summer only)

(Not applicable to 45 required graduate credits)

PPHS-701, 702,703 Principles of Photographic
Registration #0907-701, -702, -703 Science
Equivalent to PPHS-700, but offered in the evening and Saturdays during the regular Fall, Winter and Spring quarters. (Preliminary admission to MS program in Photographic Science or consent of Graduate Coordinator)

Credit 15

(Not applicable to 45 required graduate credits)

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

Class 3, Credit 3

PPHS-731, 732, 733 Principles of Instrumental
Registration #0907-731, -732, -733 and Photographic Optics
The principles of geometrical and physical optics with application to photographic instrumentation systems. Geometrical optics-general laws, first-order imaging, aberrations and geometrical image evaluation, mirror and prism systems, the eye and vision characteristics, radiometry of optical images, basic instrument systems. Physical optics-Maxwell's equations, electromagnetic waves, polarization, interference and interferometers, coherence, Kirchoff integral and Huygen's principle, Fraunhofer and Fresnel diffraction, Fourier-transform formulation of diffraction, transferfunction description of imaging system performance.

Class 3, Credit 3

PPHS-741, 742,743 Analysis and Evaluation
Registration #0907-741, -742, -743 of Imaging Systems
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
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 Chairman of the Photographic Science graduate program.)

Credit 3

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 advisor.

Credit 9 minimum for M.S.

Master of Fine Arts in Photography

PPHG-700 Fundamentals of Photographic
Registration #0907-700 Communication
A summer course for students entering the graduate program with insufficient undergraduate credits 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.
Credits not applicable to M.F.A. requirements.

PPHG-701, 702,703 History and Aesthetics
Registration #0903-701, -702, -703 of Photography
Covering the "History and Aesthetics of Photography" from 1839 to the present, with special emphasis on the development of photographic seeing, and its related effect on other media. A survey of the numerous processes and how their development affected the image-making of their particular period, i.e. daguerreotypes, callitypes, and ambrotypes. Student projects designed to illuminate phases of photographic history best understood by personal visual exploration.

Credit 3/Qtr.

PPHG-705, 706, 707 Student/Faculty Seminar
Registration #0903-705, -706, -707
An all purpose weekly meeting to facilitate communication among all members of the M.F.A. community.

Credit 1/Qtr.

PPHG-720 Photography (Still)
Registration #0903-720
Photographic communications workshop. Individually planned studies in photographic visual communication as determined by faculty-student consultation based on the student's personal objectives. Research, group critiques, seminars, studio and laboratory practice, field trips.

Credit 1-9

PPHG-725, 726,727 Photography Core
Registration #0903-725, -726, -727
Major emphasis is placed on the individual's learning to generate and intensify his personal statement through photography. Some of the projects are assigned while others are selected by the candidate.

Required for still photography majors.

Credit 3/Qtr.

PPHG-730 Cinematography
Registration #0903-703
Film making workshop. Individually planned studies in cinematography, as determined by faculty-student consultation, group critiques, seminars, studio and laboratory practice, field trips.

Credit 3-9

PPHG-740 Photographic Museum Practice
Registration #0903-740
Museum internship workshop, still or motion picture. Research, assigned projects, seminars in history, function and administration of museums, with emphasis on photographic curatorial duties. Practice in exhibition planning and development. Field trips. This cannot be selected as a minor concentration.

Credit 3-9

PPHG-799 Independent Project
Registration #0903-799
The student proposes an advanced project to an individual instructor. The student and the instructor are jointly responsible that the material to be covered is appropriate to the student's program and that the number of credits proposed are justified. Both will sign the proposal which must also be approved by the coordinator and the director of the school.

Credit 1-9

PPHG-889 Pre-Thesis Seminar
Registration #0903-889
Development and statement of written thesis proposal with emphasis on research required and exposure to various concepts of M.F.A. thesis possibilities.

Credit 1

PPHG-890 Research and Thesis
Registration #0903-890
Research, execution of a creative project and presentation of an acceptable exhibition with emphasis on technique, design, and communication. The candidate will select his thesis subject with the approval of the graduate committee and will deposit a suitable report and record of the thesis with the Institute. Museum majors will plan, assemble and take full responsibility for mounting a major photographic exhibit under the sponsorship of Rochester Institute of Technology, or a major museum or educational institution. The announcement, catalog, reviews and a satisfactory illustrated report of the project must be deposited with the Institute.

Credit 1-9

Master of Science in Photographic Science

PPHS-700 Principles of Photographic Science
Registration #0907-700
A course intended for students who have completed their undergraduate programs in engineering, or the sciences and who now wish to prepare themselves for entry into the graduate program in Photographic Science and Instrumentation. It is an intensive course, assuming working knowledge of mathematics, physics, and chemistry, and includes radiation theory and radiometry, properties of radiation-sensitive materials, chemistry and kinetics of photographic processing, sensitometry, tone reproduction, principles of color measurement, and color photographic systems. (Preliminary admission to MS program in Photographic Science or consent of Graduate Coordinator)

Credit 15 (Summer only)

(Not applicable to 45 required graduate credits)

PPHS-701,702,703 Principles of Photographic
Registration #0907-701, -702, -703 Science
Equivalent to PPHS-700, but offered in the evening and Saturdays during the regular Fall, Winter and Spring quarters. (Preliminary admission to MS program in Photographic Science or consent of Graduate Coordinator)

Credit 15

(Not applicable to 45 required graduate credits)

PPHS-711, 712, 713 Theory of the
Registration #0907-711,-712, -713 Photographic Process
Chemical and physical properties of silver halides and gelatin, physical structure and optical properties of the silver halide emulsion and their relations to the characteristic curve; chemistry and preparation of emulsions; extensive treatment of theory of sensitivity and latent image formation; chemistry and kinetics of processing, including color processing; theory of color reproduction; chemistry and physics of selected non-silver processes.

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 5/Qtr.

School of Printing

Management courses

PPRM-201 Introduction to Technical Writing
Registration #0910-201
Basic approach to fundamentals of modern technical writing. Review of English and writing skills. Consideration of principles, techniques, form, and style.

Class 3, Credit 3

PPRM-301 Applications of Computers to
Registration #0910-301 the Graphic Arts
A study of the applications of automated data processing, involving both tabulating systems and electronic computer systems, to 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-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 imposition and preplanning techniques. Obtaining and interpreting specifications. Design and use of estimating forms. Pricing for a profit margin. Preparing the quotation.

Class 4, Credit 4

PPRM-402 **Estimating II**
Registration #0910-402
Continuing study of commercial offset lithography estimating. Multi-color offset presses and signature-related bindery operations. Signature imposition. Camera, layout, stripping and plate processing production times. Phototypesetting and mechanical artwork costs. Color separations and the costs associated with process color printing. Valuing finishing operations. (PPRM-401)

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, assignment and transportation problems, linear programming, decisions under uncertainty. These topics are considered from conceptual and problem solving viewpoints without emphasis on mathematics beyond what can be covered adequately in the course.

Class 4, Credit 4

PPRM-501 **Financial Controls I**
Registration #0910-501
Gives the line manager an understanding of the firm's financial accounting system so that he 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-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**
Registration #0910-503,-504 **Control I, II**
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-505 **Advertising Management**
Registration #0910-505
A survey of the advertising industry and its relationship to printing. Advertising research, copywriting, media, and the social aspects of the advertising process.

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 **Estimating Workshop**
Registration #0910-507
Estimating for letterpress, flexography, gravure and screen printing. Special considerations in web-fed press planning. Estimating practices in the business forms and book manufacturing industries. Addressing, mailing and order fulfillment. Preplanning and break-even analysis. Computer-assisted estimating systems. Techniques for competitive estimating and pricing. (PPRM-402)

Class 4, Credit 4

PPRM-509 **Economics of Production**
Registration #0910-509 **Management**
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
Makeup and measurement of the labor force. Histoi7 of organized labor. Wages, hours, union security, and other issues. Collective bargaining and contract negotiations emphasizing the printing industry. Labor law. (PPRM-302)

Class 4, Credit 4

PPRM-512 **Collective Bargaining in the**
Registration #0910-512 **Graphic Arts**
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

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

Class 4, Credit 4

PPRM-514 **Newspaper Management**
Registration #0910-514
Consideration of personnel, organization, finance, maintenance, advertising, circulation, and other sources of revenue as they pertain to the metropolitan press. Problems and practices of plant supervision.

Class 4, Credit 4

PPRM-515 **Legal Problems 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 applying to advertising, photography, and publishing.

Class 4, Credit 4

PPRM-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 to produce it at a profit). Students examine marketing functions and consider alternative ways to perform them in various company situations.

Class 4, Credit 4

PPRM-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

PPRM-599 **Independent Study**
Registration #0910-599
Student selects and develops independent study project of his/her own design. Project and amount of credit assigned must be approved by Director of School of Printing.

Credit by arrangement

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 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 on modern composing room procedures.

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 phototypesetting. 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
Historical analysis of letter forms. Essential requirements and principles of layout and printing design as applied to commercial printing and advertising. Practical application of theory in solving printing design problems.

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. Prepress preparation of various plates for printing. Introduction to flexographic printing.

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. Course 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 negatives 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, gravure cylinders, and electronically engraved plates. Theoretical study plus practical involvement in making of various plates.

Class 2, Lab. 3, Credit 3

PPRT-208 **Lithographic Press**
Registration #0911-208
An introductory study of the principles and methods of offset presswork. Press functions. Operations and care of presses. Exercise in running simple jobs.

Class 2, Lab. 3, Credit 3

PPRT-209 **Screen Printing**
Registration #0911 -209
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.

Class 2, Lab. 3, Credit 3

PPRT-301 **Typography II**
Registration #0911-301
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)

Class 2, Lab. 6, Credit 4

PPRT-302 **Composition Systems**
Registration #0911-302
Detailed study of photocomposition with emphasis on systems approach. Introduction to use of computers in composing rooms, and operation of specialized equipment. Field trips. (PPRT-202)

Class 2, Lab. 4, Credit 3

PPRT-303 **Layout and Printing Design**
Registration #0911-303
Typical printing design problems with emphasis on typographic arrangements, pictorial arrangement with consideration of production follow-through. Includes design of complete booklet dummy and other commercial items for black-and-white and color reproduction from roughs to comprehensive layout.

Class 2, Lab. 6, Credit 4

PPRT-304 **Advanced Relief Press**
Registration #0911 -304
A study of pressroom problems in letterpress printing on cylinder press equipment. Commercial forms, single color and multi-color work. Makeready system. Operation and care of equipment. (PPRT-204)

Class 2, Lab. 6, Credit 4

PPRT-305 **Gravure**
Registration #0911 -305
Laboratory and technical course embracing the theories and practices of gravure presswork using sheet-fed presses. Demonstrations and class use of three-unit web press will also be incorporated. Study of related information on techniques, equipment, materials, and supplies.

Class 2, Lab. 3, Credit 3

PPRT-306 **Tone Reproduction Photography**
Registration #0911-306
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 half tone sensitometry and process control. (PPRT-206)

Class 2, Lab. 3, Credit 3

PPRT-307 **Lithographic Plates**
Registration #0911 -307
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 roomlight-contact films.

Class 2, Lab. 3, Credit 3

PPRT-308 **Lithographic Press Problems**
Registration #0911 -308
An advanced course in the theory, practice, and problems of offset presswork. Development of technical knowledge of materials and equipment. Practice in running multicolor work. (PPRT-208)

Class 2, Lab. 6, Credit 4

PPRT-309 **Advanced Screen Printing**
Registration #0911-309
Further study of the theory and practice of screen printing covering areas such as experiments with fabrics or screens; stencil forming materials and the effects these have on finished product. Further study into the inks and substrates that are common to the screen printer. Introduction to and running of automatic cylinder screen printing press and container press capable of printing cylindrical, conical and flat objects. (PPRT-209)

Class 2, Lab. 3, Credit 3

PPRT-311 **Relief and Gravure Plates**
Registration #0911 -311
An introduction to the technological requirements involved in producing relief printing plates. Original and duplicate plate characteristics are considered in light of typical production needs. Chemical, mechanical, and electronic processes are discussed and illustrated in lecture and laboratory experiences.

Class 2, Lab. 3, Credit 3

PPRT-311 **Imposition and Finishing**
Registration #0911-311
Course is designed to understand imposition planning as related to and governed by folding and other finishing operations. Content deals with the concepts of pre-press planning, binding and finishing. Included are topics on preparing layouts, forms and folded paper material for binding. Laboratory experiments include operation of modern bindery equipment and the binding of a hardcover bound book.

Class 4, Credit 4

PPRT-312 **Stripping**
Registration #0911 -312
Examination and treatment of negative and positive films to remove defects; study and application of various methods of assembling film negatives or positives into flats in preparation for platemaking; study of proofing systems and types of impositions.

Class 2, Lab. 3, Credit 3

PPRT-313 **Copy Preparation**
Registration #0911-313
Preparation of copy or 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)

Class 2, Lab. 6, Credit 4

PPRT-314 **Flexography**
Registration #0911-314
A study of the theory and practice of flexographic printing. Uses and development of flexography. Plate and ink requirements. Press principles and operation. Experiments in printing on a wide variety of surfaces. (PPRT-204)

Class 2, Lab. 6, Credit 4

PPRT-315 **Ink and Color**
Registration #0911-315
Theory of light and color; basic theory of process color and correction; use of color comparator and spectrophotometer. The study of color systems and color matching systems. Theory and application of various ink systems; practice in standard ink mixing and color matching emphasizing offset and letterpress processes. Correlation of ink properties with applications; emphasis on relationship of ink to paper and press. Study of ink problems and their correction.

Class 2, Lab. 6, Credit 4

PPRT-316 **Production for Book Publishing**
Registration #0911 -316
A study of the procedures utilized in the modern production of books, from the viewpoint of both publishing firms and book manufacturers. The structure of the publishing industry is analyzed, along with each step in the production of a book, from manuscript to bound copy.

Class 3, Credit 3

PPRT-317 **Calligraphic Forms**
Registration #0911-317
An introduction to the basics of calligraphy. Exercises in use of broad-edge pen to develop primary forms of italic and Chancery Cursive 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 methods of producing a newspaper by both the letterpress and the lithographic processes. Uses of hot type and cold type composition. Newspaper makeup procedures in hot type as well as pasteup methods with the use of cold type. A review of basic camera, stripping, plate, and press operations. (PPRT-319)

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. Principles of quality control and problem solving. Practical laboratory projects on a commercial four-unit perfecting web offset press. (PPRT-208)

Class 2, Lab. 3, Credit 3

PPRT-401 **Typographic Workshop**
Registration #0911-401
Principles of typography applied to individual projects, depending upon the educational objectives of each student. Opportunity is allowed for complete use of the facilities of the typographic composition laboratories. (PPRT-301)

Class 2, Lab. 6, Credit 4

PPRT-402 **Applications of Electronics**
Registration #0911 -402 **to Graphic Arts**
A basic course in fundamentals of electricity and electronics as related to the graphic arts field. Theory and application are combined as major topics are studied, implicating numerous graphic arts machines and devices.

Class 2, Lab. 2, Credit 3

PPRT-403 **Layout and Printing Design**
Registration #0911-403
A project course with design problems which involve the student in converting his 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 2, Lab. 3, Credit 3

PPRT-501 **Development of Printing Types**
Registration #0911-501
Present-day typefaces studied with relationship to their historical development and current use. Type classification and nomenclature.

Class 3, Credit 3

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. (PPRT-406)

Class 2, Lab. 3, Credit 3

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**
Registration #0911-593
Course offered for photography students. Theory and practice of the methods of relief, planographic, flexographic and intaglio processes.

Class 2, Lab. 3, Credit 3

Graduate Courses
Master of Science in Printing

Printing Education Courses

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

Credit 4

PPRE-702 **Teaching Methods in Graphic Arts**
Registration #0908-702 **Education**
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

PPRE-713 **Typographical Procedures**
Registration #0908-713
Theory and practice of type composition by hand and machine. Monotype, Linotype, and Intertype. Phototypesetting. Use of perforated tape in automated typesetting.

Credit 4

PPRE-720 **Photographic Reproduction**
Registration #0908-720 **Technology**
The fundamental principles, procedures, techniques, and applications of the photographic process as it is related to the production of negatives for the major printing processes. An independent graduate research project is required.

Credit 4

PPRE-860 **Practice Teaching in the**
Registration #0908-860 **Graphic Arts**
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. A one-hour, weekly seminar is provided for the discussion of overall student teacher progress.

Credit 12

Printing Management Courses

PPRM-701 **Computers in the Graphic Arts**
Registration #0910-701
Introduction to basic computer characteristics. Function of hardware components in relation to software requirements. Discussion of computer languages as they relate to applications in printing. An independent graduate research project is required.

Credit 4

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-701)

Credit 4

Printing Technology Courses

PPRT-701 Research Methods in Graphic Arts
Registration #0911 -701
Methods common to most types of experimental and survey research and how they may be applied to research in the graphic arts.
Credit 4

PPRT-702 Graphic Reproduction Theory
Registration #0911-702
Orientation in the interpersonal, man-machine, and machine relationships inherent in the management role. Areas of investigation include aspects of behavioral and mechanistic theory as it pertains to various aspects of the graphic arts industry. Distinguished speakers contribute to breadth.
Credit 4

PPRT-703 Statistical Inference
Registration #0911-703
Hypothesis testing, confidence intervals, and sample size for variables. Introduction to analysis of variance and regression analysis.
Credit 5

PPRT-704 Design of Experiments
Registration #0911-704
Basic designs for experiments, objectives, conclusions, error estimation, data analysis. Continuation of analysis of variance and regression analysis. Response surfaces and factorials. (PPRT-703)
Credit 5

PPRT-705, 706, 707 Application of Mechanics and
Registration #0911 -705, -706, -707 Electronics to Materials, Machine Design, and Processes in Printing
Force systems, elementary dynamics. Work, power, and energy. Relation to stress and strain, particularly as applicable to printing equipment and processes; torsion stresses of printing materials. 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 study. (PPRM-701)
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 concepts to modern industrial techniques.
Credit 4

PPRT-710 Ink and Substrates
Registration #0911-710
The study of ink components by process and their relationship to "printability" on various substrates. Ink receptivity. Ink and substrate compatibility to meet process requirements. Printing demands for various substrates; paper, polyethylenes, polypropylenes, foils, and plastics.
Credit 4

PPRT-711 Tone and Color Analysis
Registration #0911-711
Methods and instrumentation necessary for the evaluation of printed tone and color and the photographic intermediate images required for their production by the photomechanical process.
Credit 4

PPRT-712 Printing Plate Methodology
Registration #0911-712
Elements of platemaking procedures for letterpress, flexographic, and lithograhic plates; gravure cylinders, and electronically engraved plates. Theoretical study plus practical involvement in making of various plates. An independent graduate research project is required.
Credit 4

PPRT-713 Lithographic Press Methodology
Registration #0911-713
A study of the principles, materials, and equipment used in lithographic presswork, set-up and operation of sheet-fed presses. An independent graduate research project is required.
Credit 4

PPRT-714 Relief Press Methodology
Registration #0911-714
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 on letterpresses, die cutting, scoring, numbering, perforating, embossing. Makeready methods for line and halftone printing. Prepress preparation of various plates for printing. Introduction to flexographic printing. An independent graduate research project is required.
Credit 4

PPRT-715 Gravure and Screen Printing
Registration #0911-715 Methodology
Survey of gravure and screen printing incorporating lectures and laboratory sessions. The study of techniques, equipment, materials, and supplies necessary to arrive at a finished product by either process. An independent graduate research project is required.
Credit 4

PPRT-716 Layout and Printing Design
Registration #0911-716
Historical analysis of letter forms. Essential requirements and principles of layout and printing design as applied to commercial printing and advertising. Practical application of theory in solving printing design problems. An independent graduate research project is required.
Credit 4

PPRT-717 Copy Preparation
Registration #0911-717
Preparation of copy for camera. Working from layouts, making analysis of requirements. Paste-up techniques, methods of preseparation mechanicals, use of photographic and typographic copy, relation to production steps in follow-up for offset platemaking and photo-engraving. Proper instructional specification writing. An independent graduate research project is required.
Credit 4

PPRT-718 Imposition and Finishing Procedures
Registration #0911-718
Theory and practice of imposition of various kinds of forms. Imposition planning as related to and governed by folding and other finishing operations. Imposition and lockup principles and procedures for letterpress forms. An independent graduate research project is required.
Credit 4

PPRT-719 Machine Composition Technology
Registration #0911-719
Emphasis on use of perforated tape in automated operation of composing machines. Introduction to use of computers in printing. Operation and application of photocomposition and cold type processes. Practice on specialized equipment. Participation in field trips required. An independent graduate research project is required.
Credit 4

PPRT-850 **Research Project**
Registration #0911-850
Individual research projects in which independent data are collected by the student, followed by analysis and evaluation. A comprehensive written report is required. Consent of adviser required.

Credit variable

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

Credit variable

College of Science

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, pollution, disease control, human heredity, contagious diseases, marine biology. (F, W, S)

Class 4, Credit 4

SSEG-202 **Contemporary Science-Chemistry**
Registration #1018-202
The overall intent of this course relates 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. (F, W, S)

Class 4, Credit 4

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 society. 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 audiovisual presentations. (F, W, S)

Class 4, Credit 4

SSEG-204 **Contemporary Science—Mathematics**
Registration #1018-204
A non-technical presentation of topics in mathematics especially designed for the non-specialists. Specific topics will be chosen to examine the mathematics of contemporary societal problems and natural phenomena. (F, W, S)

Class 4, Credit 4

NOTE: From time to time special courses may be offered in the Contemporary Science series, e.g., Environmental Geology, Oceanography, etc.

NOTE: Quarter offered follows course description in parentheses; F—Fall; W-Winter; S-Spring; SR-Summer

Biology

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 should be structured as ordinary courses and should have specified prerequisites, contact hours, and examination procedures. Offered every quarter.

Class variable, Credit variable

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. Offered every quarter.

Class variable, Credit variable.

Molecular & Cellular Biology

SBIC-320 **Histology**
Registration #1002-320
Detailed study of the structure and function of normal and abnormal vertebrate tissue (SBIG-201 (S, SR)

Class 2, Lab. 4, Credit 4

SBIC-401 **Immunohematology**
Registration #1002-401
Composition of blood, blood groups, and the chemistry and immunology of blood-like substances. Structures of hemoglobin, chemical and physical properties of the red cell membrane. Chemical genetics of blood groups with reference to practical applications in hospital procedures. Antigen-antibody reactions and compatibility of blood groups will be emphasized in the laboratory. (F)

Class 2, Lab. 3, Credit 3

SBIC-402 **Immunology**
Registration #1002-402
Fundamental study of nature of antigens and antibodies, the mechanisms of agglutination, precipitation, complement fixation, anaphylaxis; the theoretical and practical aspects of the immune response, immunological tolerance, and allergic reaction. Laboratory work: preparation, standardization, and assays of antigens and antibodies. (SBIC-404) (S, SR)

Class 2, Lab. 3, Credit 3

SBIC-403 **Advanced Cellular Biology**
Registration #1002-403
An in-depth study of the structure and physiology of membrane bound organelles, molecular genetics, and the biochemistry of genetic events. (SBIG-203, SCHB-602) (F, W)

Class 3, Lab. 3, Credit 4

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. (SBIG-201, SCHG-217) (F)

Class 3, Lab. 4, Credit 5

SBIC-405 **Medical Microbiology**
Registration #1002-405
Pathogenic micro-organisms, host-parasite relationships, epidemiology, public health, virology, pathogenic molds, principles of immunology. Advanced laboratory techniques, anaerobiosis, assays, Quant, tests, isolating and identifying pathogens. (SBIC-404) (W)

Class 3, Lab. 3, Credit 4

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. (SBIC-402, SBIC-404, SCHB-602) (W, S)

Class 4, Credit 4

Developmental, Genetic & Environmental Biology

SBID-240 **General Ecology**
Registration #1003-240
Introduction to ecosystem ecology stressing the dynamic interrelationships of plant and animal communities with their environments. A study to include such ecological factors as energy flow and trophic levels in natural communities, plant responses and animal behavior, population dynamics, biogeography and representative ecosystems. (SBIG-203) (S)

Class 3, Lab. 3, Credit 4

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. (SBIG-203, SBID-240)
(S, SR)

Class 3, Lab. 3, Credit 4

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. (SBIG-203) (S)

Class 3, Lab. 3, Credit 4

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 plant and animal systems are considered. (SBIG-203) (F, W)

Class 2, Lab. 6, Credit 4

General Biology

SBIG-201,202,203 **General Biology**
Registration #1004-201, -202, -203
Basic principles of modern cellular biology including cell structures and the materials which make up cells. Physiological processes and their mechanisms in cellular functions. Principles of genetics and evolution. Organic systems. Principles of ecology. The three quarters may be taken in any sequence. No prerequisite is needed for any sequence of the course. (SBIG-201 -F; SBIG-202-W; SBIG-203-S)

Class 3, Lab. 3, Credit 4

SBIG-210** **Human Biology I**
Registration #1004-210 **(Microbiology & Disease)**
The fundamental processes of living organisms with particular emphasis on the cause, nature, and impact of some of the common diseases and malfunctions of the human body. (F)

Class 4, Credit 4

SBIG-211,212** **Human Biology II, III**
Registration #1004-211, -212 **(Physiology & Anatomy)**
An introduction to the structure and function of the human body. The laboratory exercises are designed to demonstrate some of the physiological functions which take place in the human body and include exercises in basic histological technique. (211-W, 212-S)

Class 3, Lab. 3, Credit 4

SBIG-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

SBIG-300 **Biological Literature**
Registration #1004-300
Use of libraries as sources of scientific information. Classification of scientific literature into original and secondary sources and techniques for making accurate literature searches. Discussions of journals, bibliographies, technical journals, and abstracts used in preparation of technical literature reports. Preparation of a literature research report. (F, W)

Class 2, Credit 2

SBIG-400 ** **Human Ecology**
Registration #1004-400
The ecological problems of man, emphasizing natural resources, food production, pollution, pest control, population, and the ecological implications thereof. (SBIG-210) (F)

Class 3, Credit 3

SBIG-440 ** **Environmental Microbiology**
Registration #1004-440
Micro-organisms in water and sewage, biological and medical aspects. Methods for detection, isolation, and enumeration. Treatment methods for eliminating and controlling harmful organisms. (S, SR)

Class 3, Lab. 2, Credit 4

Organismal Biology

SBIO-301 **Invertebrate Zoology**
Registration #1006-301
Biology of invertebrate animals with reference to classification, structure, function, and ecology. (SBIG-203) (W, S)

Class 3, Lab. 3, Credit 4

SBIO-302 **Vertebrate Zoology**
Registration #1006-302
Morphology, physiology, behavior classification, and ecology of chordates. (SBIG-203) (W, S)

Class 3, Lab. 3, Credit 4

****Not acceptable for biology credit for biology department majors.**

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. (SBIG-203) (F)

Class 3, Lab. 3, Credit 4

SBIO-304 **Botany**
Registration #1006-304
Distribution of the major groups of plants and their adaptation to their particular environment. (SBIG-203) (W, S)

Class 3, Lab. 3, Credit 4

SBIO-305, 306 **Physiology and Anatomy**
Registration #1006-305, 306
Cellular make-up of the body and aggregation into functional units. Tissues, organs, and systems and their relationship in terms of their structure and function. (SBIG-203, SCHG-217) (305-W, 306-S)

Class 3, Lab. 3, Credit 4

SBIO-410 **Plant Physiology**
Registration #1006-410
Physiological phenomena in the growth and development of higherplants. Water relationships, photosynthesis, translocation, mineral nutrition, growth, hormonal control and reproduction. (Minimum of 10 credits in biological science.) (W, S)

Class 3, Lab. 6, Credit 5

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) (F)

Class 2, Lab. 6, Credit 4

SBIO-412 **Parasitology**
Registration #1006-412
Structure, life cycle, and control of human parasites. Emphasis on forms of diagnostic importance. (Minimum of 10 credits in biological science.) (S)

Class 3, Lab. 3, Credit 4

SBIO-413 **Comparative Physiology**
Registration #1006-413
A comparative study of the physiological mechanism of a selected group of animals with particular emphasis on circulatory, respiratory, exemtory and neuromuscular phenomena. (SBIG-203) (W, S)

Class 3, Lab. 3, Credit 4

SBIO-605 **Advanced Physiology**
Registration #1006-605
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.

Class 3, Lab. 3, Credit 4

Biological Techniques

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.) (F, W)

Class 2, Lab. 6, Credit 4

SBIT-431 **Histological Technique**
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. (SBIG-2030)(W)

Class 1, Lab. 4, Credit 3

SBIT-432,433 **Biology Laboratory Techniques**
Registration #1007-432, -433
Instrumental and experimental methods of analysis of biological material. The first quarter stresses the principles of laboratory instruments, which include photometry, flourometry, electrophoresis, chromatography, and radioactive particle counters. The second quarter is devoted to applications in the plinical laboratory. (432-W, 433-S)

Class 2, Lab. 6, Credit 4

SBIT-470 **Advanced Radiation Biology**
Registration #1007-470
A study of the biological effects of ionizing radiation, and uses in the medical and biological laboratories. Emphasis will be placed upon dosages and responses.(SPSP-351 or SBIT-430) (S)

Class 3, Lab. 3, Credit 4

SBIT-541, 542, 543 **Biology Research**
Registration #1007-541, -542, -543
Faculty directed student projects or research usually involving laboratory work and/or calculations over a period of at least two quarters that could be considered of an original nature.

Class variable, Credit variable

SBIT-670 **Introduction to Electron Microscopy**
Registration #1007-670
An introduction to the theory and practice of electron microscopy. Laboratory experience includes fixation, staining, sectioning, and mounting of selected tissue samples as well as operation and maintenance of low and medium resolution electron microscopes. (Permission of instructor) (Offered upon sufficient request)

Class 2, Lab. 3, Credit 3

Chemistry

SCHA-261, 262, 263 **Introduction to**
Registration # 1008-261, -262, -263 **Chemical Analysis**
An introduction to qualitative and quantitative analysis. Introduction to the chemistry of inorganic ions by qualitative analysis. Classical methods of gravimetric analysis and titration analysis based on acid-base, precipitation, oxidation-reduction and complex formation as well as non-aqueous solvent acid-base reactions, introduction to electro-chemical techniques, and fundamentals of spectroscopy are stressed. Equilibrium concepts and statistical evaluation of results are incorporated. (261-F, 262-W, 263-S)

Class 2, Lab. 5, Credit 3

SCHA-311 **Analytical Chemistry—Instrumental**
Registration # 1008-311 **Analysis**
Elementary treatment of instrumental theory and techniques, properties of light; refractive index; ultraviolet, visible and infrared spectrophotometry; emission spectroscopy; flame photometry; electrochemistry; Nernst Law; pH meters and electrodes. (SCHC-213) (F)

Class 3, Lab. 4, Credit 4

SCHA-312 **Analytical Chemistry—Separations**
Registration #1008-312
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-213) (W)

Class 3, Lab. 4, Credit 4

SCHA-612 **Instrumental Analysis**
Registration #1008-612
Theory, applications and limitations of instrumental methods ir qualitative, quantitative, and structural analysis. Topics coverec include fluorescence and phosphorescence, Raman, mass spectrometry, nuclear magnetic resonance, X-ray and radiochemistry, and electrochemistry. (SCHP-313) (F, W)

Class 3, Lab. 5, Credit 5

SCHA-613 **Advanced Analytical Chemistry**
Registration #1008-613
Theories underlying analytical methods, trace analysis, new instrumental techniques, organic quantitative analysis and non-aqueous titrimetry. Project oriented laboratory optional. (SCHP-313) (S)

Class 3, Lab. 3, Credit 3 or 4

SCHB-602 **Biochemistry**
Registration #1009-602
Introduction to biological chemistry. Chemical structures, reactions and physiological functions of molecular components of cells: amino acids, sugars, lipids, nucleotides and selected biopolymers. Solution behavior, catalytic properties and structure of proteins and enzymes. (SCHO-232, SCHO-433) (SR, F)

Class 3, Credit 3

SCHB-603 **Biochemistry—Metabolism**
Registration #1009-603
Bioenergetics principles; catabolism* of carbohydrates, fatty acids and amino acids; photosynthesis, biosynthesis of carbohydrates, lipids, and nitrogenous compounds; active transport; metabolic diseases. (SCHB-602) (W)

Class 3, Credit 3

SCHB-604 **Biochemistry—Nucleic Acids &**
Registration #1009-604 **Molecular Genetics**
The biochemistry of inheritance, expression of genetic information, protein biosynthesis, differentiation, viral and bacterial infection and the “origin of life.” (SCHG-602) (S)

Class 3, Credit 3

SCHB-605, 606, 607 **Biochemistry-Case Studies**
Registration #1009-605, -606, -607
Biological and clinical case studies of biochemistry. The cases are arranged to be correlated with the lecture topics of Biochemistry, SCHB-602, 603, 604. (Concurrent registration in SCHB-602, 603, 604. (605-F, 606-W, 607-S)

Class 1, Credit 1

SCHC-211,212,213 **General Chemistry**
Registration #1009-211, -212, -213
For chemistry majors and others who desire an in-depth study of general chemistry. Atomic structure, chemical bond, properties of elements and compounds; states of matter; solutions; acids and bases; oxidation-reduction reactions; chemical calculations. (211 —F; 212-W; 213-S)

Class 3, Credit 3

SCHC-401 **Chemical Literature**
Registration #1009-401
Organization of technical libraries, classification of scientific literature into original and secondary sources and techniques for making literature searches. Use of card catalog, indexes, abstracts, monographs, handbooks, critical tables, journals, bibliographies, technical catalogs, and patents. Preparation of literature research reports. (SCHO-431, SCHP-441) (F, W)

Class 2, Credit 2

SCHC-541,542,543 **Chemistry Research**
Registration #1009-541, -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

SCHC-670 **Introduction to Electron Microscopy**
Registration #1009-670
An introduction to the theory and practice of electron microscopy. Laboratory experience includes fixation, staining, sectioning, and mounting of selected tissue samples as well as operation and maintenance of low and medium resolution electron microscopes. (Permission of instructor) (Offered upon sufficient request)

Class 2, Lab. 3, Credit 3

SCHC-671 **Independent Study-Chemistry**
Registration #1010-671
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

SCHC-672 **Special Topics—Chemistry**
Registration #1010-672
Advanced courses which are of current interest and/or logical continuations of the courses already being offered. These courses should be structured as ordinary courses and should have specified prerequisites, contact hours, and examination procedures.

Class variable, Credit variable

SCHG-201, 202, 203,204 **General, Organic,**
Registration #1011 -201, -202, -203, -204 and Biochemistry
Terminal, four quarter survey of chemistry presented for the non-science majors, e.g., Dietetics students. Laboratory emphasis-introduction to methods of chemical analysis, qualitative and quantitative techniques. (201 -W, 202-S, 203-F, 204-W)

Class 3, Lab. 3, Credit 4

SCHG-205, 206,207 **Chemical Principles**
Registration #1011-205, -206, -207
For photo science, mathematics, and physics majors. Chemical principles are discussed with an emphasis placed on problem solving. Topics include atomic structure, chemical equilibrium, oxidation-reduction, electrochemistry, thermodynamics, organic chemistry and instrumental methods of sample analysis. Laboratory experiments are designed to complement the lecture material. (205-F; 206-W; 207-S)

Class 3, Lab. 3, Credit 4

SCHG-208, 209 **College Chemistry**
Registration #1011-208, -209
For engineering students. The concept of energy and the work function is discussed in terms of industrial chemical processes. Topics include applications of the gas laws, equilibrium theory, nuclear and 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. (208-F; 209-S)

Class 4, Credit 4

SCHG-215, 216,217 **General & Analytical**
Registration #1011-215, -216, -217 **Chemistry**
Principles of chemistry presented for students in medical technology and life sciences; laboratory emphasis; inorganic chemistry, separations techniques, quantitative analysis. (215-F, Class 3, Lab. 3, Credit 4) (216-W, Class 3, Lab. 3, Credit 4) (217-S, Class 3, Lab. 6, Credit 5)

SCHG-271 **Chemistry of Water**
Registration #1011-271
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. (F, W)

Class 2, Lab. 3, Credit 3

SCHG-272 **Chemistry of Water**
Registration #1011-272
Chemistry of organics, metals, construction materials, radioactive and other environmental pollutants, and other substances related to water analysis. Laboratory practice in water analysis, including use of instrumentation. (S, SR)

Class 2, Lab. 3, Credit 3

SCHG-281, 282, 283 **General Chemistry**
Registration #1011-281, -282, -283
For printing students. Aspects of general chemistry of widest applicability to graphic arts technology; first quarter includes definitions of terms, basic concepts and laws; second quarter devoted to properties of solutions and organic materials; third quarter deals with applications in ink, paper, photo-lithographic processes and other topics as time allows. (281 -F; 282-W; 283-S)

Class 3, Lab. 2, Credit 4

SCHI-661, 662 **Inorganic Chemistry**
Registration #1012-661, -662
The properties and structures of the element^and their compounds in relation to electronic and stereo-chemical principles; inorganic lab techniques. (SCHO-433, SCHP-443) (661 -S, SR; (662-F, W)

Class 3, Lab. 3, Credit 4

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-206) (231-F; 232-W)

Class 3, Lab. 3, Credit 4

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. (SCHO-232) (S)

Class 3, Lab. 3, Credit 4

SCHO-431, 432,433 **Organic Chemistry**
Registration #1013-431, -432, -433
Study of organic compounds: nomenclature, preparations, reactions, and properties including spectral structural determinations. Electronic mechanistic interpretations emphasized. Laboratory work emphasizes technique, involves preparations and analysis. (SCHC-213 or SCHG-207 or SCHG-217) (431 -F, W; 432-S, SR; 433-F, W)

Class 3, Lab. 6, Credit 5

SCHO-631 **Advanced Organic Chemistry**
Registration #1013-631
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) (Offered upon sufficient request)

Class 3, Credit 3

SCH0-632 **Advanced Organic Chemistry**
Registration #1013-632
Topics include activation parameters, kinetic and non-kinetic treatment of mechanism elucidation, linear free energy concepts, quantitative analysis of conformational and electronic effects, simple Huckel Molecular Orbital Theory, electrocyclic reactions, acidity functions, and primary and secondary isotope effects. (SCHO-433, SCHP-443) (Note: SCHO-631 is recommended but not required) (Offered upon sufficient request)

Class 3, Credit 3

SCHO-636 **Spectrometric Chemical Identification**
Registration # 1013-636 **of Organic Compounds**
The theory and application of nuclear magnetic resonance, infrared, mass spectrometry, and ultraviolet spectra as applied to organic structure determination are covered in this course. (SCHO-433)

Class 2, Credit 2

SCHO-638 **Systematic Identification of Organic**
Registration #1013-638 **Compounds**
In this laboratory course the student utilizes systematic chemical and spectral tests to deduce the structure of organic compounds. (SCHO-433)

Lab. 6, Credit 2

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; thermochemistry; and introduction to the second law. (SCHC-213) (S)

Class 3, Lab. 3, Credit 4

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) (441-F, W; 442-S, SR; 443-F, W)

Class 3, Lab. 3, Credit 4

SCHP-641 **Chemical Thermodynamics**
Registration #1014-641
A study of the basic fundamentals of thermodynamics and their use in deriving the interrelationships of thermodynamic functions. Applications to thermochemistry, chemical and phase equilibria are made. (SCHP-443, SMAM-307) (Offered upon sufficient request)

Class 3, Credit 3

SCHP-642 **Physical Chemistry for the**
Registration #1014-642 **Life Sciences**
This course will present the elements of physical chemistry to students who hav6 a strong interest in the health related sciences. Molecular structure, thermodynamics, and kinetics will be discussed with a minimum of mathematics and with view to their biological applications. (SCHG-215, 216, 217; SCHO-231, 232) (W)

Class 3, Credit 3

SCHP-647 **Principles of Magnetic Resonance**
Registration #1014-647
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, and no previous knowledge of the subject material is assumed. (SCHP-443, SMAM-307) (Offered upon sufficient request)

Class 3, Credit 3

SCHT-241 **Chem Tec I**
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 equilibrium, visible spectrophotometry, the periodic table, chemistry and detection of some common metals and non-metals. (F)

Class 3, Lab. 9, Credit 6

SCHT-242 **Chem Tec II**
Registration #1015-242
Formation of molecules and ionic compounds, sampling techniques, sample preparation, gravimetric and titrimetric analysis, measurement of pH. (W, S)

Class 4, Lab. 9, Credit 7

SCHT-243 **Chem Tec III**
Registration #1015-243
Oxidation and reduction, coordination compounds, classes and reactions of organic compounds, infrared spectrophotometry. (F, SR)

Class 3, Lab. 9, Credit 6

SCHT-244 **Chem Tec IV**
Registration #1015-244
Continuation of classes and reactions of organic compounds, kinetics, nuclear magnetic resonance and ultra-violet spectrophotometry, mass spectrometry atomic absorption. (W, S)

Class 2, Lab. 9, Credit 5

SCHT-251 **Mathematics for the Technologist**
Registration #1015-251
This course will be taught by the chemistry faculty and will form an integral part of the laboratory experiments that are conducted in the Chem Tec courses. Topics will be covered as they appear in the experimentation. Suggested topics for this course include slide rule operation, the use of significant figures, accuracy and precision, errors and dimensional analysis, concentration in terms of molarity, normality, stoichiometry, preparation of standard curves. (F)

Class 4, Credit 4

SCHT-305, 306 **Chemistry Specialty**
Registration #1015-305, -306
The final academic year of the Chem Tec curriculum is designed 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: advanced instrumental techniques, the development of synthetic techniques in organic chemistry and familiarization with biological laboratory techniques. (305-F, SR; 306-W, S)

Class 2, Lab. 6, Credit 4

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 encouraged to innovate after consultation with his supervising chemist or engineer. In this context each student will have the opportunity to work alongside one of our faculty or graduate students 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. (307-F, SR; 308-W, S)

Lab. 9, Credit 3

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 apparatus, annealing, use of a simple lathe and hand-torch work. (F, SR)

Lab. 4, Credit 2

Graduate Courses
Master of Science in Chemistry and
Master of Science in Clinical Chemistry

SCHA-612 **Instrumental Analysis**
Registration #1008-612
Theory, applications and limitations of instrumental methods in qualitative, quantitative, and structural analysis. Topics covered include florescence and phosphorescence, Raman, mass spectrometry, nuclear magnetic resonance, X-ray and radiochemistry, and electrochemistry. (SCHA-312)

Class 3, Lab. 5, Credit 5

SCHA-613 **Advanced Analytical Chemistry**
Registration #1008-613
Theories underlying analytical methods, trace analysis, new instrumental techniques, organic quantitative analysis and nonaqueous titrimetry. Project oriented laboratory optional. (SCHA-312, SCHA-612)

Class 3, Lab. 3, Credit 3 or 4

SCHA-712 **Advanced Analytical Chemistry**
Registration #1008-712
Theories behind analytical methods; complexiметry with applications to separations and masking; theory of electrode processes, specific ion electrodes; non-aqueous methodology; new analytical techniques. (SCHA-612)

Class 3, Credit 3

SCHB-602 **Biochemistry**
Registration #1009-602
Introduction to biological chemistry. Chemical structures, reactions and physiological functions of molecular components of cells: amino acids, sugars, lipids, nucleotides and selected biopolymers. Solution behavior, catalytic properties and structure of proteins and enzymes. (SCHO-433 or SCHO-232)

Class 3, Credit 3

SCHB-603 **Biochemistry—Metabolism**
Registration #1009-603
Bioenergetics principles; catabolism of carbohydrates, fatty acids and amino acids; photosynthesis, biosynthesis of carbohydrates, lipids, and nitrogenous compounds; active transport; metabolic diseases. (SCHB-602)

Class 3, Credit 3

SCHB-604 **Biochemistry—Nucleic Acids and**
Registration # 1009-604 **Molecular Genetics**
The biochemistry of inheritance, expression of genetic information, protein biosynthesis, differentiation, viral and bacterial infection and the “origin of life.” (SCHB-602)

Class 3, Credit 3

SCHB-605, 606, 607 **Biochemistry—Case**
Registration #1009-605, -606, -607 **Studies**
Biological and clinical case studies of biochemistry. The cases are arranged to be correlated with the lecture topics of Biochemistry 602, 603, and 604. (Concurrent registration in SCHB-602, 603, and 604 is required)

Credit 1

SCHC-650 **Media Design Project**
Registration #1010-650
Students in small groups will design, produce, test and evaluate a media form or device for use in the teaching of science at the two year college level.

Credit 2-4

SCHC-651 **Media Design Seminar**
Registration #1010-651
A seminar workshop on evaluation and critique, human information processing, and instructional systems management as applied to media production.

No-Credit

SCHC-652 **Internal Internship**
Registration #1010-652
Students in small groups will be assigned to a particular general chemistry course for a minimum of one quarter for the purpose of investigating more efficient utilization of the instructional media, recitation/laboratory periods, and computer aided instruction. Various ways will be explored to assist hearing-impaired students and freshmen with remedial work as well as provide advanced work for rapid learners and those with advanced high school preparation.

Credit 2

SCHC-671 **Independent Study—Chemistry**

Credit variable

SCHC-672 **Special Topics-Chemistry**
Registration #1010-672
Advanced courses which are of current interest and/or logical continuations of the course already being offered. These courses should be structured as ordinary courses and should have specified prerequisites, contact hours, and examination procedures.

Class variable, Credit variable

SCHC-759 **Internship Research**
Registration #1010-759
Industrial internship research.

Credit 0-16

SCHC-770 **Chemistry Seminar**
Registration #1010-770

Credit 1

SCHC-779 **Research and Thesis Guidance**
Registration #1010-779
Hours and credits to be arranged. Chemical research in a field chosen by the candidate, subject to approval of the Department Head and advisor.

Credit variable

SCHI-661,662 **Inorganic Chemistry**
Registration #1012-661,-662
The properties and structures of the elements and their compounds in relation to electronic and stereochemical principles; inorganic laboratory techniques. (SCHO-443 and SCHP-443)

Class 3, Lab. (Optional) 3, Credit 3 or 4/Qtr.

SCHI-761 **Advanced Inorganic Chemistry**
Registration #1012-761
Theories of molecular geometry; hard-soft, acid-base theory; transition metal chemistry, crystal and ligand field theories, spectroscopic interpretation; reaction mechanisms. (SCHI-661)

Class 3, Credit 3

SCHL-720, 721,722 Advanced Clinical Chemistry
Registration #1021-720, -721,-722 I, II, III
A three course sequence in modern techniques and methodology of clinical chemistry with emphasis on quality control, instrumentation, and automation. This shall include modern general methods of analytical chemistry, the technical aspects of the tests used, and the principles of the methods involved. Additionally, an understanding of normal and abnormal values shall be stressed in relationship to health and disease. (SBIT-432, 433 or equivalent; SCHB-603)

Class 2, Lab. 6, Credit 4/Qtr.

SCHL-799 Clinical Chemistry Research
Registration #1021-729

Credit 0-3

SCHO-631 Advanced Organic Chemistry
Registration #1013-631
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

SCHO-632 Advanced Organic Chemistry
Registration #1013-632
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-631 is recommended but not required)

Class 3, Credit 3

SCHO-636 Spectrometric Chemical Identification
Registration #1013-636 of Organic Compounds
This course is concerned with the theory and application of nuclear magnetic resonance, infrared, mass spectrometry, and ultraviolet spectra as applied to organic structure determination. (SCHO-433)

Credit 2

SCHO-638 Systematic Identification of
Registration #1013-638 Organic Compounds
The laboratory utilizes systematic chemical and spectral tests to deduce the structure of organic compounds. (SCHO-433)

Credit 2

SCHO-731 Physical Organic Chemistry
Registration #1013-731
A theoretical treatment of the basic tools used in mechanism elucidation. Interpretation of kinetic, stereochemical and spectral data emphasized. (SCHO-433 and SCHP-443. Note: SCHO-631 recommended but not required)

Class 3, Credit 3

SCHO-732 Stereochemistry
Registration #1013-732
Advanced treatment of steric relationships and stereoisomerism in organic compounds. (SCHO-433, SCHP-443)

Class 3, Credit 3

SCHO-733 Heterocyclic Chemistry
Registration #1013-733
The preparation, properties, and reactions of heterocyclic systems, especially heteroaromatic rings. (SCHO-433)

Class 3, Credit 3

SCHO-734 Natural Products
Registration #1013-734
Introduction to the major classes of natural products. Emphasis is on recent total synthesis of representative natural products of current interest. (SCHO-631)

Class 3, Credit 3

SCHO-735 Organic Chemistry of Polymers
Registration #1013-735
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

SCHP-641 Chemical Thermodynamics
Registration #1014-641
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

SCHP-642 Physical Chemistry for
Registration #1014-642 the Life Sciences
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

SCHP-646 Radiochemistry
Registration #1014-646
Radioactive decay from statistical and differential approaches. Nature of nuclear emissions; interactions with matter; counting techniques and statistics; chemical tracers; chemical applications of nuclear reactions; shielding health hazards. Laboratory: counting techniques; sample preparation and handling; use of tracers in analysis, structural studies, equilibrium studies, kinetic studies. (SCHP-443)

Class 3, Lab. (Optional) 3, Credit 3 or 4

SCHP-647 Principles of Magnetic Resonance
Registration #1014-647
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

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

SCHP-744 Quantum Mechanics
Registration #1014-744
Matrix formulation of quantum mechanics, variations and perturbational 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

SCHP-745 Quantum Chemistry
Registration #1014-745
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

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

Mathematics

SMAM-201, 202, 203 — Algebra, Trigonometry, and Analytic Geometry
Registration # 1016-201, -202, -203
A standard course in college algebra and trigonometry and a study of selected topics in analytic geometry. (201 —F; 202-W; 203-S)

Class 3, Credit 3

SMAM-204 — Modern Algebra
Registration #1016-204
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. (F)

Class 4, Credit 4

SMAM-210,211 — Freshman Seminar
Registration #1016-210, -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. (210-F, 211-W)

Class 1, Credit 1

SMAM-214, 215 — Introductory Calculus
Registration #1016-214, -215
214: A non-rigorous introduction to the study of differential calculus. The following topics will be covered: functions and graphs, limits, continuity, the derivative and its significance, the algebra of derivatives, chain rule, related rates, maxima and minima.
215: A continuation of SMAM-214, dealing with an introduction to integral calculus. The following topics will be covered: definite integral, area, work and distance problems, volumes, fundamental theorem of calculus, approximation techniques, exponential and logarithmic functions, applications, introduction to differential equations. (SMAM-204 or equivalent)
(214—F, W; 215-S)

Class 3, Credit 3

SMAM-216,217 — Mathematics of Business and Finance
Registration #1016-216, -217
Simple and compound interest, annuities, amortization, depreciation, bond, stock, life insurance, break-even analysis, concept of optimization. (SMAM-201) (216-W, 217-S)

Class 3, Credit 3

SMAM-221, 222, 223 — College Mathematics
Registration #1016-221, -222, -223
A survey of selected topics from college algebra, trigonometry, analytic geometry and differential 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: Complex numbers, vector algebra, introduction to limits, graphing of algebraic and exponential functions.
223: Basic differential calculus with strong emphasis on exponential processes.
(221-F; 222-W; 223-S)

Class 4, Credit 4

Note: Quarter usually offered follows course description in parentheses; F—Fall; W-Winter; S-Spring; SR-Summer

Numbers in parentheses indicate prerequisites.

SMAM-251, 252, 253 — Calculus
Registration #1016-251, -252, -253
A standard first course in calculus intended for students majoring in mathematics, a 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.
252: The transcendental functions. Anti-derivatives by various methods. The definitive 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. (251-F, 252-W, 253-S)

Class 4, Credit 4

SMAM-265 — Discrete Mathematics
Registration #1016-265
An elementary survey of topics from modern applied mathematics that are discrete in nature, including number theory, set theory, machine computation, Boolean algebra, graphs, probability, matrix algebra, difference equations. Applications are stressed. (S)

Class 4, Credit 4

SMAM-300 — Transfer Math
Registration #1016-300
Content includes material taught in SMAM-253 and SMAM-305 (SR)

Class 8, Credit 8

SMAM-305 — Calculus
Registration #1016-305
A continuation of SMAM-253 treating partial derivatives, multiple integrals, 3-dimensional analytic geometry and vector algebra. (SMAM-253) (F, SR)

Class 4, Credit 4

SMAM-306 — Differential Equations
Registration #1016-306
A first course. Solutions in closed form for a few common types of first order equations. Applications to a variety of physical problems. Second order linear equations, methods of undetermined coefficients and variation of parameters, independence and the Wronskian. Applications to vibrating systems. Numerical techniques including Runge-Kutta. More applications. Power series solutions. (SMAM-305) (W)

Class 4, Credit 4

SMAM-307 — Differential Equations
Registration #1016-307
Topics include Laplace transform, systems of linear differential equations, some Fourier series and their use in partial differential equations. Numerical techniques in boundary value problems. (SMAM-306) (S)

Class 4, Credit 4

SMAM-308 — Engineering Math
Registration #1016-308
Vector algebra and vector calculus including line, surface, and volume integrals, Stokes' Theorem, Gauss' Theorem. (SMAM-306) (S)

Class 4, Credit 4

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. (W, S)

Class 4, Credit 4

SMAM-341 Foundations of Higher Mathematics
Registration #1016-341
A general introduction to several elementary concepts of higher mathematics including the rudiments of logic, the theory of sets, relations and functions between sets, cardinality of sets, and a brief discussion of the Peano postulates. (S)

Class 4, Credit 4

SMAM-351,352 Introduction to Probability
Registration #1016-351, -352 and Statistics
Discrete and continuous probability; random variables; probability, density, and distribution functions. Measures of central tendency and dispersion. Sampling theory; confidence limits; correlation. (SMAM-253) (351 -F, S, SR; 352-W, S)

Class 4, Credit 4

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) (S)

Class 4, Credit 4

SMAM-365 Combinatorial Mathematics
Registration #1016-365
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, block designs, Polya counting theory (SMAM-253) (S)

Class 4, Credit 4

SMAM-410 Advanced Calculus
Registration #1016-410
Topics from multi-dimensional calculus, Fourier series, special functions, special techniques for differential equations and asymptotic expansions. Alternate topics may be chosen to suit special needs of students. (SMAM-306 or SMAM-308) (Offered upon sufficient demand)

Class 4, Credit 4

SMAM-411,412 Real Variables
Registration #1016-411, -412
Functions of one and of several variables are considered with the basic concepts of sequence, series, continuity, differentiation, and integration studies in depth. Included are the Heine-Borel, mean value, Taylor, and implicit function theorems. (SMAM-305 and either SMAM-341 or permission of instructor) (411-F, W; 412-S, SR)

Class 4, Credit 4

SMAM-420 Complex Variables
Registration #1016-420
A study of the complex number system and of 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) (F, W)

Class 4, Credit 4

SMAM-431,432 Linear Algebra
Registration #1016-431, -432
A first course in the algebra of matrices and n-tuple vectors over the complex numbers. Theory, application to physical problems and computational aspects are all stressed. Topis include the theory of systems of linear equations, their solution by several algorithms; vector and matrix algebra; inner products and norms; independence, dimension, rank; Gram-Schmidt theorem; matrix inversion and determinants; eigenvalues, eigenvectors and their approximation. (431 -F, W; 432-S, SR)

Class 4, Credit 4

SMAM-465 Linear Programming
Registration #1016-465
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-432)

Class 4, Credit 4

SMAM-466 Integer Programming
Registration #1016-466
The optimization of functions of integers, theory and practice of branch and bound, implicit enumeration, cutting plane duality and related solution techniques, heuristics, applications. (SMAM-465)

Class 4, Credit 4

SMAM-467 Theory of Graphs and Networks
Registration #1016-467
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-431 or permission of instructor)

Class 4, Credit 4

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) (501 -F,W; 502-S, SR)

Class 4. Credit 4

SMAM-511,512 Numerical Analysis
Registration #1016-511, -512
Numerical techniques for interpolation, differentiation, quadrature, solution of differential equations, non-linear equations, eigenvalue problems. Discussion of error propagation and estimation. Emphasis is on techniques appropriate for digital computers. (SMAM-306, ICSP-215) (511-F, W; 512-S, SR)

Class 4, Credit 4

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) (521-F, W; 522-S, SR)

Class 4, Credit 4 —

SMAM-531,532 Abstract Algebra
Registration #1016-531, -532
531: A review of pertinent basic set theory and number theory. Groups, subgroups, cyclic and permutation groups, LaGrange's theorem, quotient groups, isomorphism theorems, applications to scientific problems.
532: The basic theory of rings, integral domains, fields, modules, the theory of vector spaces in the context of modules. Applications of the theory of vector spaces to differential equations and problems in engineering such as stability of control systems. (SMAM-341 or permission of instructor) (531-F, W; 532-S, SR)

Class 4, Credit 4

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) (F, W)

Class 4, Credit 4

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-341 SMAM-412) (S, SR)

Class 4, Credit 4

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

SMAM-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 and either SMAM-341 or permission of instructor) (561 -F, W; 562-S, SR)

Class 4, Credit 4

SMAM-565 **Game Theory**
Registration #1016-565
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

SMAM-566 **Non-linear Optimization Theory**
Registration #1016-566
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), computational aspects (rates of convergence computational complexity). (SMAM-432 and SMAM-305)

Class 4, Credit 4

SMAM-567 **Theory of Optimal Control**
Registration #1016-567
Solutions to the optimal control problem via variational method, Pontrijagin maximum principle, dynamic programming. Linear, time-optimal control processes (contrelability, stability, observability, the synthesis problem.) Implementation of optimal control, system design, computational aspects. Introduction to non-linear processes and recent research interests. (SMAM-432 and SMAM-412)

Class 4, Credit 4

SMAM-571,572 **Topology**
Registration #1016-571, -572
Metric spaces, topological spaces, separation axioms, compactness, connectedness, product spaces. (SMAM-412 or permission of instructor) (571 -F, W; 572-S, SR)

Class 4, Credit 4

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

SMAM-611 **Engineering Mathematics**
Registration #1016-611
A brief introduction to analytic functions. Cauchy theory, linear transformations, Taylor and Laurent series, residue theory with applications to real integrals and Fourier integrals. (F, W)

Class 3, Credit 3

SMAM-612 **Engineering Mathematics**
Registration #1016-612
Partial differentiation, curvilinear coordinates, line integrals, vector calculus, curl, divergence, Theorems of Greene, Gauss, Strokes. (S, SR)

Class 3, Credit 3

SMAT-420 **Introduction to Solution**
Registration # 1019-420 **of Engineering Problems**
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

SMAT-421,422 **Solution of Engineering**
Registration #1019-421, -422 **Problems I, II**
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

Physics

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) (401-F; 402-S)

Class 4, Credit 4

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) (411-F; 412-S)

Class 4, Credit 4

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) (F) (1973-4 and alternate years)

Class 4, Credit 4

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) (421-F; 422-S)

Class 1, Lab. 3, Credit 2

SPSP-431,432 **Electronic Measurements**
Registration #1017-431, -432
Laboratory course in electrical and electronic measurements and instrumentation, with theory of electron emission, electron tubes, and solid state devices as needed. (SPSP-313, SPSP-321) (431 -F; 432-S)

Class 2, Lab. 3, Credit 3

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) (F) (Alternate years)

Class 4, Credit 4

SPSP-501 **Theoretical Physics**
Registration #1017-501
Application of advanced mathematical methods to physics. (SMAM-308 plus co-registration or credit in SPSP-401 and SPSP-411) (S)

Class 5, Credit 5

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) (F)

Lab. 6, Credit 2

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) (531 -S; 532-offered upon sufficient request)

Class 4, Credit 4

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

SPSP-550,551 **Physics Seminar**
Registration #1017-550, -551
Discussions of contemporary developments in physics. Special emphasis on technical literature search, preparation and presentation of technical papers. (Senior physics majors.) (550-F; 551-S)

Class 1, Credit 1

SPSP-552 **Atomic Physics and Quantum**
Registration #1017-552 **Mechanics**
Elements of relativistic mechanics and of wave mechanics, quantum theory, Schroedinger's equation and its solutions, atomic spectra and atomic structure. (SPSP-501; SPSP-315 or permission of instructor) (F)

Class 4, Credit 4

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) (S)

Class 4, Credit 4

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 should be structured as ordinary courses and should have specified prerequisites, contact hours, and examination procedures.

Class variable, Credit variable

SPSP-599 **Independent Study—Physics**
Registration #1017-599
Faculty directed study of appropriate topics on a tutorial basis. This course will generally be used to enable an individual to pursue studies of existing knowledge available in the literature.

Class variable, Credit variable

Institute College

Computer Science and Technology

ICSP-205 **Computer Techniques**
Registration #0601-205
This course will introduce the student to various facets of computing systems. Concentration will be on the FORTRAN IV language and application programs, documentation, and working knowledge thereof. For non-CS&T Majors.

Class 3, Credit 3

ICSP-209 **Introduction to Data Systems**
Registration #0601-209
Introduction to the capabilities and characteristics of data processing equipment in a business environment. Topics include the characteristic roles of systems analyst, programmer, and operator in the development of information systems; unit record and computer based systems; data communication systems. Lab work includes operation of some unit record equipment and computer programming.

Class 4, Credit 4

ICSP-215 **Programming Language-FORTRAN**
Registration #0601-215
A study of FORTRAN programming techniques and applications, topics include FORTRAN constants, variables, expressions, functions, logical operations, storage allocations, statements, I/O manipulation, program structures, subprograms, plotting, debugging, diagnostic methods and applied problem solving methods. For CS&T Majors. (ICSS-202)

Class 4, Credit 4

ICSP-220 **FORTRAN Programming for Engineers**
Registration #0601-220
A study of applied computer programming techniques, topics include FORTRAN programming, numerical methods and applications of computer to engineering problems. (EEEE-201)

Class 4, Credit 4

ICSP-301 **COBOL Programming**
Registration #0601-301
COBOL programming techniques and applications, topics include COBOL coding methods, data processing and sequential file manipulation, table look-up, SORT and SEARCH verbs, introduction to the concept of modular and structured programming, COBOL debugging and editing facilities, establishment of documentation standards, case studies. (ICSS-200 or ICSS-202)

Class 4, Credit 4

ICSP-302 **Computer Applications in**
Registration #0601-302 **Engineering Problems**
Fundamentals of programming in the BASIC language. The applications of circuit analysis programs to the solution of electrical circuits.

Class 1, Credit 1

ICSP-304 **Advanced COBOL Programming**
Registration #0601-304
Advanced COBOL programming techniques and applications; topics include magnetic tape and disc file processing techniques using COBOL, subroutines, overlay and segmentation, report writer, core dump analysis, modular and structured programming techniques, coding optimization techniques, case studies. (ICSP-301)

Class 4, Credit 4

ICSP-305 Assembly Language Programming
Registration #0601-305
A study of assembly language programming methods, topics include computer organization, assembly process, assembly coding, addressing, binary arithmetic, repeatability, storage allocation, subroutine linkage, looping and address modification, character manipulation, bit manipulation, floating-point arithmetic, decimal instruction set, some system I/O, macros and debugging techniques. For Computer Science and Technology majors. (ICSP-215 or ICSP-301)

Class 4, Credit 4

ICSP-306 Advanced Assembly Language
Registration #0601-306
A study of more advanced assembly language programming techniques, macros, macro generation, conditional assembly, system macros, program linkage, re-entrant and recursive routines. I/O programming at the interrupt level on some machines. (ICSP-305)

Class 4, Credit 4

ICSP-308 Structured Programming
Registration #0601-308
A study of techniques in structured programming, topics include deficiencies in conventional programming methods, modular programming, program structures, structured programs, top down programming and comparative studies in programming approach. (High-level language, and an assembly language)

Class 4, Credit 4

ICSP-318 APL Programming Techniques
Registration #0601 -318 & Applications
APL programming techniques and applications; topics include APL programming, APL report formatting features, file I/O subsystem, graphic I/O, scientific and business systems design using APL case studies, (a programming course in FORTRAN or BASIC)

Class 4, Credit 4

ICSP-330 PL/1 Programming
Registration #0601-330
A study of PL/1 language coding and programming techniques. Topics include structured programming, statements, attributes, defaults, I/O statements, looping, pictures, storage allocation, functions and subroutines. (A high level language)

Class 4, Credit 4

ICSP-331 Advanced PL/1 Programming
Registration #0601-331
A study of more advanced PL/1 programming techniques. Topics include Record I/O, File Processing, Indexed and Regional File Processing, PL/1 Application in Scientific problems and programming projects. (ICSP-330)

Class 4, Credit 4

ICSP-350 Programming Language Concepts
Registration #0601-350
The concepts and syntactic structure of languages used in computer programming are analyzed by a study of several of the more sophisticated languages in use. Semantic problems will be considered. Programs will be written in selected languages. (ICSS-320)

Class 4, Credit 4

ICSP-432 Computer Applications in
Registration #0601 -432 Analysis and Design
A study of techniques of using computers in the field of physical science. Topics include review of programming language, hardware specification and selection, interface problems, software availability and selection, graphical methods, simulation methods and case studies. Projects and hands-on experience will be required. This course is designed for non-Computer Science and Technology majors. (ICSP-205 or equivalent)

Class 4, Credit 4

ICSP-532 Computer Applications in Social
Registration #0601-532 and Behavioral Sciences
A study of computer techniques applied to social and behavioral sciences. Topics include language selections, matrix manipulation, statistics (basic), analysis of variance, correlations and regression, distribution, factor analysis, econometrics and probit analysis packages. A project relating to individual fields of interest will be required. (ICSP-205, SMAM-309)

Class 4, Credit 4

ICSS-200 Survey of Computer Science
Registration #0603-200
Basic concepts and overview of computer science for non-Computer Science and Technology majors. Topics include historical development; algorithms, flowcharting, programming in a problem-oriented language like BASIC; exposure to assembly language; hardware concepts, including a functional description of CPU operations; data representation and manipulation; software concepts, including compilers, assemblers, and operating systems; and the application of the computer to various disciplines.

Class 4, Credit 4

ICSS-202 Introduction to Computer Science
Registration #0603-202
Basic concepts and overview of computer science for CS&T majors. Topics include those for ICSS-200 with the addition of more rigorous treatment of number systems and machine organizations.

Class 4, Credit 4

ICSS-230 Discrete Structure
Registration #0603-230
A study of discrete mathematical foundations; topics include propositional logic, set algebra, functions and relations, Boolean algebra and Boolean functions, permutations and combinations, vectors and matrices, graphs, digraphs, trees and strings. Applications of these structures to various areas of computer science.

Class 4, Credit 4

ICSS-310 Information Systems Design
Registration #0603-310
Computer oriented information systems design; topics include data organization, file organization, structure and access methods, file device selection, input/output file design, forms design, decision tables, introduction to data base concept, establishment of programming and documentation standards, application of advanced COBOL, case studies. (ICSP-209, ICSP-301)

Class 4, Credit 4

ICSS-311 Information Systems Analysis
Registration #0603-311
Computer oriented information systems analysis, topics include problem definition, problem-analysis, fact gathering and analysis techniques, systems design, interviewing techniques, cost analysis system implementation and testing techniques, system evaluation, case studies. (ICSS-310)

Class 4, Credit 4

ICSS-315 Digital Computer Organization
Registration #0603-315
Review of binary numbering systems and arithmetic, complement notation, instruction and data representation. Logical design fundamentals, including review of Boolean functions and combinational logic. Hardware fundamentals including logic gates, flip-flops, adders, data bases, and memory technology. Machine organization of CPU memory, input/output and control unit; functioning and interfacing including instruction fetch/execute cycle, data flow and control, cycle stealing and instruction interpretation. Introduction to interrupts, memory protection features, multiprocessors, concepts of microprogramming, and other advanced architectural concepts. This course replaces ICSS-210. (ICSS-230, ICSS-305)

Class 4, Credit 4

ICSS-320 Data Structure Analysis
Registration #0603-320
Information structures-linear lists, stacks, queues, sequential allocation, linked allocation, circular lists, doubly linked lists, arrays and orthogonal lists; trees, traversing binary trees; lists and garbage collection; multilinked structures; dynamic storage allocation. (ICSP-305)

Class 4, Credit 4

ICSS-321 Sorting and Searching Techniques
Registration #0603-321
A study of sorting and searching principles and techniques, topics include internal and external sorting, table look-up, hash coding and other methods, comparative studies of various techniques and the relations between storage media, and physical file structure. (ICSS-320)

Class 4, Credit 4

ICSS-340 Finite State Machines
Registration #0603-340 and Automata
Principles of finite state machines and automata; topics include finite state models, machine capabilities, descriptive methods, decomposition methods, regular expressions, bilateral analysis, bilateral synthesis, sequential iterative systems and space-time transformations. (ICSS-230, ICSS-315)

Class 4, Credit 4

ICSS-355 The Human Side of
Registration #0603-355 Computers
Survey of issues of concern regarding the interaction of computer systems and humans. Participants will be expected to prepare a major study, including proposed solutions, for at least one problem. Topics include: the strengths and weaknesses of computers, the effect of, and the computer's role in change, the effect on organizations, the management process, standardization, organizational structure, and automation; effect on individuals, the "priesthood of the machine", computer assisted instruction, medical uses; effects on society, information banks, privacy, and other legal questions, law enforcement and other governmental uses, the computer utility, the cashless society. (ICSS-200 or ICSS-202)

Class 4, Credit 4

I CSS-400 Logical Design
Registration #0603-400
Digital computer logic design; topics include review of switch theory, sequential circuit analysis, sequential circuit synthesis, error detection, error correction network, speed-up techniques, parallel and serial approaches, interface techniques and comparative study of digital computer architecture. (ICSS-315)

Class 4, Credit 4

ICSS-420 Data Communication Systems
Registration #0603-420
Data based systems, data communication systems. Topics include the role of the data base; communication techniques; common carrier implications, tariffs, exchanges, concentrators, multiplexors, buffering; network analysis, cost and design; software considerations. (SMAM-309, Third year standing in Computer Science and Technology)

Class 4, Credit 4

ICSS-430 Numerical Methods
Registration #0603-430
Numerical methods using computers; topics include error analysis, power series calculation of functions, roots of equations, solution of linear simultaneous equations, numerical integration, and interpolation and curve fitting. The computational aspects rather than mathematical development will be emphasized. (SMAM-251-52 or SMAM-214 and ICSP-215 or ICSP-205)

Class 4, Credit 4

ICSS-440 Operating Systems
Registration #0603-440
A general survey of operating system modules. Topics include linkers and loaders; I/O and file systems; memory management, paging, segmentation, virtual memory; interrupt handling; resource allocation; scheduling algorithms; deadlocks; multiprogramming and multiprocessing conflict resolution; process definition, communication, and projection. Several existina operating systems are examined. (ICSS-320, ICSS-315)

Class 4, Credit 4

ICSS-450 Computing Management
Registration #0603-450
The application of management principles to managing a data processing installation. Topics include organization, personnel selection and staffing, economic analysis including equipment and software selection, leasing, and purchase, installation layout, physical, software, and file security, management controls and auditing, maintenance, and legal aspects. A major project in equipment selection and installation will be assigned. (Must be fourth or fifth year CS&T major.)

Class 4| Credit 4

ICSS-465 Introduction to Management
Registration #0603-465 Information Systems
A study of the analysis, design, and implementation of management information systems. Various approaches to system analysis, including inquiring systems and the views of C. West Churchman. A survey of proposed and actual MIS designs for general and specific applications, such as accounting, financial, and inventory systems, and consideration of the "total information system." Implementation aspects, such as decision tables, data bases and data base management systems, security, financial considerations, and testing. (ICSS-311)

Class 4, Credit 4

ICSS-480 Formal Languages
Registration #0603-480
Computers formal language principles; topics include context free, context sensitive grammar, regular expressions, Turing machines, introduction to unsolvability and computability. (ICSS-340)

Class 4, Credit 4

ICSS-485 Data Base Concepts
Registration #0603-485
Introduction to the concept of data base; topics include historic development of data bases, data organization and structure, data security, recovery, relationship and retrieval, system design using the Xerox EDMS, comparison of the data base approach with traditional file organization and access methods, a study of other existing data bases such as IMS and TOTAL (ICSS-320)

Class 4, Credit 4

ICSS-510 Systems Workshop
Registration #0603-510
Commercial projects utilizing COBOL and the principles of systems analysis and design. The projects will be completed by individuals or small groups. (ICSS-311)

Class 4, Credit 4

ICSS-515 Analysis of Algorithms
Registration #0603-515
This course should be designed to teach the mathematics necessary to properly analyze the computational effort of a given algorithm. Specific algorithms should be analyzed and then improved. (Advanced CS&T standing)

Class 4, Credit 4

ICSS-520 Computer Architecture
Registration #0603-520
A study of computer architectural analysis and design. Topics include review of basic theories, hardware technology, parallel and distributive logic, asynchronous and synchronous machines and case study. (ICSS-315)

Class 4, Credit 4

ICSS-525 **Assemblers, Interpreters, and Compilers**
Registration #0603-525
A survey of the three basic programming language processors-assemblers, interpreters, and compilers. 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 the principles covered in ICSS-440. Development of a small operating system and a study of its functional characteristics. Special topics include I/O programming, interupt handing, resource allocation and virtual system concepts. Laboratory emphasis. (ICSS-440)

Class 4, Credit 4

ICSS-545 **Microprogramming**
Registration #0603-545
A study of principles and applications of microprogramming. Topics include historical review, read-only storage (ROS), work organization, encoded control, ROS timing, ROS storage capacity and cost, advantages, disadvantages, writable control storage and levels of microprogramming in existence today. (ICSS-315)

Class 4, Credit 4

ICSS-550 **Review of Computer Science**
Registration #0603-550
Review of advances in computer science which have occurred in the last few years-designed to give graduating or upper-class students an introduction to recent technological and theoretical advances through readings in the current literature. (Normally taken during the last quarter of school.) (Must be fifth year CS&T Major)

Class 4, Credit 4

ICSS-560 **Compiler Construction Laboratory**
Registration #0603-560
Design of full-scale processors for the purpose of language translation. Projects to be completed in a structured environment in areas of parsing, code generation, code optimization, and language design. (ICSS-525)

Credit 4

ICSS-575 **Minicomputer Systems and Applications**
Registration #0603-575
A study of minicomputer hardware architecture, logical design, system interface, software organization, operating systems and applications in various areas. Hands-on experimentation on the PDP 11/10 and Microdata 1600D dual processing system is emphasized in this course. (Fourth year CS&T Major)

Class 4, Credit 4

ICSS-580 **Systems Programming**
Registration #0603-580
A study of computer system programming techniques, topics include system specifications, system generations, utility, service routines, operating systems, language processors, resources allocation, system protection and system efficiency optimization. (ICSS-525, ICSS-440)

Class 4, Credit 4

ICSS-585 **System Programming Laboratory**
Registration #0603-585
A follow-up study of Systems Programming to provide actual experience on a computer system. (ICSS-580)

Class 4, Credit 4

ICSS-590 **Seminar in Computer Science**
Registration #0603-590
Current advancement in computer science. Topics selected include telecommunications, operating systems, sorting, systems analysis, virtual storage, microprogramming and others. (Fourth year CS&T Major.)

Class 2-4, Credit 2-4

I CSS-599 **Independent Study**
Registration #0603-599
Selected topics between a student and a faculty member. (Fifth year CS&T Major with an average higher than 2.5)

Class 2-4, Credit 2-4

Graduate courses
Computer Science and Technology
Computer Systems Management

ICSM-700 **Review of Programming Languages**
Registration #0611 -700
A review of programming techniques and the applications of Fortran and Assembly Language for the incoming graduate student with deficiencies in programming.

Credit 4

ICSM-710 **Computer Systems Software**
Registration #0611-710
A study of the wide spectrum of developing and existing system software. Topics discussed include supervisors, monitors, compilers, utility programs, I/O executives, communication processing systems, application programs, and minicomputer operating systems. Detailed studies in IBM and Xerox Systems will be made and comparative studies between systems and the availability of various systems will also be covered.

Credit 4

ICSM-715 **Computer Systems Hardware**
Registration #0611-715
A study of the characteristics of computer system hardware. The topics discussed include speed, memory size, architecture, expandability, maintenance problems and software backup. Both case studies and comparative studies will be made to large, medium, and small scale computers, as well as to mini computers.

Credit 4

ICSM-740, 741 **Computer System Personnel & Management I, II**
Registration #0611 -740, -741
A study of computer installation personnel and management structure with topics that include system programmer and system analyst qualification and selection, applications programmer qualification and selection, responsibility assignment, scheduling procedures, cost analysis, performance evaluation quality control and other behavioral aspects.

Credit 4

ICSM-765 **Advanced Computer Utilization Techniques**
Registration #0611-765
A study of advanced computer utilization techniques with topics that include resource allocation of available software in business, mathematical, and engineering application. Information storage and retrieval techniques as well as characteristics of some more frequently used programs are studied.

Credit 4

ICSM-790 **Seminar**
Registration #0611-790
Topics discussed include management problems, production problems, maintenance problems, hardware and software system problems, and invited topics given by Computer Center directors.

Credit 4

ICSM-799 **Independent Study**
Registration #0611-799

Credit Variable (2-4)

Computer Science

ICSS-630 Discrete Simulation
Registration #0603-630
Computer Simulation techniques are examined with topics that include abstract properties of simulations, modeling, analysis of a simulation run, and statistics. At least one general purpose simulation language (GPDS) will be taught. Each student will be required to write at least one simulation program, run it on a digital computer, and present an analysis thereof.
Credit 4

ICSS-635 On-Line Information Systems Design
Registration #0603-635
Design of on-line informative systems with topics that 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. (Consent of Department)
Credit 4

ICSS-636 Data Base System Implementation
Registration #0603-636
Requirements and characterization of generalized data base systems, the role of data base administrator, creation of a general data base, elements of data base management systems, data base management in multi-access environment, survey of data base management systems, selecting a data base management system, projects in data base systems implementation. (ICSS-485)
Credit 4

ICSS-655 Real-Time Computation
Registration #0603-655
Principles and applied problems in real-time computation with topics including processor subsystems, communication networks, terminal subsystems, A/D conversion, D/A conversion, interface, noise problems, the major cycle mode, message switching system, through-put rate calculations, system efficiency, and system optimization.
Credit 4

ICSS-670 Computer Graphics
Registration #0603-670
Theory and technology of computer graphics. Display devices and processors. Display files and transformations. Interactive and three-dimensional graphics and graphic systems. Graphic languages an systems design.
Credit 4

ICSS-705 Fundamentals of Computing
Registration #0603-705
Computer Systems, number representations, arithematic operations and error analysis, structured programming, recursive programming, systems software, computer architecture and microprogramming. (ICSM-700 or equivalent)
Credit 4

ICSS-706 Foundations of Computing Theory
Registration #0603-706
Principles of computing theory. Mathematical logic, set theory, relations, functions, grammars and languages, lattices and Boolean algebra, graph theory. (SMAM-431)
Credit 4

ICSS-715 Computational Complexity
Registration #0603-715
This course is concerned with the mathematical analysis of computer algorithms. Topics include matrix operations, combinatorial algorithms, integer and polynomial arithematic, NP complete problems, and lower bounds on algorithms involving arithmetic operations. Background in analysis techniques is presumed. (ICSS-706)
Credit 4

ICSS-720 Computer Architecture
Registration #0603-720
The PMS and the ISP descriptive systems. Organization of processors, memories, switches, input-output devices, controllers, and communication links. Basic theories, hardware technology, parallel and distributive logic, asynchronous and synchronous machines. Computer families.
Credit 4

ICSS-725 Assemblers, Interpreters and Compilers
Registration #0603-725
A survey of the software processors with topics including design and construction of programming language processors, relative merits vis-a-vis cost, user demands, ease of modification, conversational computing, large scale data reduction, and macro processors.
Credit 4

ICSS-726 Deterministic and Probability Models
Registration #0603-726 of Operating Systems
Concurrent processes control, processor scheduling models, computer sequencing problems, auxiliary and buffer storage models, storage allocation in paging systems, memory management of multiprogramming computers. (ICSS-440; and SMAM-352 or SMAM-522)
Credit 4

ICSS-736 Data Base Systems
Registration #0603-736
Data base concepts, information storage structures, data models and data sublanguages, the relational approach, the hierarchical approach, and the network approach, data security and integrity, performance and restructuring application and management issues. (ICSS-485)
Credit 4

ICSS-746 Information Storage and Retrieval
Registration #0603-746
Information structure and file organization. Dictionary and thesaurus construction, utilization, and maintenance. Statistical and syntactic language analysis. Question-answering systems. Systems evaluation.
Credit 4

ICSS-750 Computability
Registration #0603-750
This course examines the theory of computation as it relates to computable functions. Topics include finite state machines, Turing machines, recursive function theory, and Post's symbol manipulation systems. The limitations of the notion of effective computability are examined. (ICSS-706)
Credit 4

ICSS-752 Coding Theory
Registration #0603-752
Study of error correcting codes. Topics include algebraic structure of group codes, linear switching circuits cyclic codes and the decoding problem. (ICSS-706)
Credit 4

ICSS-755 Real-time Computation
Registration #0603-755
Principles and applied problems in real-time computation with topics including processor subsystems, communication networks, terminal subsystems, A/D conversion, D/A conversion, interface, noise problems, the major cycle mode, message switching system, through-put rate calculations, system efficiency, and system optimization.
Credit 4

ICSS-756 **Theory of Parsing**
Registration #0603-756
Application of theoretical concepts developed in formal language and automate theory to the design of programming language and its processors. Syntactic and semantic notation for specifying programming languages, theoretical properties of some grammars, general parsing, non-backtrack parsing, and limited backtrack parsing algorithms. (ICSS-480)

Credit 4

ICSS-760 **Compiler Construction**
Registration #0603-760
Language definition, lexical analysis, syntactic analysis, storage allocation and management, code generation, code optimization, diagnostic generation, bootstrapping.(ICSS-480 and ICSS-525)

Credit 4

ICSS-770 **Computer Graphics**
Registration #0603-770
Theory and technology of computer graphics. Display devices and processors. Display files and transformations. Interactive and three-dimensional graphics and graphic systems. Graphic languages and systems design.

Credit 4

ICSS-775 **Microcomputer Systems and Applications**
Registration #0603-775
A study of minicomputer hardware architecture, logical design, system interface, software organization, operation systems and applications in various areas. Hands-on experimentation on the PDP 11/10 and Microdata 1600D dual processing system is emphasized.

Credit 4

ICSS-780 **Systems Programming**
Registration #0603-780
Computer system programming techniques with topics that include system specifications, system generations, utility, service routines, operating systems language processors, resource allocation, system protection, and system efficiency optimization.

Credit 4

ICSS-785 **Systems Programming Laboratory**
Registration #0603-785
A follow-up study of Systems Programming to provide actual experience on a computer system.

Credit 4

ICSS-790 **Seminar**
Registration #0603-790

Credit Variable 2-4

ICSS-799 **Independent Study**
Registration #0603-799

Credit Variable 2-4

ICSS-890 **M.S. Thesis**
Registration #0603-890

Credit Variable 4-8

Instructional Technology

Undergraduate courses
Audiovisual Communications

ICAV-401 **Message Design**
Registration #0612-401
Reviews perception and learning principles 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 design messages and analyze examples illustrating such principles.

Credit 4

ICAV-405 **Audiovisual Seminar**
Registration #0612-405
Permits entering 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. Guest speakers and visits to local media production units will permit personal contact with potential employers. Required of all students.

Credit 2

ICAV-440 **Audiovisual Program Design I**
Registration #0612-440
Students learn how to produce programmed instructional materials by working through a programmed text. Students must write a program, developmental^ test it and validate the final version. Emphasis is on mastery of skills and techniques involved rather than on theory. Required for all students.

Credit 4

ICAV-450 **Audiovisual Program Design II**
Registration #0612-450
The systems approach to instructional programming is discussed and used as a basis for a systematic, four-stage process of program identification, design, development, and dissemination. Each student must design an instructional product utilizing this systems model. Required for all students. (ICAV-440)

Credit 4

ICAV-460 **Selection, Storage and Dissemination of**
Registration #0612-460 **Media Resources**
Examines sources for listings and descriptions of media products, strategies for selection, methods for proper storage and efficient retrieval of non-print materials, and distribution practices.

Credit 2

ICAV-485 **Electronics in AV**
Registration #0612-485
Covers the fundamentals of electricity and electronics, with particular emphasis on applications to audiovisual hardware and electronic systems, especially as related to proper operation and use.

Credit 4

ICAV-490 **Audio Techniques**
Registration #0612-490
Covers the theory and practice of sound recording with both studio and field grade tape recorders in reel-to-reel and cassette formats. Major topics include hardware, microphone selection and use, acoustical considerations, dubbing, editing and recording techniques under a variety of environmental conditions. Emphasis is on mastery of techniques and equipment selection for specific uses.

Credit 4

ICAV-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

ICAV-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)

ICAV-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)

ICAV-503 Practicum in Audiovisual Production
Registration #0612-503
Allows a student to explore or develop a special competence in advanced production 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)

ICAV-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, the intended medium, and styles of writing.

Credit 4

ICAV-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

ICAV-560 Media Facilities Design
Registration #0612-560
Examines major variables influencing the design of such media facilities as media production areas, darkrooms, audio and television studio and control rooms, and training and instructional areas. Topics include acoustics, lighting, ventilation, electrical circuits, space requirements and layouts.

Credit 4

ICAV-570 Survey of Audiovisual Equipment
Registration #0612-570
Permits the student to both survey the wide spectrum of AV equipment available and to do an in-depth analysis of one type of equipment. Different groups of students will then report to the class the results of their in-depth study, using demonstrations, media presentations, visits by dealers or manufacturers and other methods.

Credit 2

ICAV-580 Producing Multimedia Presentations
Registration #0612-580
Multimedia here refers to either using combinations of media (as in a slide/tape plus movie or videotape presentation) or the use of multi-image techniques. While both the theory and programming devices will be examined, the student’s major task is to design, produce and present a multi-media and/or multi-image production.

Credit 4

ICAV-595, 596 Senior Project
Registration #0612-595, 596
Permits the student to apply his skill and knowledge in designing and producing an appropriate senior project in his specialty area. This may involve a media production, design of a training system, or an in-depth study or survey. These courses are to be taken in the Winter and Spring quarters of the Senior year. The project proposal must be completed within the first half of the Winter quarter. Proposal guidelines are available from the Department. Both courses are required for graduation.

Credit 2/Qtr.

Graduate courses

ICIT-700 Introduction to Instructional Technology
Registration #0613-700
This modularized course surveys a variety of areas in Instructional Technology, including the definitions of Instructional Technology, the history, the research, leaders, funding, trends, health science applications and community college applications. Each module is worth one-half credit. Each student is required to complete at least two credits for graduation.

Credits 2 or 3

ICIT-703 Training Health Professionals
Registration #0613-703
Examines the various methods used to train physicians, nurses, dentists, and veterinarians. Particular emphasis is placed on the role of Instructional Technology in current training programs. Maximum use is made of field trips to various local training programs.

Credit 2

ICIT-705 Sources of Information in Instructional Technology
Registration #0613-705
Examines the wealth of information sources available to Instructional Technologists, including catalogs of non-print material, handbooks, newsletters, ERIC, hardware and software dealers, conference proceedings, and books. Students are given problems to solve requiring the use of these sources.

Credit 2

ICIT-710 Programmed Instruction
Registration #0613-710
Emphasis is placed on programming as a process, i.e., a systematic design activity leading to the solution of an instructional problem. Each student will utilize the process to design, produce and validate a linear program. Also explores the developmental history, research, and literature in the field of programmed instruction.

Credit 4

ICIT-712 Computer Assisted Instruction
Registration #0613-712
Examines the research, hardware, courseware, language, and centers of CAI. Various methods of course development are discussed. Students are required to produce at least one interactive instructional program.

Credit 4

ICIT-715 Instructional Television
Registration #0613-715
Explores the various uses of television as an instructional medium, i.e., individualized instruction, instruction of the masses, stand-alone instruction, integrated instruction. Students must produce at least one television program. Surveys the hardware, technology, and software of television.

Credit 4

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

Credit 4

ICIT-722 Research Project
Registration #0613-722
This variable credit course allows a student to conduct a research project based on the student's interests and with the advice and consent of a faculty member. A formal research proposal must be submitted before registering for .this course. Proposal guidelines are available from the department.

Credit (1-4)

ICIT-735 Psychology of Learning and Teaching
Registration #0613-735
Examines the various theories of learning and teaching by such authors as Gagne, Briggs, Merrill, Skinner, and Tyler. Relates these theories to instructional methods. Covers various instructional paradigms proposed by such authors as Hall, Popham, and Bruner.

Credit 4

ICIT-745 Instructional Facility Design
Registration #0613-745
This course is designed to enable the instructional technologist to assist and participate in the design of spaces and related utilities for effective learning. Specific topics include acoustics, lighting, ventilation, electric circuits, related electronic controls, cable and duct planning, equipment specifications, spatial relationships, together with architectural engineering and contracting procedures.

Credit 3

ICIT-750,751 Instructional Development I, II
Registration #0613-750, -751
This two quarter course examines in detail the process of instructional development. Students examine the literature in instructional development in order to become well versed in the proliferation of theories and methods. Functionally, instructional development is defined as the systematic solution of instructional and learning problems involving, at least, the assessment of needs, specification of objectives, analysis and synthesis of strategies, and evaluation.

This course requires the student to complete projects using an instructional development process. The content of the projects reflects the career interest of the student, i.e. health related for those in the Health Science Applications option, and community college oriented for those in the Community College option. Provision is also made for those generalists interested in examining instructional development in depth. These two courses are required for graduation.

Credits 4, 4

ICIT-752 Instructional Development III
Registration #0613-752
This course continues the process of examining Instructional Development begun in ICIt-750 and 751. Students examine and critically evaluate the literature of Instructional Development; continue or initiate projects; and/or create a model for Instructional Development. (ICIT-750 and 751.)

Credit 4

ICIT-762 Management and Budgeting in Instructional Technology
Registration #0613-762
Covers the basic theories of management, e.g., theory X and theory Y, the managerial grid, recruitment and interviewing techniques, and employee relations. Examines the organizational structure of an Instructional Materials Center. Examines methods for fiscal budgeting of large and small projects. Examines the problems of financing a Media Service Center, e.g. chargeback systems.

Credit 4

ICIT-765 Individual Learning Style Analysis
Registration #0613-770
Examines the proposition that individuals learn in different ways and therefore instructional strategies must be dependent on learner style. Covers the area of Cognitive Style Mapping and the applicability of standardized and criterion referenced tests to the description of individual learning styles. Prequisite: ICIT - 735.

Credit 4

ICIT-770 Interpersonal Communications
Registration #0613-770
Most, if not all, projects managed by or worked on by instructional technologists require the ability to work well with people. The acquisition of this skill is the objective of this course. Participants in the course will examine their own feelings as well as others in a group situation.

Credit 2

ICIT-780 Selected Topics in Instructional Technology
Registration #0613-780
This seminar provides a forum for a small group of students to examine various areas of interest to them. Each student selects a topic, examines it thoroughly, and presents the findings to the group. This course is required for graduation.

Credit 2

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

Credit 1-4

ICIT-850 Independent Study
Registration #0613-850
An opportunity for a student to explore, with a faculty advisor, an area of interest to the student. A proposal, guidelines available from the department, must be submitted prior to registering for this course.

Credit 1-4

Community/Junior College Relations

Note: Graduate courses applicable to the M.S. in Business Technology are listed under College of Business. A more detailed statement of course objectives, assumed prior knowledge, and topics to be covered is available through the CCJCR office.

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 The Student in the Two-Year College
Registration #0604-702
Adviping/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
Systems of curriculum planning, and cognitive styles, goals, objectives, evaluation, measurement, and productivity are studied as they relate to the accountability of faculty, students, and administration.

Credit Variable (1-4 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 in educational planning, leading to a better understanding of the total learning by the two-year college students.

(All degree candidates should enroll once in Seminar).

Credit 2

IJCG-752 **Goal Projections and New Developments**
Registration #0604-752 **in Selected Career Disciplines**
This is a series of specialized seminars on new knowledge, trends, and projected competency goals for different career curricula. Each scheduled section of this course will concentrate on an identified cluster of associate degree-certificate programs.

The participants will understand the current and projected knowledge and be able to apply such information to their own teaching.

Class 20 hours total, Credit 2

IJCG-755 **Career Counseling**
Registration #0604-755
A summer seminar for counselors concentrating upon manpower forecasting, career trends, emerging occupations, and related advising/counseling techniques.

(Special registration arrangements)

Credit 5

IJCG-760 **Collective Bargaining in**
Registration #0604-760 **Community Colleges**
An introduction to the collective bargaining process. This workshop course includes various role implications, legal aspects, impact analysis, strategies, preparations, procedures, and mock negotiation sessions.

Class 20 hours total, 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 3 to 6

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 to the field of community college teaching. Projects may be directed at teaching, curriculum development, or instructional technology. Proposals require approval by the Director.

Credit Variable (1-6)

Engineering Technology

IJCT-705 **Mechanical Engineering Concepts**
Registration #0606-705
The first and second laws of thermodynamics are applied to fundamental problems in mechanical engineering technology.

Credit 4

IJCT-707 **Engineering Concepts in**
Registration #0606-707 **Solid Body Mechanics**
A special graduate level course to update knowledge in solid body mechanics. Statics of rigid bodies, deformable bodies, and dynamics of rigid bodies, dynamics of deformable bodies are reviewed and extended, using modern mathematical techniques, i.e., vectors, matrices, and Cartesian tensors in three dimensions. Mathematical models are constructed and integrated with laboratory exercises and/or projects using analog and digital computers as aids in obtaining effects on systems by varying the parameters.

Credit 4

IJCT-708 **Engineering Technology Analysis**
Registration #0606-708
The fusion of three significant elements: 1) the historical base, 2) which led to the development of certain areas of mathematics, and 3) how this mathematics is used in engineering design. This course also develops the knowledge in selected mathematical topics necessary for teaching engineering technology. Instructional topics are selected on the pre-assessment of the course participants' understanding.

Credit 3

IJCT-710 **Science and Technology of Materials**
Registration #0606-710
The intent of this course is to develop in the student an understanding of the properties of crystalline and non-crystalline materials, metals, alloys, polymers, ceramics, and glass, based on their micro or macro structures.

Credit 3

IJCT-711 **Microelectronics**
Registration #0606-711
Principles of physical basis of active and passive solid state devices are introduced. Manufacturing processes of assembly of passive circuit elements and active solid state devices into a unified circuit package. Discussion of thick/thin film circuit techniques, hybrid circuit assembly, and integrated circuit techniques. Design concepts of solid state design.

Credit 3

IJCT-713 **Computers in Engineering**
Registration #0606-713 **Technology I**
Introduction to digital computers and application to solution of technical problems with FORTRAN programming methods, solution of equations, and numerical methods. Simultaneous linear equations, and numerical methods. Simultaneous linear equations, finite differences, method of least squares, numerical integration, and solution of ordinary differential equations are discussed. (College Mathematics through Calculus or equivalent)

Credit 4

IJCT-714 **Computers in Engineering**
Registration #0606-714 **Technology II**
This course continues the study, use and application of digital computers and numerical methods to solve engineering technology problems. Additional programming languages, programming techniques, finite differences, methods of solution to ordinary and partial differential equations, methods for linear systems, and numerical analysis are included. Programming assignments are pertinent to the student's area of speciality.

Credit 4

IJCT-715 Electromechanical Systems I
Registration #0606-715
Introduction to the concepts and principles of electromechanical systems and components. The underlying unifying concepts of electrical, fluid, mechanical and thermal systems are examined. Various types of transducers such as temperature, displacement, force, electropneumatic and electrohydraulic are studied. Other topics include thermistors, thermocouples, strain gauges, control valves, open and closed loop systems and digital systems.

Credit 3

IJCT-716 Electromechanical Systems II
Registration #0606-716
The study of the major components and subsystems required for the operation of numerically controlled machines and other industrial applications of electromechanical technology.

Credit 3

IJCT-717 Electrical Measurements
Registration #0606-717
This course presents the various fundamental electrical measuring devices, instruments, and transducers which the mechanical engineer is likely to encounter. Basic principles and applications are stressed.

Credit 3

IJCT-718 Applications of Linear Integrated Circuits
Registration #0606-718
The course reviews the advantages and disadvantages of integrated circuits, and increases the student's familiarity with integrated circuits specifications and circuits for obtaining these specifications, and his/her ability to design circuits using integrated circuits. Also familiarity with the many types of circuits using op-amps is stressed.

Credit 3

IJCT-719 Communication Theory
Registration #0606-719
To provide the student with the basic principles and applications of communication theory in system design.

Credit 3

IJCT-720 Integrated Physics
Registration #0606-720
The course objectives include the synthesis and integration of a wide variety of physics topics that are the basis of electrical, mechanical, and optical technology, and the understanding of their common concepts, structures, and terminology.

Credit 4

IJCT-721 Digital Fundamentals
Registration #0606-721
Boolean algebra with extensive applications to digital systems.

Credit 3

IJCT-722 Digital Integrated Circuits
Registration #0606-722
A comprehensive review of the design, manufacture, application, and evaluations of integrated digital circuits, with the major emphasis on the uses of the circuits and related laboratory work. (IJCT-721 or equivalent)

Credit 3

IJCT-725 Numerically Controlled Machines
Registration #0606-725
Basic principles and capabilities of N/C; N/C machine and its controls; increment and absolute systems, point-to-point and continuous path systems, manual programming; use of computers and programs for N/C, N/C turning; design criteria and managing of N/C; non-machining applications.

Credit 3

IJCT-727 Advanced Electrical Measurements
Registration #0606-727
A continuation of Electrical Measurements (IJCT-717) stressing current industrial applications, electronic instrumentation, and trouble shooting. Biomedical applications will be included.

Credit 3

IJCT-728 Active Filter Design
Registration #0606-728
This course deals with modern approaches to the design of frequency selective filters. Concepts of transfer functions, poles and zeros, and graphical evaluation of frequency response are discussed. Following this, the classical filter approximations (e.g., Butterworth, Chebyshev, and Elliptic) are developed for low pass, band pass, and high pass passive designs. The final portion of the course includes the design of active R-C filters using operational amplifiers.

Credit 3

IJCT-730 Electric Power Transmission
Registration #0606-730
A survey of modern power systems including symmetric components, transmission line constants, relaying and control techniques, system stability and economic operation. The impact of large power solid state electronics and ecological studies is discussed.

Credit 3

IJCT-731 Mechanical Systems Design
Registration #0606-731
This course provides a comprehensive introduction to the analytical and graphical techniques required for the design of mechanism and machine parts.

Credit 3

IJCT-732 Manufacturing Organization and Management
Registration #0606-732
The study of the principles of manufacturing organization and management as they relate to teaching the material in the two-year college.

Credit 3

IJCT-751 Engineering Technology Seminar
Registration #0606-751
A series of discussions to analyze and propose solutions for instructional problems peculiar to teaching technical courses. Guest discussion leaders are invited at appropriate times. Individual projects are assigned.

Credit 1

Packaging Science

IPKP-201 Principles of Packaging
Registration #0607-201
The materials, processes, and technology employed to protect goods during handling, shipment, and storage. A brief review of materials and container types, package design and development, and research and testing will be presented.

Class 4, Credit 4

IPKP-301 Packaging Materials
Registration #0607-301
The manufacture, properties, uses, and testing of all common packaging materials and components will be presented. Opportunities for reuse, recycling, and proper disposal will be discussed.

Class 3, Lab. 2, Credit 4

IPKP-401 Packaging Equipment and Systems
Registration #0607-401
A survey of package making and filling machinery available, plus handling and conveying equipment. The characteristics and maintenance of different types of equipment will be studied, and students will gain practice in setting up complete lines for packaging various products.

Class 2, Lab. 4, Credit 4

IPKP-421 **Package Environment**
Registration #0607-421 **and Testing**
An exploration of the different shipping, storage, and use environments common to various products and packages. Structural design of packages that protect products, and methods to test package effectiveness and predict shelf life in these environments will be studied. Package design in relation to solid waste disposal and material and energy shortages will be stressed.

Class 2, Lab. 4, Credit 4

IPKP-501 **Package Development**
Registration #0607-501 **and Marketing**
The interrelationship between these two activities, detailing how the retail package should 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.

Class 2, Lab. 4, Credit 4

IPKP-590 **Senior Thesis**
Registration #0607-590
An in-depth study of some phase of packaging which will enable the student to make use of the knowledge and skills acquired during the course of the program.

Arranged, Credit 4

IPKP-599 **Independent Study**
Registration #0607-599
Independent study, in consultation with the instructor, on any packaging-related topic.

Arranged, Credit variable

School of Applied Science

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, trip reports, and business letters. The techniques of library research and oral reports using video tapes of student presentations are also stressed.

Class 2, Credit 2

ITEC-430 **Water Supply and Distribution**
Registration #0608-430
The consideration of water sources, surfaces and groundwater geology, impoundment reservoirs and wells, criteria for quality and quantity, storage systems, methods of distribution, system analysis, materials and methods of construction, AWWA, FIRO, and other standards are explored.

Class 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-436 **Design of Sanitary and Stormwater**
Registration #0608-436 **Drainage Systems**
A survey of population estimate techniques for sewage flow determination, application of basic hydraulics to the analysis and design of sanitary and stormwater collection system for a subdivision, sewer appurtenances and their design such as street inlet and inverted siphon, stormwater retention facilities and curved and pressure sewers.

Class 2, Recitation 2, Credit 3

ITEC-438 **Principles of the Treatment**
Registration #0608-438 **of Water and Sewage**
An introduction to water and wastewater treatment interpretation of analyzed physical, chemical, and biological parameters of water quality with regard to the design and operation of treatment processes and to the control of the quality of natural water. Fundamental principles and applications of physical, chemical and biological processes employed in water and wastewater treatment. Analysis of waste assimilative capacity of streams.

Class 3, Lab. 2, Credit 4

ITEC-440 **Mechanical Equipment**
Registration #0608-440
Considerations in the selection and operation of mechanical equipment used in pollution abatement and water treatment facilities. The topics include pumps, preliminary treatment equipment such as bar racks, grit chambers, communitors, clarifiers, aeration equipment and systems, chlorination equipment, standby generators. Several field trips are included.

Class 3, Credit 3

ITEC-513 **Computer Techniques in Civil**
Registration #0608-513 **Engineering Technology**
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 basic concepts of zoning: residential, commercial, industrial, agricultural, and concepts of flood plains, green belts, protection of wetlands, wild and scenic river designation, wilderness areas, are studied as well as the functions of zoning and planning boards.

Class 2, Credit 2

ITEC-516 **Structural Analysis and**
Registration #0608-516 **Design I**
The analysis and design of continuous reinforced concrete beams and frames are reviewed as well as the method of moment distribution and ultimate design theory using ACI Code. A design project is emphasized.

Class 3, Recitation 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 interrelation with the supporting soil are explored.

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**
Registration #0608-546 **Practices**
A treatment of legal and ethical aspects of the profession. Review of codes of ethics and current professional problems Several guest speakers representing different segments of the Civil Engineering field.

Class 1, Credit 1

Civil Technology Electives

ITEC-510 Design of Water Treatment Facilities
Registration #0608-510
Principles of water treatment plant design with conceptual and hydraulic water purification and conditioning facilities. The topics discussed include the design of a rapid sand filtration plant with water softening treatment.

Class 2, Lab. 3, Credit 3

ITEC-520 Design of Wastewater Treatment Facilities
Registration #0608-520
Principles of wastewater treatment plant design. Conceptual and hydraulic design of activated sludge and trickling filter plants are studied. Tertiary treatment facilities, such as nitrogen and phosphorous removal will be discussed.

Class 3, Lab. 2, Credit 4

ITEC-549 Environmental Engineering Project
Registration #0608-549
Theory and laboratory study of certain aspects of water pollution control treatment processes. Students are required to prepare a technical paper based on the laboratory findings.

Class 2, Lab. 5, 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 Structural Analysis and Design II
Registration #0608-552
Analysis and design of steel structures using AISC code. Topics include high-strength bolts, welding, design of building frames and trusses, composite beams, study of typical contract and shop drawings. Field trip is scheduled.

Class 3, Recitation 2, Credit 4

Upper-Division Electrical Engineering Technology

ITEE-310 Electricity
Registration #0609-310
Basic circuits for photographic management majors. Topics covered include basic circuit elements. A.C./D.C. voltages and currents, elementary circuit analysis, A.C. power systems and equipment.

Class 3, Lab. 3, Credit 4

ITEE-311 Electronics
Registration #0609-311
The continuation of ITEE-310 with basic electronic devices and applications, rectifier circuits, electronic amplifiers, control circuits, and instrumentations. Principles and application of electronic optic devices are also discussed. (ITEE-310)

Class 3, Lab. 3, Credit 4

ITEE-401 Circuit Theory I
Registration #0609-401
An introductory course in the use of Laplace transform 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.

Class 4, Rec. 2, Credit 5

ITEE-402 Circuit Theory II
Registration #0609-402
Frequency response network functions as solved by use of pole-zero diagrams or Bode diagrams of network functions. Mutual inductance. The Fourier series solution of circuits with non-sinusoidal inputs.

Class 3, Rec. 2, Credit 4

ITEE-404 Control Systems I
Registration #0609-404
Analysis of closed loop control system using Routh's and Nyquist's stability criteria. Determination of steady-state error, phase and gain margin and static-error coefficients. Lead and lag compensating networks and their applications. Relationships of stability criteria and related control theory to actual time response characteristics.

Class 3, Lab. 3, 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, phase shifting circuits and three-phase circuits.

Class 3, Lab. 3, Credit 4

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

Class 3, Lab. 3, Credit 4

ITEE-424 Logic & Digital Devices
Registration #0609-424
The analysis and simplifications of logic equations using Boolean algebra with application to semiconductor integrated circuits and relay circuits. Truth tables and Karnaugh map reduction techniques, sequential circuits, state tables and counter circuits are also studied.

Class 3, Lab. 2, Credit 4

ITEE-428 Linear Amplifier Design
Registration #0609-428
The design of transistor bias networks to meet specific circuit requirements is discussed. A study of the design and analysis of bipolar and FET amplifiers is done with emphasis placed on low and high frequency response characteristics. Also discussed are tuned amplifiers, special considerations necessary in dealing with transistor arrays, and transient response characteristics.

Class 3, Lab. 3, Credit 4

ITEE-520 Electrostatic and Magnetic Fields
Registration #0609-520
Basic principles of electrostatic fields including vector analysis, Coulomb's law, field intensity, Gauss's law, energy and potential difference, potential gradient, conductors, dielectrics, capacitance, and experimental mapping methods are introduced.

Class 4, 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 application are also discussed. Microwave antenna design.

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.

Class 3, Lab. 3, Credit 4

ITEE-526 **Semiconductor Physics**
Registration #0609-526
Theoretical description of p-n junctions and semi-conductor phenomena. Transistor and FET models are developed to obtain parameters. Solid state device characteristics are derived.

Class 4, Credit 4

ITEE-532 **Power Amplifier Design**
Registration #0609-532
Design of Class A and B low frequency power amplifiers including distortion analysis, feedback, and class C.R.F. power amplifier design using transistors. Thermal considerations for power transistors and heat sink design are included.

Class 3, Lab. 3, Credit 4

ITEE-534 **Communication Systems I**
Registration #0609-534
An introduction to basic A.M. and F.M. modulation systems and their spectrum. Design of circuits for the generation and detection of modulated carriers, pulse modulation and sampling systems.

Class 3, Lab. 2, Credit 4

ITEE-535 **Communication Systems II**
Registration #0609-535
Fourier series and Fourier transform. Spectrum analysis of various modulation systems. Performance of systems in the presence of noise. Basic information theory and coding.

Class 4, Credit 4

ITEE-536 **Control Systems II**
Registration #0609-536
Design of 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.

Class 3, Lab. 2, Credit 4

ITEE-538 **Digital Computer Design I**
Registration #0609-538
Design of logic circuits using 7400 series TTL gates. A study of TTL flip-flops, one shots and oscillator circuits. Design of arithmetic circuits, shift registers and counters.

Class 3, Lab. 2, Credit 4

ITEE-539 **Digital Computer Design II**
Registration #0609-539
A continuation of ITEE-538 with application of logic circuits to computer design. Core and semiconductor memories and their application to computers are considered. The operation of computers and computer systems, machine language, programming, indexing and indirect addressing are also examined. Peripheral devices, interfacing and microprocessors are discussed if time permits.

Class 3, Lab. 2, Credit 4

ITEE-540 **Pulse Circuit Design**
Registration #0609-540
The response of R-C circuits as applied to pulse and square waves. Switching characteristics of transistors: rise, fall, and storage time. Clipping and clamping circuits. Design of transistor logic gates and inverters. Design of multivibrators, Schmitt triggers, differential amplifiers, comparators, trigger and counting circuits.

Class 3, Lab. 2, Credit 4

ITEE-544 **Integrated Circuit Theory and Applications**
Registration #0609-544
Fabrication techniques are considered. Logic families such as TTL, ECL, CMOS, and IIL are considered. RAMS and ROMS are reviewed. The basic OP-AMP is considered so as to understand its characteristics. Other 1C topics are covered depending upon student interest.

Class 3, Lab. 2, Credit 4

ITEE-545 **Applications of Linear Integrated Circuits**
Registration #0609-545
A study of the applications of linear integrated circuits including summers, integrators, differentiators, active filters, analog computation, comparators and regulators. Actual and ideal characteristics are compared and studied.

Class 3, Lab. 2, Credit 4

ITEE-546 **Industrial Electronics**
Registration #0609-546
Design of SCR/Triac 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.

Class 3, Lab. 2, 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.

Class 3, Lab. 3, Credit 4

ITEE-550 **Power Systems**
Registration #0609-550
A review of three phase circuits and power calculations. Derivation and use of per unit quantities and symmetric components are reviewed with transformer tests, inductances and efficiency calculations. Inductance and capacitance of three phase transmission lines, energy sources and load cycles are also discussed.

Class 3, Lab. 2, Credit 4

ITEE-551 **Protective Relaying**
Registration #0609-551
Symmetrical components are derived. The physical construction and characteristics of electro-mechanical relays, short circuit calculation and line, bus, and transformer protection are studied.

Class 3, Lab. 2, Credit 4

ITEE-552 **Power System Stability**
Registration #0609-552
Continuation of symmetric components. Fault calculations. Steady-state and transient stability. Lightning and switching characteristics. Shielding and arrester protection. Solid state relays.

Class 4, Credit 4

ITEE-554 **Electronic Optic Devices**
Registration #0609-554
Basic units for measuring radiated energy. Laser and light emitting diode operating theory. Characteristics of solid state light sensors. Optical systems in industry. Basic principles of hologram generation.

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. Pole-Zero filter design principles and applications.

Class 3, Lab. 3, 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.

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, sketching, orthographic projection, 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, columns, shrink fits, and curved beams are covered.

Class 3, Recitation 2, Credit 4

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

Class 3, Recitation 2, Credit 4

ITEM-406 **Dynamics of Machinery**
Registration #0610-406
A study of the kinematics and kinetics of machine elements such as gears, cams, linkages, and the dynamic balancing of machinery. (ITEM-405)

Class 3, Recitation 2, Credit 4

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 crystal structure, phases and phase diagrams, physical properties, corrosion and oxidation, diffusion in metals, recovery, recrystallization and grain growth, age hardening and heat treatment of metals. The effect of processes such as welding on the metallurgy of the part will be examined. Organic and ceramic materials will also be studied. (Prerequisite for ITEM-415 is ITEM-414)

I. Class 3, Lab. 2, Credit 4

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-431 **Production Management**
Registration #0610-431
A study of modern industrial organization and how it is managed. Techniques of decision making 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
The use of 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-201)

Class 4, Credit 4

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. The concepts of work and heat, thermodynamic processes, systems, and cycles. An introduction to the basic concepts of heat transfer is also included.

Class 4, 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 noise testing and analysis. (SMAT-422)

Class 3, Lab. 2, Credit 4

ITEM-460 **Applied Fluid Mechanics**
Registration #0610-460
A study of the fundamentals of fluid statics and dynamics. Applications of these principles of pumps, turbines, flow measurement, pipe flow, and fluid power. (ITEM-441)

Class 3, Lab. 2, Credit 4

ITEM-470 **Numerical Control Applications**
Registration #0610-470
The philosophy and use of numerical control in manufacturing. The course will review manual programming, examine different applications of numerical control, and introduce computer assisted programming techniques.

Class 3, Lab. 2, Credit 4

ITEM-472 **Tool Engineering**
Registration #0610-472
The selection of tools for production, specification of tools, jigs, fixtures, dies, production type gages, selection of tooling for automatic machines, and determining assembly tooling are studied.

Class 3, Lab. 2, Credit 4

ITEM-480 **Methods Analysis**
Registration #0610-480
Principles and applications of basic methods and techniques for improvement of the man-job-time relationship, job standards and recording, and work-space design for efficient use of manpower.

Class 3, Recitation 2, Credit 4

ITEM-485 **Technical Communications**
Registration #0610-485
An individually-paced course in written technical communication. Emphasis on laboratory reports. (Students must enroll in concurrent laboratory course(s))

Class 2, Credit 2

ITEM-490 **Production Planning**
Registration #0610-490
An introduction to plant design, problems in factory planning, preparation of plant 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.

Class 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 topics such as clutches, brakes, couplings, belts, chains and/or vibrations in machinery.

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, fiction, 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.

Class 3, Lab. 2, 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. (SMAT-422)

Class 3, Lab. 2, 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-550 **Topics in Machine Design**
Registration #0610-550 **for Electrical Majors**
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. Consent of the instructor is required.

Credit 4

NOTE: Exceptions to prerequisites can be made only by the consent of the Course Instructor.

Reserve Officers' Training Corps

First year

MMSM-201 **The Military and American Society I**
Registration #0701 -201
Organization of the Army and ROTC. Warfare: its nature, origins, conduct and future. 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 Department of Defense. Public opinion and national security. 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. Marksmanship training. Leadership laboratory.

Class 1, Credit 1

Second year

MMSM-301 **Introduction to Basic Operation**
Registration #0701-301 **and Tactics**
Provides a knowledge of the fundamentals and techniques of tactics at squad level. Leadership, command and control in the tactical employment of small units is stressed.

Class 2, Credit 2

MMSM-302 **Military History I**
Registration #0701-302
Survey course in Military History. Scrutinizes technological and tactical innovations and their effect on the conduct of war. Covers the period to 1866.

Class 2, Credit 2

MMSM-303 **Military History II**
Registration #0701-303
American Military History from 1866. The involvement of the U.S. in the international conflicts of the 20th century. Emphasis is placed on the U.S. and its involvement overseas.

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.

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.

Class 3, Credit 3

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.

Class 3, Credit 3

Fourth year

MMSM-501 **Military Justice/Administration**
Registration #0701 -501 **and Staff Operations**
An in-depth study of the Uniform Code of Military Justice from its inception to the present. Particular emphasis is placed on the comparison and relationship of the civilian and military systems. Staff functions at battalion level and company administration.

Class 3, Credit 3

MMSM-502 **Theory and Dynamics of the**
Registration #0701 -502 **Military Team**
Provides a broad understanding of the principles, fundamentals and tactics as they apply to employment of combat teams: Emphasis is on leadership responsibilities and the roles and contributions of various branches of the Army in support of the combat team.

Class 3, Credit 3

MMSM-503 **World Changes and Military**
Registration #0701-503 **Implications**
Provides an understanding of the component parts of the international system. The spectrum of force and use of force in the contemporary world. The major world events having military implications for the U.S.

Class 3, Credit 3