

Master Copy

FLORIDA TECHNOLOGICAL UNIVERSITY



COURSE DESCRIPTIONS
BULLETIN SUPPLEMENT
FALL-1971

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Sequence 16
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DESCRIPTION OF COURSES

CLASSIFICATION OF COURSES

The University course numbering system is as follows:

- 100-299 are freshman and sophomore level courses and are designed primarily for these students.
- 300-499 are junior and senior level courses and are designed primarily for these and other advanced students. When approved for inclusion in an individual program of graduate study by a supervisory committee approved by the Dean of Graduate Studies, selected 300-499 courses may serve the needs of individual graduate students.
- 500-599 are *beginning graduate and advanced undergraduate* level courses — open to graduate students and those seniors who receive approval of the appropriate Dean(s).
- 600-699 are *beginning graduate and professional* level courses open only to graduate students.

SPECIAL UNDERGRADUATE COURSES

The following special undergraduate courses are available in all departments as needed: Special Topics (491), Seminar (492), Special Readings (493), Independent Study (494), Research Methods (495), Research Planning (496), Research (497), Research Report (498), Thesis (499). Variable credit is permitted.

SPECIAL GRADUATE COURSES

The following special *beginning graduate and advanced undergraduate* courses are available in all departments as needed: Special Topics (591), Seminar (592), Special Readings (593), Independent Study (594). Variable credit is permitted.

The following special *beginning graduate and professional* courses are available in all departments as needed: Special Topics (691), Seminar (692), Special Readings (693), Independent Study (694), Research Methods (695), Research Planning (696), Research (697), Research Report (698), Thesis (699). Variable credit is permitted.

PREREQUISITES

A student registering for a course must meet the prerequisites listed for it. A *prerequisite* (PR) is a requirement which must be satisfied before another course may be taken. A *corequisite* (CR) is a requirement which must be satisfied concurrently with, or prior to, the listed course.

AVAILABILITY OF COURSES

The University does not offer each year all of the courses listed in the catalog. The Class Schedule should be consulted for those courses offered each quarter.

ACCOUNTANCY

ACCY 111 Basic Concepts

Qtr. Hrs. - 4

Accounting as a device for measurement and control of business activity. An introduction to the basic concepts and principles; the analysis and recording of transactions; preparation of financial statements; accounting systems and procedures.

ACCY 112 Basic Concepts

Qtr. Hrs. - 4

PR: ACCY 111. A continuation of ACCY 111. Accounting for partnerships and corporations; managerial techniques such as cost control and budgeting.

ACCY 307 Accounting Concepts

Qtr. Hrs. - 5

PR: Junior standing. An accelerated course in accounting concepts for the student desiring an understanding of accounting theory and practice. Credit may not be earned in both ACCY 307 and the ACCY 111, 112 sequence.

ACCY 308 Accounting for Engineers

Qtr. Hrs. - 5

PR: Junior standing. Industrial accounting, estimated costs, budget procedures and records useful to the engineer. Use of accounting and cost control as tools. Enrollment restricted to engineering students.

ACCY 311 Intermediate Accounting

Qtr. Hrs. - 4

PR: ACCY 112. Accounting theory and practice in relation to professional preparation, analysis and interpretation of financial statements and other accounting and financial data. An in-depth study of assets, liabilities, and stockholders' equity. Income determination; tax implications; funds flow; mathematical principles and application; professional pronouncements.

ACCY 312 Intermediate Accounting

Qtr. Hrs. - 5

PR: ACCY 311. A continuation of ACCY 311.

ACCY 321 Cost Accounting

Qtr. Hrs. - 3

PR: ACCY 112 or 307. The elements of cost recording. The basic cost concept. The importance of cost determination and recording.

ACCY 322 Cost Accounting

Qtr. Hrs. - 3

PR: ACCY 321. The development of cost accounting. Its purposes and its shortcomings. Coordination of cost accounting with general accounting records. Methods of cost analysis and cost application.

ACCY 341 Governmental Accounting

Qtr. Hrs. - 3

PR: ACCY 112 or ACCY 307. Budget, accounting and reporting problems of state and national governments. Design and installation of appropriate accounting systems. Improvement of methods and procedures for public bodies.

ACCY 411 Advanced Accounting**Qtr. Hrs. - 3**

PR: ACCY 312. Complex cases in partnership formation, operation, expansion, and liquidation. Installment sales; consignments; home and branch relationships; mathematics of compound interest.

ACCY 412 Advanced Accounting**Qtr. Hrs. - 3**

PR: ACCY 312 or consent of instructor. Business combinations; acquisition of subsidiaries; investment carried at equity and cost methods. Advanced problems of consolidated statement preparation. Foreign branches.

ACCY 413 Advanced Accounting**Qtr. Hrs. - 3**

PR: ACCY 412 or consent of instructor. Cases of enterprises in distress; estates and trusts. Also a study of the general and special funds related to municipal accounting and non-profit organizations.

ACCY 433 Auditing**Qtr. Hrs. - 3**

PR: ACCY 312. The audit concept. Understanding evidence as applied to the audit. Fundamental techniques, practices and procedures.

ACCY 434 Auditing II**Qtr. Hrs. - 3**

PR: ACCY 433. A continuation of ACCY 331. A further examination of current auditing practices and procedures, including statistical sampling. Preparation of audit reports.

ACCY 451 Federal Income Tax Accounting**Qtr. Hrs. - 3**

PR: ACCY 312. History, theory and basic concept of federal income taxation principles.

ACCY 452 Federal Income Tax Accounting**Qtr. Hrs. - 3**

PR: ACCY 451. Corporation tax returns. Study of accounting methods acceptable for tax purposes. Study of federal income tax procedures and appeals methods.

ACCY 461 Computer Applications to Accounting Problems**Qtr. Hrs. - 3**

PR: COMP 103 and ACCY 312. The purpose of the computer in financial management. Its use as part of the accounting process. Place of the computer in present day accounting, budgeting and auditing matters.

ACCY 499 Undergraduate Research**Qtr. Hrs. - 2-5**

PR: Consent of instructor. May be repeated for credit.

ACCY 601 Managerial Accounting**Qtr. Hrs. - 3**

(Not open for accounting majors.) Accounting as an information and measurement system for internal planning and control; concepts and analytical techniques for accumulating costs of products and services.

ALLIED HEALTH SCIENCES

- AHS 100 Allied Health Sciences Orientation** Qtr. Hrs. - 1
A survey of the allied health sciences; opportunities and scope of the field.
- AHS 320, 321 Hospital Organization and Management** Qtr. Hrs. - 3,3
PR: MGMT 301. Organization patterns in hospitals, clinics, and community health agencies, medical staff organization; principles and practices of management.
- AHS 340, 341 Introduction to Disease** Qtr. Hrs. - 3,3
Nature and cause of disease, treatment, and management of patients in major clinical areas of medicine.
- AHS 350 Medical Legal Jurisprudence** Qtr. Hrs. - 3
Principles of law as applied to the health field with special reference to health practices.
- AHS 375 Recent Advances in Medicine** Qtr. Hrs. - 3
A review of new discoveries and treatments in the medical field.
- AHS 491 Special Topics** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- AHS 492 Seminar** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- AHS 494 Independent Study** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- AHS 497 Research** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

ART

- ART 201 Design Fundamentals I** Qtr. Hrs. - 3
Materials, processes, form. Application to product design, communication design, environmental design, and the visual arts. Stresses the value of planning and design in the development of a more humane civilization. Emphasis on two-dimensional design problems.
- ART 202 Design Fundamentals II** Qtr. Hrs. - 3
Continuation of ART 201. Emphasis on color theory.
- ART 203 Design Fundamentals III** Qtr. Hrs. - 3
Continuation of ART 202. Emphasis on three-dimensional design problems.

- ART 211 Drawing Fundamentals I** Qtr. Hrs. - 3
Drawing as a means of formal organization. Introduction to problems in drawing methods and media. Emphasis on descriptive techniques.
- ART 212 Drawing Fundamentals II** Qtr. Hrs. - 3
Continuation of ART 211. Emphasis on traditions of spatial organization.
- ART 221 The History of Art I** Qtr. Hrs. - 3
Painting, sculpture, and architecture from the Prehistoric Era through the Medieval Period.
- ART 222 The History of Art II** Qtr. Hrs. - 3
Painting, sculpture, and architecture from the Renaissance to the 19th Century.
- ART 223 The History of Art III** Qtr. Hrs. - 3
Painting, sculpture and architecture of the 19th and 20th Centuries.
- ART 231 Visual Arts Overview** Qtr. Hrs. - 3
An introduction to the visual design professions with emphasis on the study of the social, environmental, economic and cultural factors influencing the design disciplines and production in the fine arts.
- ART 301 Lettering** Qtr. Hrs. - 3
PR: Six quarter hours of Design Fundamentals or consent of the instructor. Principles of design and use of letter forms. Study of historic designs and styles. Development of skills and execution.
- ART 302 Graphic Design** Qtr. Hrs. - 3
PR: Six quarter hours of Design Fundamentals or consent of the instructor. Recommended: ART 301. Fundamental principles of visual communication and of design in printed commercial material.
- ART 305 Three-Dimensional Design** Qtr. Hrs. - 3
PR: ART 203 or consent of the instructor. Intermediate problems in three-dimensional materials, processes, form.
- ART 307 Design II** Qtr. Hrs. - 3
PR: Nine quarter hours in Design Fundamentals or consent of instructor.
- ART 308 Jewelry Design** Qtr. Hrs. - 3
PR: Consent of the instructor.
- ART 311 Intermediate Drawing** Qtr. Hrs. - 3
PR: Six quarter hours of Drawing Fundamentals or consent of the instructor. Intermediate problems in drawing. Emphasis on the human form.
- ART 321 Arts of Pre-Literate Societies** Qtr. Hrs. - 3
The visual arts in recent and contemporary primitive societies with emphasis on the cultures of Africa and Oceania.

- ART 322 Asian Art** Qtr. Hrs. - 3
An introduction to the history of visual arts of China, Japan, India and other Eastern cultures.
- ART 324 History of Photography** Qtr. Hrs. - 3
The development of still photography in terms of its historical, aesthetic, and social impact on Western Culture from 1839 to the present.
- ART 341 Photography** Qtr. Hrs. - 3
Consideration of basic technical and aesthetic factors in using still photography as a vehicle for visual, artistic expression.
- ART 351 Painting** Qtr. Hrs. - 3
PR: Three quarter hours in Design Fundamentals and three quarter hours in Drawing Fundamentals or consent of the instructor.
- ART 361 Printmaking** Qtr. Hrs. - 3
PR: Three quarter hours of Drawing Fundamentals or consent of the instructor. Basic procedure and processes in printmaking. Formal and expressive characteristics of the print media.
- ART 371 Sculpture** Qtr. Hrs. - 3
PR: Six quarter hours in Design Fundamentals, to include three quarter hours in three-dimensional work, or consent of the instructor.
- ART 381 Ceramics** Qtr. Hrs. - 3
PR: ART 203 or consent of the instructor. Basic concepts of ceramic design, experience in processes of forming, decorating, glazing, and firing pottery.
- ART 391 Experiments in Art and Technology** Qtr. Hrs. - 3
PR: Consent of the instructor.
- ART 402 Advanced Graphic Design** Qtr. Hrs. - 3
PR: ART 301 and ART 302. May be repeated for credit.
- ART 405 Advanced Three-Dimensional Design** Qtr. Hrs. - 3
PR: ART 305. May be repeated for credit. Advanced problems in three-dimensional materials, processes, form.
- ART 408 Advanced Jewelry Design** Qtr. Hrs. - 3
PR: ART 308. May be repeated for credit.
- ART 411 Advanced Drawing** Qtr. Hrs. - 3
PR: ART 311. May be repeated for credit.
- ART 425 Religious Symbolism in the Visual Arts** Qtr. Hrs. - 4
A study of the origin, migration, and transmutation of religious signs, symbols and images in the history of art. (Same as HUM 425.)

ART 433 Theory and Criticism of the Visual Arts**Qtr. Hrs. - 3**

Criteria of criticism; analysis of works of art; elements of psychology and sociology of art; semantics of critical terminology; relation of aesthetic meaning to reality and truth; emphasis on developments in the arts of the 20th Century.

ART 434 Art and Technology**Qtr. Hrs. - 3**

The impact of technological developments in the visual arts of the 20th Century.

ART 441 Advanced Photography**Qtr. Hrs. - 3**

PR: ART 341. May be repeated for credit.

ART 451 Advanced Painting**Qtr. Hrs. - 3**

PR: ART 351. May be repeated for credit.

ART 461 Advanced Printmaking**Qtr. Hrs. - 3**

PR: ART 361. May be repeated for credit.

ART 471 Advanced Sculpture**Qtr. Hrs. - 3**

PR: ART 371. May be repeated for credit.

ART 481 Advanced Ceramics**Qtr. Hrs. - 3**

PR: ART 381. May be repeated for credit.

ART 482 Advanced Experiments in Art and Technology**Qtr. Hrs. - 3**

PR: ART 391. May be repeated for credit.

ART 484 Senior Studio and Exhibition**Qtr. Hrs. - 3**

PR: Senior standing and consent of the studio areas faculty. Required of all art majors with a studio concentration.

ART 491 Special Topics**Qtr. Hrs. - 2-5**

PR: Consent of the instructor. May be repeated for credit.

ART 492 Seminar**Qtr. Hrs. - 2-5**

PR: Consent of instructor. May be repeated for credit.

ART 494 Independent Study**Qtr. Hrs. - 2-5**

PR: Consent of instructor. May be repeated for credit.

ART 497 Research**Qtr. Hrs. - 2-5**

PR: Consent of the instructor. May be repeated for credit.

BIOLOGY**BIOL 100 General Biology****Qtr. Hrs. - 4**

Basic principles emphasizing the unifying concepts of biology and their relationships to diversity in living organisms. Recommended for majors and preprofessional students.

- BIOL 103 Biological Principles** Qtr. Hrs. - 4
 An integrated approach to life processes and their relationships among diverse organisms, including man. Recommended for non-majors.
- BIOL 105 Biology and Environment** Qtr. Hrs. - 4
 PR: BIOL 100 or BIOL 103. Biological implications of the interaction among human society, population, and technology in relation to the environment and natural systems.
- BIOL 330 Immunology** Qtr. Hrs. - 3
 PR: MICR 300. Basic principles of the immune reaction; antigens, antibody formation, hypersensitivity and autoimmunity.
- BIOL 331 Serology** Qtr. Hrs. - 2
 PR: BIOL 330. Laboratory exercises in the production of antibodies, agglutination and precipitin reactions; quantitative techniques and isohemoagglutination.
- BIOL 332 Cell Physiology** Qtr. Hrs. - 5
 PR: 11 hours in biological sciences and CHEM 123. Basic physiological processes, cellular organization, exchange of materials, conversion of energy, irritability and contractibility.
- BIOL 350, 351 Principles of Ecology** Qtr. Hrs. - 4,4
 PR: 12 hours in biological sciences. A sequence of courses covering basic ecological processes. Weekend field trips are required.
- BIOL 360 Genetics** Qtr. Hrs. - 4
 PR: BIOL 100. Basic principles of heredity as applied to plants and animals. Laboratory will emphasize work with *Drosophila*.
- BIOL 420 Cytology** Qtr. Hrs. - 4
 PR: 11 hours in biological sciences and CHEM 123. Structure of vegetative and reproductive cells; cytoplasmic differentiation, mitosis, meiosis and chromosomal aberrations.
- BIOL 450, 451, 452 Limnology** Qtr. Hrs. - 3,4,3
 PR: BIOL 351 or consent of instructor. A sequence of courses on the ecology of freshwater environments, including the interactions of biological, chemical and physical factors.
- BIOL 460 Organic Evolution** Qtr. Hrs. - 4
 PR: 11 hours in biological sciences including BIOL 360. An outline of evolutionary principles, natural selection and phylogeny; origin of variation and origin of species.
- BIOL 470 History of Biology** Qtr. Hrs. - 3
 PR: Junior standing. People and events from Aristotelian times to the present; development of the science of biology.

BIOL 491 Special Topics	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
BIOL 492 Seminar	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
BIOL 494 Independent Study	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
BIOL 497 Research	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	

BOTANY

BOT 100 General Botany	Qtr. Hrs. - 4
PR: BIOL 100 or 103. Introduction to botany; plant structure and function, including a survey of the plant kingdom giving special emphasis to forms important to man.	
BOT 270 Economic Botany	Qtr. Hrs. - 3
PR: BOT 100. Provides a broad understanding of the various plant groups and their economic importance to man; designed primarily for non-majors.	
BOT 272 Plants and the Urban Environment	Qtr. Hrs. - 3
The selection, placement, propagation and care of ornamental plants in residential, commercial and industrial areas.	
BOT 310 Botanical Microtechnique	Qtr. Hrs. - 4
PR: BOT 100. Methods for preparation and staining of plant materials for microscopic study.	
BOT 320 Comparative Morphology of Plants	Qtr. Hrs. - 5
PR: BOT 100. A sequential survey of the algae, fungi, bryophytes, ferns, fern allies, gymnosperms and flowering plants, with emphasis on evolutionary relationships, structure and function.	
BOT 325 Plant Anatomy	Qtr. Hrs. - 4
PR: BOT 100. A study of the development, structure and function of the principle organs and tissues of vascular plants.	
BOT 330 Plant Physiology	Qtr. Hrs. - 5
PR: BIOL 332 or consent of instructor. Chemical and physical activities of plants; absorption, transpiration, mineral nutrition, photosynthesis and growth.	
BOT 340 Phycology	Qtr. Hrs. - 4
PR: BOT 320 or consent of instructor. A lecture-laboratory course to survey the diversity and classification of marine, terrestrial and freshwater algae.	

- BOT 345 Plant Taxonomy** Qtr. Hrs. - 5
PR: BOT 100. An introduction to systematics, classification and identification of vascular plants with emphasis on the flora of peninsular Florida.
- BOT 350 Plant Ecology** Qtr. Hrs. - 4
PR: BOT 345 or consent of instructor. Role of soils and climate in relation to succession and composition of diverse plant communities.
- BOT 442 Bryology** Qtr. Hrs. - 4
PR: BOT 320 or consent of instructor. A lecture-laboratory survey course on the diversity and classification of mosses, liverworts and hornworts with special emphasis on those found in Florida.
- BOT 443 Mycology** Qtr. Hrs. - 4
PR: BOT 320, MICR 200 or consent of instructor. A lecture-laboratory course to cover the major groups of fungi, treating their morphology and classification and emphasizing those of special importance to man.
- BOT 453 Plant Geography** Qtr. Hrs. - 3
PR: BIOL 350 or BOT 350. The major climatic plant formations of the world and historical plant geography.
- BOT 470 Plant Pathology** Qtr. Hrs. - 4
PR: BOT 443 and MICR 200. A survey of the microorganisms causing plant diseases, emphasizing fungi, especially those forms which are important to Florida.
- BOT 472 Botanical Nomenclature** Qtr. Hrs. - 2
PR: BOT 345. The development of the International Code of Botanical Nomenclature and its application to special problems.
- BOT 491 Special Topics** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- BOT 492 Seminar** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- BOT 494 Independent Study** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- BOT 497 Research** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- BOT 547 Field Botany** Qtr. Hrs. - 4
PR: 12 hours in biological sciences; or science teaching experience; or consent of instructor. Classification and identification among lower and higher plant groups with emphasis on field experience. Major reference sources reviewed.

BUSINESS ADMINISTRATION

BADM 101 Business

Qtr. Hrs. - 4

Survey of managerial divisions of finance, production, personnel, and marketing in business. Business terminology and overall structure of business in its environment. Historical and economic perspectives are considered. This course open only to students at freshman or sophomore level.

BADM 301 Business Concepts

Qtr. Hrs. - 3

PR: Junior standing. The role of business and the environment in which it operates are considered. The responses business makes to freedom, ownership, the market economy and government are discussed. This course satisfies the Advanced Environmental Studies requirement for business.

BADM 302 Personal Investments

Qtr. Hrs. - 3

PR: Junior standing. Management of personal finance; life insurance and home ownership as investments; owning a business as an investment; income protection; investable funds; vehicles for investment; financial institutions; aids to investment; investment companies. Cannot be used for credit for BSBA degree.

BADM 311, 312 Mathematical Applications to Business

Qtr. Hrs. - 3,3

PR: MATH 115 or 221. A study of a wide range of quantitative decision procedures as applied to problems in business administration.

BADM 371 Business Law

Qtr. Hrs. - 3

PR: Junior standing. The presentation of law as an expanding social and political institution in the environment of the business enterprise. Consideration given to the development and sources of law, the judicial system, torts, crimes, and contracts.

BADM 372 Business Law

Qtr. Hrs. - 3

PR: BADM 371. Recognized commercial organizations including agencies, partnerships, corporations. An examination of each and their functions in the business world.

BADM 373 Business Law

Qtr. Hrs. - 3

PR: BADM 371; BADM 372 desirable. A study of the legal concepts underlying the transfer and sale of goods and commercial paper, including an examination of the law of sales, commercial paper and secured transactions and their interaction with the commercial environment.

BADM 444 International Business Operation

Qtr. Hrs. - 3

PR: Senior standing or consent of instructor. An integration of economics and the functional areas of business focused upon the problems of managing international business operations. Economic, legal, functional and administrative problems are studied through cases and literature emphasizing financial and marketing problems.

BADM 474 Business Law, Interests in Property and Liability Qtr. Hrs. - 3
PR: BADM 371 or consent of instructor. Includes bailments, real and personal property, and security interests therein, insurance, suretyship and guaranty.

BADM 484 Operations Research Qtr. Hrs. - 3
PR: ECON 321. Methods and models of operations research applied to specific business problems. Develops use of mathematical techniques and demonstrates its use in modern decision theory.

BADM 490 Senior Seminar: Business in Human Affairs Qtr. Hrs. - 2
Business issues and problems as they relate to human affairs. This course, primarily intended for the senior student, is offered as one of the Advanced Environmental Studies seminars. Not open to the student majoring in the College of Business Administration.

BADM 485 Business Policies Qtr. Hrs. - 5
PR: Senior standing and completion of all other business core course requirements, or consent of instructor. A study of problems confronting businessmen. The student will be expected to utilize the subject matter contained in the business core courses and his major in the analysis of business problems.

BADM 497 Undergraduate Research Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

BADM 601 Quantitative Analysis for Business Decisions Qtr. Hrs. - 3
PR: Graduate standing. Quantitative techniques useful for the solution of business problems.
Elements of calculus in addition to other mathematical techniques are employed. Mathematical model building to aid the decision-making process is stressed.

BADM 621 Business Policy and Responsibility Qtr. Hrs. - 3
PR: Graduate standing. Functions and responsibilities of management, motivation of the businessman and factors governing business decisions.

BADM 695 Business Research Methods Qtr. Hrs. - 3
PR: Graduate standing. Identification of areas for research, methods of business and economic research, and presentation and evaluation of the results.

BADM 697 Masters Research Qtr. Hrs. - 2-5
PR: Graduate standing and consent of the instructor. May be repeated for credit.

CHEMISTRY

CHEM 100 Freshman Orientation

Qtr. Hrs. - 1

A discussion session to acquaint students in the curriculum with the art, history, and current practice of chemistry.

CHEM 111, 112, 113 General Chemistry

Qtr. Hrs. - 4,3,3

A course designed to develop a reasonable appreciation of chemistry by the non-major. Fundamental theories, inorganic, organic, natural products, biochemistry, and industrial processes will be discussed with emphasis on word concepts. This course, although not adequate preparation for most advanced lecture courses, will provide the necessary background for students wishing to participate in many of the laboratory courses.

CHEM 114, 115 General Chemistry Laboratory

Qtr. Hrs. - 1,1

PR: CHEM 111 or CHEM 161. A course to acquaint the non-major with some of the chemical arts as practiced in the inorganic, organic, and biochemical fields.

CHEM 121, 122, 123 Organic Chemistry

Qtr. Hrs. - 4,3,3

Following an introduction of atomic structure, chemical periodicity, and stoichiometry, a study of spectroscopy and bonding in organic molecules is used to provide a bridge from the usual high school chemistry course to the study of organic chemistry. Fundamentals of organic chemistry including nomenclature, structure, reactions, and reaction mechanisms are covered.

CHEM 124 Organic Laboratory Techniques

Qtr. Hrs. - 2

PR: CHEM 121. An introduction to the laboratory techniques of organic chemistry including the preparation, reaction, and analysis of organic compounds.

CHEM 125 Organic Laboratory Techniques

Qtr. Hrs. - 2

PR: CHEM 122 and CHEM 124. A lecture-laboratory course for the development of laboratory skills through class-developed experiments. An open-ended approach is used.

CHEM 151 Basic Laboratory Skills

Qtr. Hrs. - 2

Development of basic analytical skills. Gravimetric, volumetric, colorimetric, and electrometric techniques will be presented. Intended primarily for majors in the biological sciences.

CHEM 161, 162, 163 Chemical Principles

Qtr. Hrs. - 3,3,3

An introductory study emphasizing the physical basis of chemistry and oriented toward the non-chemistry major. Stoichiometry, the periodic table, equilibrium, thermodynamics, kinetics, and atomic and molecular structure will be covered. Some descriptive inorganic chemistry will be included.

CHEM 261, 262, 263 Chemistry Fundamentals Qtr. Hrs. - 3,3,3
CR: MATH 222. The theory of chemical reactions. Atomic structure and chemical bonding theory, chemical periodicity, stoichiometry, equilibria, thermodynamics, and kinetics will be included.

CHEM 351, 352 Analytical Laboratory Techniques Qtr. Hrs. - 4,4
PR: CHEM 161 or CHEM 261, and CHEM 123; or CHEM 113. A lecture-laboratory course providing a working knowledge of analytical laboratory techniques. Classical and instrumental methods are examined with emphasis on selection of the preferred analytical method, performing the analysis, and interpreting the data obtained.

CHEM 355 Chemical Instrumentation for the Medical Laboratory Qtr. Hrs. - 4
PR: CHEM 113 and CHEM 352; or consent of instructor. A lecture-laboratory course designed to develop a working knowledge of the analytical instrumental techniques in the modern medical laboratory.

CHEM 361, 362 Chemistry Fundamentals Qtr. Hrs. - 3,3
PR: CHEM 263. Continuation of CHEM 261, 262, 263.

CHEM 364, 365 Physical Chemistry Measurements Laboratory Qtr. Hrs. - 2,2
PR: CHEM 361 or CHEM 367. The development of laboratory skills for precise chemical measurements such as molecular weight, density, atomic and molecular absorption, and electrical and magnetic properties.

CHEM 367, 368, 369 Physical Chemistry Qtr. Hrs. - 3,3,3
PR: CHEM 163, PHYS 108 or PHYS 212, and MATH 222. A lecture course in physical chemistry for transfer students majoring in chemistry and interested non-majors. Atomic and molecular structure, thermodynamics, kinetics, and chemical bonding will be included. CHEM 367, 368 will cover basic concepts. CHEM 369 will be a more detailed study of selected topics.

CHEM 399 Introduction to Research Qtr. Hrs. - 1
PR: Consent of instructor. A discussion course required of all chemistry majors in order to introduce them to the science and art of research as practiced in chemistry. Topics will be presented by staff and visiting scientists relative to their personal research efforts.

CHEM 421, 422 Advanced Organic Chemistry Qtr. Hrs. - 3,3
PR: CHEM 123, and CHEM 362 or CHEM 369. A consideration of organic reaction mechanisms in the light of bonding theories, thermodynamics, and kinetics.

CHEM 431 Inorganic Chemistry Qtr. Hrs. - 3
PR: CHEM 362 or CHEM 369. A discussion of descriptive inorganic chemistry based on various bonding theories, thermodynamics, and kinetics.

- CHEM 441, 442, 443 Biochemistry** Qtr. Hrs. - 3,3,3
 PR: CHEM 123, and CHEM 163 or CHEM 362. A consideration of the general properties of proteins, carbohydrates, and nucleic acids. Enzymes and their effect on biochemical systems will be discussed. Intermediary metabolism will be a central theme throughout the course.
- CHEM 444, 445 Biochemical Methods** Qtr. Hrs. - 2,2
 PR: CHEM 113 or CHEM 441, and CHEM 352. A laboratory course stressing the application of the chemical arts to the separation, identification, and quantitation of materials of biological significance.
- CHEM 451, 452 Analytical Laboratory Techniques** Qtr. Hrs. - 4,4
 PR: CHEM 352; and CR: CHEM 362 or CHEM 368. A lecture-laboratory course designed to establish an understanding of modern methods of chemical analysis. Students will be encouraged to propose qualitative and quantitative methods of analysis for various inorganic and organic materials. Specific instrumental techniques will also be covered.
- CHEM 461 Selected Topics in Physical Chemistry** Qtr. Hrs. - 3
 PR: MATH 321, and CHEM 362 or CHEM 369. A rigorous mathematical treatment of chemical thermodynamics, kinetics, and quantum mechanics.
- CHEM 471 Introduction to Nuclear Chemistry** Qtr. Hrs. - 3
 PR: CHEM 361 or CHEM 367. Discussion of fundamental particles, nuclear reactions, radioactivity, radiation chemistry, and isotope chemistry.
- CHEM 474 Radiochemical Techniques** Qtr. Hrs. - 3
 PR: CHEM 351. A lecture-laboratory course stressing radiochemical handling techniques, radiation safety, and the detection and measurement of nuclear radiation.
- CHEM 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- CHEM 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- CHEM 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- CHEM 497 Research** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.

CIVIL ENGINEERING & ENVIRONMENTAL SCIENCES

- CEES 321 Surveying** Qtr. Hrs. - 3
 CR: Junior Standing. Theory and field practice in engineering, measurements, and the reduction and adjustment of data. Two lectures, three hours laboratory.

- CEES 322 Engineering Geology** Qtr. Hrs. - 4
 PR: ENGR 152. Basic principles of physical geology with emphasis on topics pertinent to analysis and engineering of soil deposition, geologic maps, weathering, groundwater, mass wasting, and earthquakes. Three lectures, three hours laboratory.
- CEES 351 Structural Mechanics** Qtr. Hrs. - 4
 PR: ENGR 312. Deflections of statically determinate structures by direct and energy methods. Introduction to matrix algebra. Influence coefficients and diagrams. Analysis of statically indeterminate structures by methods of consistent displacements, slope-deflection, and moment distribution.
- CEES 355 Structural Steel Design** Qtr. Hrs. - 3
 PR: ENGR 312. Design of steel structural members. Selected topics in beam design, column design, plastic design, connections and built-up members.
- CEES 357 Structural Concrete Design** Qtr. Hrs. - 3
 PR: ENGR 312. Principles of designing reinforced concrete members. Selected topics in concrete mixes, beams, columns, and ultimate analysis.
- CEES 411 Environmental Engineering — Water Supply** Qtr. Hrs. - 4
 PR: ENGR 332. Water resources, hydrologic cycle, water quality, chemistry of natural water, water treatment, transmission, and distribution.
- CEES 412 Environmental Engineering — Wastewater** Qtr. Hrs. - 4
 PR: ENGR 332. Drainage systems, collection and transmission of wastewater, channel flow, biodegradation of organic wastes, principles of wastewater treatment, effluent and sludge handling and disposal.
- CEES 414 Water and Wastewater Systems Design** Qtr. Hrs. - 3
 PR: CEES 411 or 412. Planning capacity and design of water distribution systems, sanitary sewerage, storm drainage systems, water and wastewater treatment plants.
- CEES 415 Atmospheric Pollution Control** Qtr. Hrs. - 3
 PR: Senior standing. Atmospheric composition and dynamics, sources and nature of contaminants, toxicity thresholds and biological significance, engineering methods of measurement and control.
- CEES 416 Public Health Engineering** Qtr. Hrs. - 4
 PR: Senior standing. Selected topics in the occurrence and transmission of diseases, mathematical theory of epidemics, sanitation of the environment, vector control and public engineering and administration.
- CEES 417 Environmental Health** Qtr. Hrs. - 4
 PR: Senior standing. Selected topics in industrial hygiene, radiological health, effects of pollution on the natural environment, pollution control concepts and regulatory agencies.

- CEES 431 Soil Mechanics and Foundation Engineering I** Qtr. Hrs. - 4
 PR: ENGR 312. Study of the fundamental principles of soil behavior, properties, engineering, and characteristics, including bearing capacity and settlement. Basic applications to retaining walls, foundations, slope stability, etc. Project type laboratory exercises with emphasis on application of laboratory testing and results to practical problems. Three lectures, three hours laboratory-demonstrations.
- CEES 432 Soil Mechanics and Foundation Engineering II** Qtr. Hrs. - 4
 PR: CEES 431 or consent of instructor. Continuation of CEES 431 with emphasis on strength and compressibility characteristics of soils, application to slope stability, earth dams, etc. Continuation of project type laboratory. Three lectures, three hours laboratory-demonstration.
- CEES 451 Matrix Methods of Structural Analysis - I** Qtr. Hrs. - 4
 PR: CEES 351 or consent of instructor. Structural analysis of beams, frames, and plates by matrix methods. Identical to EMMS 441.
- CEES 452 Matrix Methods of Structural Analysis - II** Qtr. Hrs. - 4
 PR: CEES 441. Extension of CEES 441 to include selected topics in stability, vibration, and limit analysis of beams, frames, and plates
- CEES 461 Transportation Engineering** Qtr. Hrs. - 3
 PR: ENGR 342. Investigation of all forms of transport — highway, rail, water, air. Systems approach to planning, design, construction, operation, and administration of transportation networks.
- CEES 462 Transportation Engineering** Qtr. Hrs. - 3
 PR: CEES 461. Advanced topics in transportation system analysis.
- CEES 463 Traffic Engineering** Qtr. Hrs. - 3
 PR: CEES 461 and ENGR 371. Study of operator and vehicle characteristics, street capacity, signals, signs and markings. All phases of traffic engineering as applied to urban areas.
- CEES 471 Urban Planning** Qtr. Hrs. - 3
 PR: ENGR 342. History and principles of planning. Basic economic, land use, population, conservation, and government planning concepts. Quantitative methods for comprehensive studies of urban development.
- CEES 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- CEES 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- CEES 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- CEES 497 Research** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.

- CEES 501 Environmental Engineering — Chemistry I** Qtr. Hrs. - 3
Study of fundamental principles of physical and analytical chemistry applicable to treatment of water and wastewater. Chemical thermodynamics, chemical kinetics, chemical equilibria, water analysis. Two hours lecture and three hours laboratory.
- CEES 502 Environmental Engineering — Chemistry II** Qtr. Hrs. - 3
PR: CEES 501 or consent of instructor. Continuation of CEES 501 to include study of fundamental principles of organic chemistry and biochemistry as applied to environmental quality control, biodegradation of wastes, and wastewater analysis. Two hours lecture and three hours laboratory.
- CEES 521 Aerial Photographic Interpretation** Qtr. Hrs. - 3
PR: Consent of instructor. Geometrical principles, optics, photography, survey cameras, stereoscopic vision and measurement, interpretation, theory of image measurement, terrestrial photogrammetry, aerial photogrammetry, thermal imagery, fundamental projective relations, errors.
- CEES 518 Hydraulic Engineering** Qtr. Hrs. - 3
Application of principles of fluid mechanics to engineering problems. Topics include open channel flow, flow in conduits under pressure, hydraulic machinery, principles of reservoir planning, water supply systems, dams, spillways, and other hydraulic works.
- CEES 581 Water Resources Engineering** Qtr. Hrs. - 3
PR: Consent of instructor. Hydrology, hydraulics, pressure conduits, open channels, and uses of water. The economics and engineering of systems for control and utilization of water resources will be studied using systems analysis and operations research techniques.
- CEES 582 Water Resources Economics** Qtr. Hrs. - 3
PR: CEES 581. General micro-economic concepts, benefits and costs from investment alternatives, external diseconomies, effluent charges, interest rates, design life, and case studies of foreign and domestic policies.
- CEES 611 Environmental Engineering — Water Supply** Qtr. Hrs. - 4
Water resources, hydrologic cycle, water quality, chemistry of natural water, water treatment, transmission, and distribution.
- CEES 612 Environmental Engineering — Wastewater** Qtr. Hrs. - 4
Drainage systems, collection and transmission of wastewater, channel flow, biodegradation of organic wastes, principles of wastewater treatment, effluent and sludge handling and disposal.
- CEES 614 Water and Wastewater Systems Design** Qtr. Hrs. - 3
Planning capacity and design of water distribution systems, sanitary sewerage, storm drainage systems, water and wastewater treatment plant.
- CEES 615 Atmospheric Pollution Control** Qtr. Hrs. - 3
Atmospheric composition and dynamics, sources and nature of contaminants, toxicity thresholds and biological significance, engineering methods of measurement and control.
- CEES 616 Public Health Engineering** Qtr. Hrs. - 4
Selected topics in the occurrence and transmission of diseases, mathematical theory of epidemics, sanitation of the environment, vector control, and public engineering and administration.

CEES 617 Environmental Health**Qtr. Hrs. - 4**

Selected topics in industrial hygiene, radiological health, effects of pollution on the natural environment, pollution control concepts, and regulatory agencies.

CEES 618 Solid Wastes Management**Qtr. Hrs. - 3**

Study of the extent and characteristics of the solid waste problem, collection and disposal systems, and environmental interfaces and effects.

CEES 681 Water Resources Systems I**Qtr. Hrs. - 4**

PR: CEES 582. A comprehensive approach to planning controlling, and development of water resources systems. Applications of systems analysis and economic theory to water resources problems. Deterministic models are developed and solved. Case studies.

CEES 682 Water Resources Systems — II**Qtr. Hrs. - 4**

PR: CEES 681. Continuation of CEES 681 to include stochastic models. Case studies.

COMMUNICATION**COM 100 Basic Communication****Qtr. Hrs. - 3**

Survey of basic factors affecting human interaction through communication; theories and models of communication; contributions of behavioral sciences and related arts; mass media in society.

COM 301 Communication as a Behavioral Science**Qtr. Hrs. - 4**

Basic principles of the behavioral science approach to the study of contemporary communication.

COM 310 History of the Motion Picture**Qtr. Hrs. - 3**

Development of the film industry, its social and economic impact. Same as THA 310.

COM 311 Business and Professional Communication**Qtr. Hrs. - 3**

Investigation of the basic principles of communication as applied to business with emphasis on the written and oral communicative acts.

COM 312 Leadership Through Oral Communication**Qtr. Hrs. - 4**

A theoretical and practical investigation of leadership in oral communication situations, principles of parliamentary law, and approaches to problem solving.

COM 313 Interpersonal Communication**Qtr. Hrs. - 4**

Nature of the communication process; variables affecting the process and the individuals involved. Analysis of communication models, sender-receiver behavior, situational cues, verbal and nonverbal messages.

COM 319 News Writing**Qtr. Hrs. - 4**

PR: Consent of instructor and student must have a minimum ability to type. Development of skills in gathering and writing for the mass media.

- COM 350 Oral Communication via Television** Qtr. Hrs. - 4
 PR: SPE 101. Practice and performance in speech preparation and delivery for television. Types of speeches include the television demonstrative, television stimulative and the television persuasive. All speeches are televised in the television-laboratory.
- COM 363 Group Interaction and Decision-Making** Qtr. Hrs. - 4
 A study of small-group interaction employing both general communication theory and small-group theory. Attention is given to such group activities as development of discussion, leadership emergence, development of norms, etc.
- COM 400 Opinion and the Mass Media** Qtr. Hrs. - 4
 The role of the mass media in influencing public opinion. Theory and nature of publicity and propaganda and other specialized usage of media to gain rapport with and reaction from selected groups.
- COM 410 Social Responsibilities of the Mass Media** Qtr. Hrs. - 4
 Relationships between the mass media and society; examination of social and ethical responsibilities of the media.
- COM 411 Legal Responsibilities of the Mass Media** Qtr. Hrs. - 4
 Legal rights and restrictions, including Constitutional guarantees; libel, invasion of privacy, and contempt of court.
- COM 420 Practicum in Communication** Qtr. Hrs. - 1
 PR: Consent of instructor. May be repeated three times for credit.
- COM 426 Public Relations** Qtr. Hrs. - 4
 Principles and practice of public relations, the means of gaining publicity and influencing people.
- COM 427 Public Relations Campaigns** Qtr. Hrs. - 4
 PR: COM 426. Planning and execution of a public relations campaign; use of research and coordination of elements of the campaign.
- COM 428 Institutional Public Relations** Qtr. Hrs. - 4
 PR: COM 426 or consent of instructor. Principles and methods of public relations as practiced by educational, medical and corporate-related institutions.
- COM 429 Mass Media and Popular Culture** Qtr. Hrs. - 4
 An impact study of mass media upon American culture past to present.
- COM 432 The Mass Media in Developing Countries** Qtr. Hrs. - 3
 Role of media in the world's developing areas, how the nations and media help shape the direction of one another.
- COM 434 Principles of Advertising** Qtr. Hrs. - 4
 Fundamentals of advertising theory and practice, including social and economic aspects.
- COM 435 Advertising Media** Qtr. Hrs. - 4
 PR: COM 434 or consent of instructor. Evaluations of advertising media, their ability to serve the advertiser's communication needs and analysis used in determining media success.

- COM 457 Communications Internship** **Qtr. Hrs. 12-15**
 PR: Consent of instructor. Internships in radio, television, film, journalism, public relations, advertising and speech involving practicum at selected professional communications organizations for one quarter. In addition to a regular prescribed work schedule, the intern must submit a weekly log of his activities and produce a significant research paper.
- COM 460 Group Dynamics** **Qtr. Hrs. - 4**
 A study of human behavior in group situations.
- COM 462 Persuasion: Attitude Formation and Change Formation** **Qtr. Hrs. - 4**
 A survey of the immediate and direct ways in which persuasive communications and social groups come to influence attitudes.
- COM 463 Studies in Listening** **Qtr. Hrs. - 4**
 Analysis of current trends, professional literature, and resource materials bearing upon the teaching of listening. Practice in listening; preparing listening experiences; oral and written reports.
- COM 492 Special Topics** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- COM 494 Seminar** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- COM 494 Independent Study** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- COM 497 Research** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- COM 602 Modern Communication Theory** **Qtr. Hrs. - 4**
 Comparative analysis of theories and models of human communication: behavior systems, encoding and decoding processes, interaction variables, and social context.
- COM 603 Informational and Educational Systems** **Qtr. Hrs. - 4**
 PR: Consent of instructor. Sources, processing, and transmittal of educational and informational materials (software) used in educational broadcast systems, information retrieval systems, learning machines, etc.
- COM 610 Communication and National Development** **Qtr. Hrs. - 4**
 An examination of the means by which communication has been used to aid in modernizing developing societies.
- COM 612 Comparative Int'l. Communication Organizations** **Qtr. Hrs. - 4**
 A study of the principle mass communication organizations of the world.
- COM 613 Communication and Society** **Qtr. Hrs. - 4**
 The importance of communications in societal stress situations, with emphasis on current problems.

- COM 617 Governmental Public Relations** **Qtr. Hrs. - 4**
PR: Consent of instructor. Emphasis study of campaign planning, image and public affairs activities of political aspirants and executive governmental offices at the city, county, state and federal levels.
- COM 620 Studies in Persuasion** **Qtr. Hrs. - 4**
Survey and evaluation of experimental research in persuasion.
- COM 621 Persuasion in the Media** **Qtr. Hrs. - 4**
Study of persuasive campaign with focus upon ethics, methodology, and strategies toward accomplishing the communication end.
- COM 622 Small Group Communication** **Qtr. Hrs. - 4**
PR: Consent of instructor. A study of communication and its effect on small group behavior.
- COM 625 Problems in Broadcast Journalism** **Qtr. Hrs. - 4**
PR: Consent of instructor. Analysis of electronic journalistic policies, sources and control of information.
- COM 628 Audience Measurement** **Qtr. Hrs. - 4**
PR: Consent of instructor. Examination and review of audience measurement techniques. Individual assignments for compilation and analysis of measurement data.
- COM 630 Communications Management** **Qtr. Hrs. - 4**
PR: Consent of instructor. Analysis and developments, with reference to particular media. Organizational theory, structure and behavior. Management principles and operations.
- COM 635 Legal Aspects of Mass Communication Law** **Qtr. Hrs. - 4**
PR: Consent of instructor. Further study into the legal rights and restrictions affecting the mass media.
- COM 640 Effects of Advertising on Society** **Qtr. Hrs. - 4**
An in-depth study of advertising's effects on consumer behavior, societal mores and media economics.

COMPUTER SCIENCE

- COMP 101 Introduction to Computer Science** **Qtr. Hrs. - 3**
History of computers; description of a typical computer; computer elements and symbology; number systems; basic arithmetic operations; computer control and data flow; peripheral components; memory devices; problem-solving using a programming language; case study of a non-trivial application of computers; economic, political, sociological, and other implications of computers, computer science, and computer technology.
- COMP 102 Computer Programming** **Qtr. Hrs. - 3**
PR: MATH 110 or the equivalent. Problem definitions, algorithms, flow charts, digital computer programming using a higher level language (FORTRAN).

- COMP 103 Computer Fundamentals for Business Applications** Qtr. Hrs. - 3
History of computers; processing information; manual information processing systems; introduction to electronic computer systems; storage of information; solving problems; preparation of common business reports.
- COMP 205 Algorithmic Processes I** Qtr. Hrs. - 3
PR: COMP 102 or sophomore standing. Algorithms and computers, flow chart language, branching and subscripted variables, looping, approximations; selected projects using a suitable procedure-oriented language.
- COMP 206 Algorithmic Processes II** Qtr. Hrs. - 3
PR: COMP 205; CR: MATH 321. Approximations, numerical applications.
- COMP 207 Algorithmic Processes III** Qtr. Hrs. - 3
PR: COMP 205. Trees, compiling, text-editing, other non-numerical applications.
- COMP 305 Assembly Language Programming Laboratory** Qtr. Hrs. - 4
PR: COMP 205. Computer structure and machine language; addressing techniques; digital representation of data; symbolic coding and assembly systems; selected programming techniques.
- COMP 306 Computers and Programming** Qtr. Hrs. - 3
PR: COMP 305. Macros, program segmentation and linkage, systems and utility programs.
- COMP 331 Introduction to Combinatorics and Graph Theory** Qtr. Hrs. - 4
PR: COMP 205 and a course in statistics. Recursion, permutations, combinations, generating functions, inclusion and exclusion, elements of the theory of directed and undirected graphs. Applications to computer science.
- COMP 387 Computer Programming with Business Applications** Qtr. Hrs. - 3
PR: COMP 101 or COMP 102 or COMP 103. A study of computer languages of particular use in business and applications to business activities.
- COMP 401, 402 System Design** Qtr. Hrs. - 3,3
PR: COMP 305, EECS 311. Processor characteristics; peripheral equipment characteristics; information representation; introduction to data communications.
- COMP 405 Data Structures** Qtr. Hrs. - 4
PR: COMP 305, 331. Basic concepts of data; linear lists, strings, arrays, and orthogonal lists; ordering or sorting techniques; recursion; string and list processing languages.
- COMP 408 Programming Languages I** Qtr. Hrs. - 3
PR: COMP 331. Formal definitions of programming languages; global properties of algorithmic languages.
- COMP 409 Programming Languages II** Qtr. Hrs. - 3
PR: COMP 408; CR: COMP 405. List processing, string manipulation, data description, and simulation languages.

COMP 411, 412 Operating Systems **Qtr. Hrs. - 3,3**

PR: COMP 306; CR: COMP 405. Task scheduling; file management; file security; multiprogramming; communication between system components, system logs, and accounting and status reporting.

COMP 421, 422 Compiler Structure **Qtr. Hrs. - 3,3**

PR: COMP 409; CR: COMP 405. A review of the major problem-oriented languages; syntax analysis; bootstrapping techniques and metacompilers; languages for compiler writing storage allocation and mapping; dynamic allocation; scanners; symbol tables; code emitters; one-pass and multi-pass systems; code optimization.

COMP 461, 462, 463 Numerical Analysis **Qtr. Hrs. - 3,3,3**

PR: COMP 206, MATH 321; CR: MATH 317 or MATH 318. Numerical solution of algebraic and transcendental equations, systems of equations, ordinary and partial differential equations, and integral equations; interpolation; finite differences; eigen-value problems; relaxation techniques; approximations and error analysis.

COMP 471, 472, 473 Mathematical Programming **Qtr. Hrs. - 3,3,3**

PR: COMP 206, COMP 331, MATH 317 or MATH 318, and MATH 321; or consent of instructor. Linear, nonlinear, and dynamic programming; applications in business, science and engineering.

COMP 481, 482 Computer Processing of Statistical Data **Qtr. Hrs. - 3**

PR: COMP 102 and STAT 402, or consent of the instructor. The use of high-speed electronic computers in statistical analysis; approximation methods; error analysis; Monte Carlo calculations; simulation; combination problems, matrix calculations; least squares analysis; multiple regression; stepwise regression; nonlinear estimation; characteristic value problems; principal component analysis, factor analysis; analysis of variance and covariance computations.

COMP 484 Health Information Systems **Qtr. Hrs. - 3**

PR: COMP 103. A critical survey of the current status of health information systems, application of automated data processing techniques to the health field, and the manual systems needed to support them.

COMP 501 Digital Computing **Qtr. Hrs. - 3**

PR: MATH 223. Digital computer programming; internal operation of the computer; current developments in programming languages and computers. Intended for secondary school mathematics teachers.

COMP 487, 488, 489 Computer Processing of Business Data **Qtr. Hrs. - 3,3,3**

PR: Junior standing and COMP 101 or COMP 102 or COMP 103. The use of high-speed electronic computers for business data processing; applications in accounting, payroll inventory control, and production control; file organization, development, and control; on-line systems and controls.

COMP 491 Special Topics	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
COMP 492 Seminar	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
COMP 494 Independent Study	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
COMP 497 Research	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	

COOPERATIVE EDUCATION

COED 100 Cooperative Education, Freshman Year	Qtr. Hrs. - 0*
COED 200 Cooperative Education, Sophomore Year	Qtr. Hrs. - 0*
COED 300 Cooperative Education, Junior Year	Qtr. Hrs. - 0*
COED 400 Cooperative Education, Senior Year	Qtr. Hrs. - 0*

ECONOMICS

ECON 201 Economics and Man	Qtr. Hrs. - 3
An introductory course specifically designed to provide both the business and nonbusiness student with a terminal course in the fundamentals of economics, including economic methodology, microeconomics, and macroeconomics.	
ECON 202 Principles of Microeconomics	Qtr. Hrs. - 3
PR: ECON 201. The determination of prices in a market economy; their role in allocating consumer and producer goods and in distributing incomes. Efficiency of markets and evaluation of public policies designed to improve efficiency.	
ECON 203 Introduction to Aggregate Economics	Qtr. Hrs. - 3
PR: ECON 201. A course providing further study in the area of national income accounting, income and employment theory, business fluctuations, and U.S. economic policy.	
ECON 301 Intermediate Price Theory	Qtr. Hrs. - 4
PR: ECON 202, 203. Theoretical analysis of the determination of product and factor prices under different market structures.	

- ECON 307 Economic History of the United States** Qtr. Hrs. - 3
PR: Junior standing or consent of instructor. An analysis of the historical growth and development of the American economy.
- ECON 311 Intermediate Money, Income & Employment Theory** Qtr. Hrs. - 4
PR: ECON 202, 203. Theoretical analysis of the determination of national income and employment, including an examination of the monetary system.
- ECON 321 Business and Economic Statistics** Qtr. Hrs. - 4
PR: ECON 203, MATH 115, STAT 301. The use of statistical methods as scientific tools in the analysis of economic and business problems. Emphasis is placed upon the collection, analysis, and interpretation of quantitative economic and business data (same as STAT 321).
- ECON 328 Transportation Economics** Qtr. Hrs. - 3
PR: ECON 202 or 203. Study of general economic characteristics and governmental regulation of public carriers. Consideration of competitive relations between modes of transportation. Criteria for public investment in highway, airport, and other transportation facilities.
- ECON 331 Economics of Labor** Qtr. Hrs. - 3
PR: ECON 202, 203. A survey of the growth, structure, objectives, and collective bargaining practices of organized labor groups.
- ECON 332 Manpower and Human Resources** Qtr. Hrs. - 3
PR: ECON 202, 203. Examines labor as a human resource or human capital. Special emphasis placed upon the changing role of manpower and manpower policies.
- ECON 341 International Economics** Qtr. Hrs. - 3
PR: 202, 203. Fundamental principles of international trade and foreign exchange, including the balance of payments and problems of foreign economic policy.
- ECON 361 Agriculture in the American Economy** Qtr. Hrs. - 3
PR: ECON 202, 203. Agriculture in a developed economy. The nature of agricultural markets, their structure and national farm policy issues.
- ECON 371 Mathematical Economics** Qtr. Hrs. - 3
PR: ECON 203 and MATH 223. An introduction to the mathematical tools of modern economic analysis.
- ECON 381 Economics of Public Utilities** Qtr. Hrs. - 3
PR: ACCY 111, 112 or ACCY 307 and ECON 202, 203 or consent of instructor. The nature of public utilities, the economics of rate determination, and regulatory policy.
- ECON 401 Managerial Economics** Qtr. Hrs. - 3
PR: ECON 202, 203. The uses of economic analysis in economic decision-making and business policy formulation.

- ECON 411 Comparative Economic Systems** **Qtr. Hrs. - 3**
PR: ECON 202, 203. An analysis of the fundamental institutions of the American economic system and a comparison of the American economic system with other economic systems.
- ECON 421 Economic Statistical Analysis** **Qtr. Hrs. - 4**
PR: ECON 321 and ECON 322. Concepts and methods of developing, analyzing, and interpreting measures of economic activity, and business and economic change.
- ECON 431 Public Finance in the American Economy** **Qtr. Hrs. - 3**
PR: ECON 202, 203. Analysis of fiscal institutions and decision-making in the public sector of the American economy; budget planning and execution, taxation, debt, and theory of taxes.
- ECON 432 Fiscal Economics** **Qtr. Hrs. - 3**
PR: ECON 431. The economics of government spending and taxation; analysis of the fiscal role and instruments of government and their effects on the economy. Fiscal policy, intergovernmental fiscal relationships, inflation, debt.
- ECON 435 Monetary Theory and Policy** **Qtr. Hrs. - 3**
PR: FIN 331. A study of the factors that influence the supply of and demand for money and credit, and the effect of changes in these factors on the allocation of resources, levels of national income, employment, and prices.
- ECON 441 Economic Development** **Qtr. Hrs. - 3**
PR: ECON 203. The processes and problems of economic development.
- ECON 451 Econometrics** **Qtr. Hrs. - 3**
PR: ECON 371 and ECON 421. Application of modern statistical methods to economic theory and problems.
- ECON 461 Business and Government** **Qtr. Hrs. - 3**
PR: ECON 202, 203. A survey of the most significant public policies affecting business firms.
- ECON 471 History of Economic Thought** **Qtr. Hrs. - 3**
PR: ECON 202, 203. A study of the leading ideas of the major contributors to the development of economic thought.
- ECON 481 Economics of Urban Areas** **Qtr. Hrs. - 3**
PR: ECON 202, 203. An analysis of the economic problems arising from and associated with the growth of cities and suburban areas within metropolitan districts.
- ECON 497 Research** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.

ECON 601 Economics of the Firm**Qtr. Hrs. - 3**

PR: Graduate standing. The application of microeconomic theory to planning and decision-making in the business firm. Emphasis will be on demand estimation; production functions; measurement of costs; pricing objectives and policies; and government antitrust policy.

ECON 611 Aggregate Economics — Income, Employment, and Growth**Qtr. Hrs. - 3**

PR: Graduate standing. The application of macroeconomic theory to planning and decision-making in the business firm. Emphasis will be on aggregate supply and demand; determinants of consumption, saving, and investment; government's stabilization role; and forecasting of economic fluctuations.

ECON 621 Statistics for Business and Economic Analysis**Qtr. Hrs. - 3**

PR: Graduate standing. The use of advanced statistical methods in business decision-making. Emphasis will be on such topics as regression and correlation and correlation analysis, sampling procedures, and forecasting techniques.

ECON 643 The Soviet Economy: Decision Making and Rationality**Qtr. Hrs. - 3**

The course is designed to examine and analyze the functionality, structure and operation of the economic system of the Soviet Union and of the East European command economies. Special emphasis will be given to rationality, decision-making, and the logic of planning. PR: Graduate standing.

BUSINESS EDUCATION — DEVELOPMENTAL**EDBE 101 Introductory Typewriting****Qtr. Hrs. - 3**

For the student with no previous instruction in typewriting. Development of basic elements in using the typewriter as a tool of literacy and communications.

EDBE 102 Communications Production - I**Qtr. Hrs. - 3**

PR: EDBE 101 or equivalent. Continuation of development of skills in speed and accuracy and introduction to skill building procedures in communications production.

EDBE 103 Communications Production-II**Qtr. Hrs. - 3**

PR: EDBE 102 or equivalent. Expansion of communications production development, speed and accuracy.

EDBE 201 Principles of Shorthand-I**Qtr. Hrs. - 3**

PR: Concurrent enrollment in EDBE 101 or equivalent. For students with no previous instruction in shorthand. Introduction to basic theory of Gregg Shorthand, vocabulary development, and speed building.

EDBE 202 Principles of Shorthand-II

Qtr. Hrs. - 3

PR: EDBE 102, and EDBE 201 or equivalents. A continuation in the study of shorthand theory, vocabulary development, and speed building.

EDBE 203 Principles of Shorthand-III

Qtr. Hrs. - 3

PR: EDBE 102, and EDBE 202 or equivalents. Development and refinement of sustained shorthand dictation, speed and vocabulary development.

EDBE 301 Shorthand Dictation

Qtr. Hrs. - 3

PR: EDBE 102, and EDBE 203 or equivalents. Continued development and refinement of shorthand dictation and introductory communications productions.

EDBE 302 Shorthand Transcription

Qtr. Hrs. - 3

PR: EDBE 102, and EDBE 301. Gregg Shorthand dictation and refinement of communications production.

EDBE 305 Office Technology

Qtr. Hrs. - 3

PR: EDBE 102 or consent of instructor. Basic operation and function of technological media in modern business offices.

EDBE 405 Principles of Business - Vocational Education

Qtr. Hrs. 3

PR: Senior standing. Study of historical development of business-vocational education with specific emphasis on identification and interpretation of present day trends and problems.

EDBE 406 Office Systems and Procedures

Qtr. Hrs. - 3

PR: EDBE 302. Study of the responsibilities of the executive secretary and office supervisor; records management, travel services, case studies in human relations in executive level job performance.

EDBE 601 Curriculum Innovations in Business Education

Qtr. Hrs. - 3

PR: Rank III Certificate of consent of instructor. A critical analysis of the business curricula in post secondary schools; development of philosophy, objectives, and design of innovative programs in business.

EDBE 602 Problems Issues, and Trends in Business Education

Qtr. Hrs. - 3

PR: Rank III Certificate of consent of instructor. Historical development; fundamentals of business education; its relation to business, vocational and general education, guidance, objectives and contemporary problems.

EDBE 603 Analysis, Trends and Research in Typewriting Instruc.

Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Techniques, materials, and instructional media; psychological principles, evaluation, and special attention to a study of research and new trends of instruction.

EDBE 604 Evaluation in Business Education

Qtr. Hrs. - 3

Rank III Certificate of consent of instructor. A study of standardized and prognostic business education tests; functions, construction, administration, and evaluation of measurement instruments.

EDBE 610 Administration and Supervision of Business Education Qtr. Hrs. - 3
PR: Rank III Certificate of consent of instructor. Organization, administration, and supervision of Business Education.

EDBE 611 Analysis of Instruction in Shorthand and Transcription Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Techniques, materials, and instructional media, psychological principles, evaluation, and special attention to a study of research and new trends of instruction.

EDBE 612 Analysis of Instruction in Office Technology Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Techniques, materials, and instructional media, psychological principles, evaluation, and special attention to a study of research and new trends of instruction.

EDBE 613 Analysis of Instruction in Basic Business and Accounting Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Techniques, materials, and instructional media, psychological principles, evaluation, and special attention to a study of research and new trends of instruction.

EDBE 614 Coordination of Cooperative Office Business Education Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. A study of cooperative programs; organization and coordination of cooperative business education programs.

EDBE 615 Improvement of Related Instruction in Cooperative Business Education Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Techniques, materials, and instructional media, psychological principles, evaluation, and special attention to the study of research and new trends of instruction in related cooperative education study.

EDBE 691 Special Topics Qtr. Hrs. - 2-5
PR: Rank III Certificate of consent of instructor. (May be repeated for credit.)

EDBE 696 Research Planning Qtr. Hrs. - 2

PR: EDTA 601. Designing and outlining a research project proposal; identifying the procedures analysis to be used in completing the proposal.

EDBE 698 Research Report Qtr. Hrs. - 2

PR: EDBE 696 and admission to candidacy. A report based on a concentrated application of theory research and creative effort toward investigating a problem in a student's area of interest.

ELEMENTARY EDUCATION - DEVELOPMENTAL

EDEL 301 Teaching Mathematics in the Elementary School **Qtr. Hrs. - 3**

PR: Admission to Phase II or consent of instructor. Consideration of selected concepts; organizing for instruction, techniques and activities; class and individual diagnosis; remedial procedures.

EDEL 302 Mathematics Programs in the Elementary School **Qtr. Hrs. - 3**

PR: EDEL 301. Analysis of teaching arithmetic, geometry and measurement; philosophy and objectives; instructional materials; current research and new curricula.

EDEL 306 Music in the Elementary School **Qtr. Hrs. - 3**

Fundamental procedures for teaching elementary school music, stressing appropriate music materials and activities for different age groups; selected experiences in music.

EDEL 307 Literature for Children **Qtr. Hrs. - 3**

PR: Admission to Phase II or consent of instructor. General survey of books and materials; criteria for analysis and evaluation; types of books available considered in terms of interests, needs, and abilities of children.

EDEL 311 Basic Foundations of Reading **Qtr. Hrs. - 3**

PR: Admission to Phase II or consent of instructor. Introduction to reading; principles, procedures and organization, current practices; analysis of reading materials; correlation with child development; investigation of research.

EDEL 312 Reading in the Elementary School **Qtr. Hrs. - 3**

PR: EDEL 311. Study of specific techniques and materials used to develop reading comprehension, vocabulary and rate; organizing and directing a reading lesson; individual differences; evaluation procedures.

EDEL 315 Teaching Science in the Elementary School **Qtr. Hrs. - 3**

PR: Admission to Phase II or consent of instructor. Consideration of selected themes, problems, and concepts; organizing for instruction; techniques and activities; evaluation procedures.

EDEL 316 Elementary School Curriculum **Qtr. Hrs. - 3**

PR: Admission to Phase II. Basic scope and sequence of the elementary school curriculum; philosophical concepts; techniques and materials for instruction; patterns of organization; planning for instruction.

EDEL 317 Teaching Social Science in the Elementary School **Qtr. Hrs. - 3**

PR: Admission to Phase II or consent of instructor. Consideration of selected themes, problems, and concepts; organizing for instruction; techniques and activities; evaluation procedures.

EDEL 318 Teaching Physical Education in the Elem. School **Qtr. Hrs. - 3**

PR: EDTA 206 and 307. Organization, practice, and conduct of elementary school physical education with emphasis on teaching methods.

EDEL 401 Programs in Early Childhood Education **Qtr. Hrs. - 3**

PR: Admission to Phase II or consent of instructor. Overview of the philosophy, content, facilities, instructional materials, and activities appropriate for children ages 3, 4, and 5; current research and new curricula. Concurrent laboratory experiences.

EDEL 402 Developmental Processes in Early Childhood **Qtr. Hrs. - 3**

PR: Admission to Phase II or consent of instructor. Developmental processes and their relationship to learning and curriculum development; influence of the family and culture.

EDEL 403 Language and Cognition of Young Children **Qtr. Hrs. - 3**

PR: Admission to Phase II or consent of instructor. Language in the learning, patterns of thinking, and perceiving of young children. Theories of language and symbolic experience, verbal and non-verbal behavior.

EDEL 404 Organization of Instruction in Nursery-Kindergarten Education

Qtr. Hrs. - 3

PR: Admission to Phase II or consent of instructor. Organization of instruction; selected themes and concepts; teaching procedures; evaluation techniques; special problems. Concurrent laboratory experiences.

EDEL 405 Language Arts in the Elementary School **Qtr. Hrs. - 5**

PR: Admission to Phase II or consent of instructor. Content, principles, materials and techniques involved in teaching speaking, listening, writing, and spelling in the elementary school; organizing for instruction.

EDEL 406 Art in the Elementary School **Qtr. Hrs. - 3**

Basic principles, purposes, scope and sequence; organization for instruction; evaluation of activities; selected art experiences.

EDEL 407 Classroom Diag. & Treatment of Reading Difficulties **Qtr. Hrs. - 3**

PR: EDEL 311. Overview of the instructional program in natural sciences; philosophy and objectives; special problems; instructional materials; current research and new curricula.

EDEL 408 Science Programs in the Elementary School **Qtr. Hrs. - 3**

PR: EDEL 315. Overview of the instructional program in natural sciences; philosophy and objectives; special problems; instructional materials; current research and new curricula.

EDEL 409 Social Science Programs in the Elementary School **Qtr. Hrs. - 3**

PR: EDEL 317. Overview of the instructional program in the social sciences; philosophy and objectives; special problems; instructional materials; current research and new curricula.

EDEL 415 Teaching Elementary School Health and Physical Education

Qtr. Hrs. - 3

PR: Admission to Phase II or consent of instructor. Observation, organization, practice, and conduct of health and physical education activities in the elementary school.

- EDEL 455 Elementary School Curriculum** Qtr. Hrs. - 4
PR: Bachelor's degree or consent of instructor. Advanced study of the elementary school curriculum; patterns of organization; school services; individual subject areas; school related activities; investigation of trends; research and new curricula.
- EDEL 456, 457 Directed Study in Elementary Education** Qtr. Hrs. - 2-5, 2-5
Workshop for the improvement of the elementary school curriculum. Open to in-service teachers.
- EDEL 530 Developmental Reading** Qtr. Hrs. - 4
PR: Rank III Certificate of consent of instructor. Principles, procedures, organization, and current practices in the elementary reading program.
- EDEL 535 Classroom Diagnosis and Treatment of Reading Difficulties** Qtr. Hrs. - 3
PR: EDEL 530 or equivalent. Principles and techniques of classroom diagnosis and corrective teaching in reading. Consideration of instructional materials.
- EDEL 604 Leadership in Elementary Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Current issues with emphasis on the improvement of instruction, analysis of curriculum, and staff development procedures.
- EDEL 605 Problems in Classroom Teaching in the Elementary School** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Identification and analysis of relevant major instructional problems in the elementary school.
- EDEL 606 Curriculum Design in Elementary Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Design and construction of programs to meet needs of varying levels of student populations. (May be repeated.)
- EDEL 607 Practicum in Elementary Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Supervised laboratory experiences including individual and small group instructional procedures. (May be repeated.)
- EDEL 610 Trends in Elementary School Science Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Analysis of historical development and current trends in science education research.
- EDEL 620 Trends in Elementary School Mathematics Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Analysis of historical development and current trends in mathematics education research.
- EDEL 621 Diagnosis of Difficulties in Elementary School Mathematics** Qtr. Hrs. - 3
PR: EDEL 620. Study and uses of tests regarding the symptoms and causes of specific learning skills in mathematics.

EDEL 622 Remediation of Difficulties in Elementary School Mathematics

Qtr. Hrs. - 3

PR: EDEL 621. Selection of materials and techniques for a remedial program based on individual diagnosis.

EDEL 630 Trends in Elementary School Reading Education

Qtr. Hrs. - 3

PR: Rank III Certificate or CI. Analysis of historical development and current trends in reading research.

EDEL 632 Corrective Reading for Classroom Teachers I

Qtr. Hrs. - 3

PR: EDEL 535 or equivalent. A practicum for classroom teachers with emphasis on group diagnostic reading tests and classroom corrective techniques.

EDEL 633 Corrective Reading for Classroom Teachers II

Qtr. Hrs. - 3

PR: EDEL 632 or equivalent. A continuation of EDEL 632.

EDEL 635 Diagnosis of Difficulties in Reading

Qtr. Hrs. - 3

PR: EDEL 535 or equivalent. Administration and interpretation of individual tests. Consideration of physical, psychological and environmental factors contributing to reading difficulties.

EDEL 636 Diagnostic Reading Practicum

Qtr. Hrs. - 4

PR: EDEL 635 or equivalent. Evaluation of reading abilities and difficulties of children in the reading laboratory of the University. Preparation of individual case reports.

EDEL 637 Remedial Reading Practicum

Qtr. Hrs. - 4

PR or CR: EDEL 636. Supervised remedial instruction with individual children. Selection of instructional materials and techniques; preparation of case progress reports; parent interviews.

EDEL 640 Trends in Elementary School Language Arts Education

Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Analysis of historical development and current trends in language arts research.

EDEL 641 Investigation in Children's Literature

Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Analysis of the various approaches available for learning through the utilization of children's literature.

EDEL 650 Trends in Elementary School Social Science Education

Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Analysis of historical development and current trends in social science education research.

EDEL 681 Seminar in Early Childhood Education

Qtr. Hrs. - 3

PR: Rank III Certificate or consent of instructor. Study and evaluation of research applicable to the design and construction of a curriculum for 3, 4, and 5 year old children.

EDEL 691 Special Topics**Qtr. Hrs. - 2-5**

PR: Consent of instructor. May be repeated for credit.

EDEL 696 Research Planning**Qtr. Hrs. - 2**

PR: EDTA 601. Design, procedures, and techniques of analysis to be used in the completion of a graduate research project.

EDEL 698 Research Report**Qtr. Hrs. - 2**

PR: EDEL 696 and Admission to Candidacy. A written report based on a planned graduate research project.

LIBRARY SCIENCE**EDLS 301 Library Materials****Qtr. Hrs. - 3**

A general introduction to the selection, acquisition, processing, and use of all types of library materials.

EDLS 321 Library Organization and Administration I**Qtr. Hrs. - 3**

Principles and practices of library organization and administration as applied to all types of libraries, including personnel, financial support, organization and servicing of the collection, planning and equipping libraries, planning and evaluating services.

EDLS 322 Library Organization and Administration II**Qtr. Hrs. - 3**

PR: EDLS 321 or equivalent. Continuation of EDLS 321.

EDLS 334 Selection and Acquisition of Library Materials**Qtr. Hrs. - 4**

Principles and methods of evaluating, selecting and acquiring book and non-book materials. The use and study of standard selection aids, reviewing media, publishers and jobbers. Procedures for budgeting, financial and statistical records, gifts and exchanges.

EDLS 384 History of Books and Libraries**Qtr. Hrs. - 3**

A history of books and libraries from ancient times to the present, in relation to the society of which they were a part.

EDLS 424 School Library Administration**Qtr. Hrs. - 3**

PR: Consent of instructor. Principles and practices of library administration applied to elementary and secondary school libraries.

EDLS 431 Cataloging and Classification I**Qtr. Hrs. - 4**

PR: EDLS 301 or consent of instructor. Introduction to the theory and practice of cataloging and classifying library materials. Practical problems in descriptive cataloging, subject cataloging and Dewey Decimal classification as practiced in small libraries.

EDLS 432 Cataloging and Classification II**Qtr. Hrs. - 4**

PR: EDLS 431 or equivalent. Additional study in the theory and practices of cataloging and classification. Introduction to Library of Congress classification and subject headings, divided and classified catalogs, and filing rules.

EDLS 444 Reference Materials and Services Qtr. Hrs. - 3

Selection, evaluation, and use of basic reference materials, with emphasis on functions and services of a reference department.

EDLS 451 Introduction to Educational Media Qtr. Hrs. - 4

Principles and practices of communication theory and its application in the classroom; selection, evaluation, acquisition, storage, and use of non-book materials and related equipment; organizing audio-visual services.

EDLS 452 Preparation and Production of Instructional Media Qtr. Hrs. - 3

Selection, evaluation, and production of instructional materials with emphasis on production of projected materials; display and presentation techniques.

MUSIC EDUCATION

EDME 401 Elementary School Music Instructional Analysis Qtr. Hrs. - 3

PR: EDTA 206 and EDTA 307. Instructional planning; sources of information; instructional techniques; and special evaluation procedure in elementary school music.

EDME 402 Secondary School Music Instructional Analysis Qtr. Hrs. - 3

PR: EDTA 206 and EDTA 307. Instructional planning; sources of information; instructional techniques; and special evaluation procedures in secondary school music.

PHYSICAL EDUCATION — DEVELOPMENTAL

EDPE 232 Instructional Analysis of Team Sports Qtr. Hrs. - 2

PR: Sophomore standing. Analysis of neuromuscular performances and optimal approach to specific learning patterns in team sports.

EDPE 323 Instructional Analysis in Tennis Qtr. Hrs. - 2

PR: Sophomore standing. Analysis of neuromuscular performances and optimal approach to specific learning patterns in team sports.

EDPE 324 Instructional Analysis in Tennis Qtr. Hrs. - 2

Mechanical analysis of neuromuscular performances and optimal approach to specific motor learning patterns.

EDPE 325 Instructional Analysis in Aquatics Qtr. Hrs. - 2

Mechanical analysis of neuromuscular performances and optimal approach to specific motor learning patterns.

EDPE 326 Instructional Analysis in Gymnastics and Tumbling Qtr. Hrs. - 2

Mechanical analysis of neuromuscular performances and optimal approach to specific motor learning patterns.

EDPE 327 Instructional Analysis in Golf Qtr. Hrs. - 2

Mechanical analysis of neuromuscular performances and optimal approach to specific learning patterns.

- EDPE 328 Instructional Analysis in Wrestling (M)** **Qtr. Hrs. - 2**
 Mechanical analysis of neuromuscular performances and optimal approach to specific learning patterns.
- EDPE 329 Choreography of Contemporary Dance (W)** **Qtr. Hrs. - 2**
 Dance production as an art form.
- EDPE 330 Instructional Analysis of Rhythmics** **Qtr. Hrs. - 2**
 PR: Sophomore standing. Analysis of rhythm and rhythmic activities as they relate to teaching physical education.
- EDPE 350 Coaching Theory** **Qtr. Hrs. - 3**
 PR: EDPE 323. Theory and methods of coaching for optimum sports performance.
- EDPE 360 School and Community Recreation** **Qtr. Hrs. - 3**
 PR: Admission to Phase II or consent of instructor. Knowledge and skills of after school activity and summer recreational programs.
- EDPE 407 Family Living Concepts** **Qtr. Hrs. - 5**
 The ideas and principles of healthy family living.
- EDPE 408 Contemporary Health Hazards** **Qtr. Hrs. - 5**
 The effects of drugs and other mood modifiers.
- EDPE 410 Kinesiomechanics** **Qtr. Hrs. - 3**
 PR: ZOOL 234. Mechanics of human movement. Anatomical and mechanical analysis of motor tasks and individual performance. Laboratory experience in analytical and evaluative methods.
- EDPE 421 Exercise Physiology — Cardiovascular** **Qtr. Hrs. - 4**
 PR: ZOOL 234. A circulatory study of man[s homeostatic regulation during environmental stress. (Includes lecture and laboratory.)
- EDPE 422 Exercise Physiology - Respiratory** **Qtr. Hrs. - 4**
 PR: ZOOL 234. A study of metabolic costs and respiratory adjustment to exercise.
- EDPE 430 Human Performance Learning** **Qtr. Hrs. - 4**
 PR: Admission to Phase II or consent of instructor. Theories of movement and factors influencing the learning of gross and fine motor skills. (Includes lecture and laboratory.)
- EDPE 440 Rehabilitation Training Techniques** **Qtr. Hrs. - 3**
 PR: Admission to Phase II or consent of instructor. Recognition and rehabilitation of sports injuries, including first aid.
- EDPE 450 Organization and Administration of Phys. Ed.** **Qtr. Hrs. - 3**
 PR: EDSE 380. Administering and organizing for instruction of the physical education class and the total school physical education program.

- EDPE 541 Development and Remedial Physical Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Methods of satisfying individual needs for physical, psychological, and social needs through physical education activities.
- EDPE 555 Coaching Seminar** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Problems and methods in coaching, including analysis of various philosophies.
- EDPE 590 Measurement in Kinesiology and Physical Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Techniques of measurement and evaluation of human physical performance and their application to physical education.
- EDPE 601 Philosophical Foundations of Physical Education** Qtr. Hrs. - 3
PR: Rank III Certificate or CI. Analysis of the forces and events leading to the development of current concepts in physical education.
- EDPE 602 Current Trends in Physical Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. A comprehensive review of the literature influencing trends in physical education.
- EDPE 603 Organization and Design of Physical Education Programs** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Study of physical education and its existing organization. Emphasis on ethics, values, principles and issues.
- EDPE 604 Administrative Problems in Physical Education** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Study of current problems in the administration of school physical education programs.
- EDPE 612 Primate Gross Anatomy Dissection** Qtr. Hrs. - 5
PR: Rank III Certificate or consent of instructor. Dissection, identification, and analysis of select vertebrate morphology.
- EDPE 621 Physiology of Exercise Environmental** Qtr. Hrs. - 5
PR: Rank III Certificate or consent of instructor. A study of physiological adaptation resulting from prescribed physical activity programs.
- EDPE 624 Rhythmics** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Instructional analysis in classical and modern rhythms.
- EDPE 631 Motor Learning** Qtr. Hrs. - 5
PR: Rank III Certificate or consent of instructor. A study of optimal human factors controlling performance.
- EDPE 632 Perceptual Motor Development** Qtr. Hrs. - 3
PR: EDTA 614 or consent of instructor. Study of the relationship between perceptual motor development and learning. Evaluation of physical activities designed to improve perceptual motor skills.

EDPE 660 School Recreation**Qtr. Hrs. - 3**

PR: Rank III Certificate or consent of instructor. A study of recreational programs related to the public schools.

EDPE 680 Kinesiologic Analysis of Individual Activities**Qtr. Hrs. - 3**

PR: Rank III Certificate or consent of instructor. Analytical techniques of kinesiology and their methods of application to individual motor activities.

EDPE 681 Kinesiologic Analysis of Team Activities**Qtr. Hrs. - 3**

PR: Rank III Certificate or consent of instructor. Analytical techniques of kinesiology and their methods of application to team motor activities.

EDPE 689 Seminar on Improvement of Human Performance**Qtr. Hrs. - 5**

PR: Admission to Candidacy or consent of instructor. Field analysis of human performance; identification and evaluation of critical factors; synthesis and evaluation of programs for improving performance.

EDPE 691 Special Topics**Qtr. Hrs. - 2-5**

PR: Rank III Certificate or consent of instructor. (May be repeated for credit.)

EDPE 693 Special Readings**Qtr. Hrs. - 4**

PR: EDTA 601 and consent of instructor. Study and analysis of readings and previous research in a selected topic.

EDPE 696 Research Planning**Qtr. Hrs. - 2**

PR: EDPE 693. Designing and outlining a research project proposal identifying the procedures analysis to be used in completing the proposal.

EDPE 698 Research Report**Qtr. Hrs. - 2**

PR: EDPE 696 and admission to candidacy. A report based on a concentrated application of theory research and creative effort toward investigating a problem in a student's area of interest.

PROFESSIONAL LABORATORY — APPLICATION

EDPL 320 Elementary School Student Teaching - Block A**Qtr. Hrs. - 3**

PR: EDTA 206 and EDTA 307. Junior year student teaching in an elementary school under the supervision of a certified classroom teacher.

EDPL 321 Elementary School Student Teaching - Block B**Qtr. Hrs. - 3**

PR: EDPL 320. Junior year student teaching in an elementary school under the supervision of a certified classroom teacher.

EDPL 330 Secondary School Student Teaching - Block A**Qtr. Hrs. - 3**

PR: EDTA 206 and EDTA 307. Junior year student teaching in a secondary school under the supervision of a certified classroom teacher.

EDPL 408 Teaching Strategies**Qtr. Hrs. - 3**

PR: Admission to Phase III. Seminar taken concurrently with student teaching. Problem study focused on current needs such as: classroom management and control, planning for instruction, and aspects of professionalism.

EDPL 409 Teaching Strategies**Qtr. Hrs. - 4**

PR: Bachelor's degree or consent of instructor. A seminar taken concurrently with Teaching Practicum, EDPL 465. Advanced problem study focused on current needs such as: classroom management and control, planning for instruction, and aspects of professionalism.

EDPL 421 Elementary School Student Teaching - Block C**Qtr. Hrs. - 9**

PR: EDPL 321. Senior year student teaching in an elementary school under the supervision of a certified classroom teacher.

EDPL 430 Secondary School Student Teaching - Block C**Qtr. Hrs. - 9**

PR: EDPL 330. Senior year student teaching in a secondary school under the direction of a certified classroom teacher.

EDPL 558 Supervision of Professional Laboratory Experiences**Qtr. Hrs. - 4**

PR: Consent of instructor. Study of the undergraduate professional laboratory experiences program with emphasis on the role and responsibilities of the Teacher Education Associate or Supervising Teacher.

EDPL 465, 466 Teaching Practicum**Qtr. Hrs. - 5,5**

PR: Bachelor's degree and approved application. Directed observation, participation, and teaching in an elementary or secondary school under the direction of a selected teacher.

SECONDARY EDUCATION — DEVELOPMENTAL**EDSE 303 School Programs****Qtr. Hrs. - 3**

PR: EDTA 206 and EDTA 307. A study of the public school curriculum, kindergarten through grade twelve.

EDSE 305 Secondary School Curriculum**Qtr. Hrs. - 3**

PR: EDTA 206 and EDTA 307. Study of total school patterns with emphasis on new trends, including individual subject areas, administration, supervision, school services and school related activities.

EDSE 310 Speech Instructional Analysis**Qtr. Hrs. - 4**

PR: EDTA 206 and EDTA 307. Study of instructional programs in speech; objectives, materials, techniques, organization for instruction, evaluation procedures, current research.

EDSE 320 Foreign Language as Human Behavior**Qtr. Hrs. - 3**

PR or CR: ENG 371 or consent of instructor. Nature of language, objectives of foreign language learning and introduction to teaching basic skills. One hour laboratory required each week.

- EDSE 321 Foreign Language Instructional Analysis** **Qtr. Hrs. - 4**
 PR: EDTA 206 and EDTA 307. Study of course objectives for the high school curriculum and survey of methods and materials having special application for teaching foreign language.
- EDSE 330 Business Instructional Analysis I** **Qtr. Hrs. - 4**
 PR: EDTA 206 and EDTA 307. Techniques, materials, and instructional media; psychological principles, evaluation, and current trends in typewriting instruction.
- EDSE 340 English Instructional Analysis** **Qtr. Hrs. - 4**
 PR: EDTA 206 and EDTA 307. Study of course objectives for the high school curriculum and survey of methods and materials which have special application for teaching mathematics.
- EDSE 350 Mathematics Instructional Analysis** **Qtr. Hrs. - 4**
 PR: EDTA 206 and EDTA 307. Study of course objectives for the high school curriculum and survey of methods and materials which have special application for teaching mathematics.
- EDSE 360 Science Instructional Analysis** **Qtr. Hrs. - 4**
 PR: EDTA 206 and EDTA 307. Study of course objectives for the high school curriculum and survey of methods and materials which have special application for teaching science.
- EDSE 370 Social Science Instructional Analysis** **Qtr. Hrs. - 4**
 PR: EDTA 206 and EDTA 307. Study of instructional programs in Social Sciences; objectives; materials; techniques; organization of instruction; evaluation procedures; current research.
- EDSE 380 Physical Education Instructional Analysis** **Qtr. Hrs. - 4**
 PR: EDTA 206 and EDTA 307. Study of course objectives for the high school curriculum and survey of methods and materials having special application for teaching physical education.
- EDSE 404 Instructional Techniques** **Qtr. Hrs. - 3**
 PR: EDPL 330, CR: EDPL 408 and EDPL 430. Procedures, applications and evaluation of technical skills a teacher may employ in the classroom.
- EDSE 421 Oral Teaching of Foreign Languages** **Qtr. Hrs. - 3**
 PR: EDPL 330 or consent of instructor. Audio-lingually-based demonstration class. Practice in linguistic methods. One hour laboratory required each week.
- EDSE 431 Business Instructional Analysis II** **Qtr. Hrs. - 3**
 PR: EDTA 206 and EDTA 307. Techniques, materials, and instructional media; psychological principles, evaluation and current trends in shorthand and related instruction.
- EDSE 432 Business Instructional Analysis III** **Qtr. Hrs. - 3**
 PR: EDTA 206 and EDTA 307. Techniques, materials, and instructional media; psychological principles, evaluation, and current trends in accounting and basic business instruction.

- EDSE 440 Teaching Language and Composition** Qtr. Hrs. - 3
 PR: EDTA 206 and EDTA 307. Techniques and methods in teaching of dialects, semantics, the various grammars. A survey of composition rhetorical methods of selected authors.
- EDSE 441 Literature for Adolescents** Qtr. Hrs. - 3
 PR: Senior standing or consent of instructor. Selecting and evaluating books for adolescents with emphasis on the uses of books in the development of young people.
- EDSE 442 Reading in the Secondary School** Qtr. Hrs. - 4
 PR: Senior standing or consent of instructor. Developmental reading for the junior and senior high school pupil.
- EDSE 451 Recent Developments in Secondary School Math.** Qtr. Hrs. - 3
 PR: Senior standing. Major concepts in SMSG mathematics and other modern secondary programs.
- EDSE 461 Biology Laboratory Teaching** Qtr. Hrs. - 3
 PR: Senior standing. Participation in introductory level chemistry laboratory. Includes laboratory set-ups, laboratory staff meetings and a weekly seminar.
- EDSE 462, 463 Chemistry Laboratory Teaching** Qtr. Hrs. - 2,2
 PR: Senior standing. Participation in introductory level chemistry laboratory. Includes laboratory set-ups, laboratory staff meetings and a weekly seminar.
- EDSE 464, 465 Physics Laboratory Teaching** Qtr. Hrs. - 2,2
 PR: Senior standing. Participation in introductory level physics laboratory. Includes laboratory set-ups, laboratory staff meetings and a weekly seminar.
- EDSE 471 Trends in Secondary School Social Sciences** Qtr. Hrs. - 3
 PR: Senior standing. Identification, development and evaluation of major social science concepts as they relate to contemporary school programs.
- EDSE 491 Directed Study in Secondary Education** Qtr. Hrs. - 2-5
 PR: Senior standing and consent of instructor. May be repeated for credit. Workshop for improvement of the secondary school curriculum. Open to in-service teachers.
- EDSE 521 Trends in School Foreign Language Programs** Qtr. Hrs. - 3
 PR: Rank III Certificate or consent of instructor. Development, articulation and innovations in foreign language curriculums.
- EDSE 541 English Programs in the Secondary School** Qtr. Hrs. - 3
 PR: Rank III Certificate or consent of instructor. Concepts, problems, and advanced topics in such courses as Project English and other secondary school English projects.
- EDSE 551 Topics in Junior High School Mathematics** Qtr. Hrs. - 3
 PR: Rank III Certificate or consent of instructor. Instructional techniques and major problems in junior high mathematics programs.

- EDSE 561 General Science Programs in the Secondary School** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Basic concepts, philosophies, and formats of experimental secondary school general science programs (may be repeated.)
- EDSE 562 High School Biology Concepts** Qtr. Hrs. - 3
PR: Rank III Certificate of consent of instructor. Major concepts in BSCS biology and other modern biology programs.
- EDSE 571 Contemporary Social Science Education** Qtr. Hrs. - 3
PR: Rank III Certificate of consent of instructor. A survey of recent developments and contemporary programs in all areas of the social sciences.
- EDSE 601 Curriculum Planning** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Developing of a theory and formulating a basic instructional plan for the classroom teacher.
- EDSE 602 Principles of Educational Supervision** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Basic theory and application of supervising principles for instructional improvement.
- EDSE 621 Media and Research in Foreign Language Teaching** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Rationale and use of technological aides in foreign language teaching, classroom research and evaluation.
- EDSE 622 Linguistic Analysis in Teaching Foreign Languages** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Linguistic aspects of foreign language learning. Applied linguistics and psycholinguistics in language teaching.
- EDSE 641 Media and Methods in English Education** Qtr. Hrs. - 4
PR: Rank III Certificate or consent of instructor. Practicum in the use of various media in the English classroom with emphasis on student film making and production of media.
- EDSE 642 Reading Guidance for Adolescents** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Review of literary works appropriate for young people to provide insight into psychological problems common to teenagers.
- EDSE 651 Laboratory Programs in Mathematics** Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Design, organization and development of special materials and projects for mathematics independent study.

EDSE 652 Seminar in Mathematics Teaching Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. A review of prominent research and the writings of selected authors in mathematics education.

EDSE 661 Inquiry in the Sciences Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. The techniques in teaching science by inquiry in the secondary school with the opportunity to participate in and develop inquiry lessons.

EDSE 662 Laboratory Programs in Science Education Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Design, organization and development of special materials and projects for science independent study centers.

EDSE 671 Laboratory Program in the Social Sciences Qtr. Hrs. - 3
PR: EDSE 571 or consent of instructor. Design, organization and development of special materials related to selected conceptual specializations.

EDSE 672 Inquiry in the Social Studies Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. An in-depth development of the role of inquiry in the new social studies with opportunity to both participate in and to develop inquiry episodes.

EDSE 691 Special Topics Qtr. Hrs. - 2-5
PR: Rank III Certificate or consent of instructor. May be repeated for credit.

EDSE 696 Research Planning Qtr. Hrs. - 2
PR: EDTA 601 and admission to candidacy. Design, procedures, and techniques of analysis to be used in the completion of a graduate research project.

EDSE 698 Research Report Qtr. Hrs. - 2
PR: EDSE 696. A written report based on a planned graduate research project.

TEACHING ANALYSIS

EDTA 206 Human Development Qtr. Hrs. - 3
Analysis of basic principles and applications in growth and learning from conception through adolescence. EDTA 307 recommended concurrently.

EDTA 305 Principles of Evaluation Qtr. Hrs. - 3
PR: Successful completion of Teaching Analysis, (EDTA 307) and Human Development, (EDTA 206). Principles of evaluation applied to advising pupils diagnosing learning deficiencies, determining effectiveness of instruction and judging pupil progress.

EDTA 306 Learning Theory Qtr. Hrs. - 3
PR: Successful completion of Teaching Analysis, (EDTA 307) and Human Development, (EDTA 206). Study of applications of learning theory to classroom teaching.

- EDTA 307 Teaching Analysis** **Qtr. Hrs. - 5**
Initial requirement; an opportunity to examine and participate in general and specific dimensions of teaching with socio-economic factors emphasized. EDTA 206 recommended concurrently.
- EDTA 490 Senior Seminar: Education in Human Affairs** **Qtr. Hrs. - 2**
Provides an overview of basic objectives, strategies, and techniques in education. This course, primarily intended for the senior student, is offered as one of the advanced Environmental Studies Seminars. Not open to the student enrolled in the College of Education.
- EDTA 601 Fundamental Research Procedures in Education** **Qtr. Hrs. - 3**
PR: Rank III Certificate or consent of instructor. Design rationale and construction, sampling methods, control and limits.
- EDTA 611 Social Factors in American Education** **Qtr. Hrs. - 3**
PR: Rank III Certificate or consent of instructor. Analysis of general and specific aspects of American education as they relate to Social and Behavioral Sciences.
- EDTA 612 Measurement and Evaluation in Education** **Qtr. Hrs. - 3**
PR: Rank III Certificate or CI. Rationale and construction of evaluative instruments, parametric and non-parametric statistics, interpretation of data.
- EDTA 613 Behavior Problems in the Public School** **Qtr. Hrs. - 3**
PR: Rank III Certificate or consent of instructor. Role of the teacher in identification, strategies for remediation and referral procedures for working with behavioral problem children. Mental hygiene principles stressed.
- EDTA 614 Studies in Human Development and Childhood** **Qtr. Hrs. - 3**
PR: Rank III Certificate or consent of instructor. Recent research in Human Development and childhood relevant to contemporary American education. Emphasizes prenatal through age 11.
- EDTA 615 Graduate Studies in Teaching Analysis** **Qtr. Hrs. - 3**
PR: Rank III Certificate or consent of instructor. Advanced studies, analysis, and participation in interaction, behavioral analysis, and socio-economic variables germane to contemporary American education.
- EDTA 616 Simulation Models in Education** **Qtr. Hrs. - 3**
PR: Rank III Certificate or consent of instructor. Recent research and theoretical analysis of instructional-learning interfaces as they affect learning in the classroom.
- EDTA 617 Adolescent Development and the Schools** **Qtr. Hrs. - 3**
PR: Rank III Certificate or consent of instructor. Recent research in human development in adolescence with special emphasis upon research of interest to secondary school teachers.

EDTA 618 Instructional Models and Learning Theories in Educ. Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Recent research and theoretical analysis of instruction-learning interfaces as they relate to learning in the schools.

EDUCATION — VISUAL ARTS

EDVA 401 Elementary School Art Instructional Analysis Qtr. Hrs. - 3
PR: EDTA 206 and EDTA 307 or consent of the instructor. Methods and curriculum materials appropriate for teaching Visual Arts in the elementary schools.

EDVA 402 Secondary School Art Instructional Analysis Qtr. Hrs. - 3
PR: EDTA 206 and EDTA 307 or consent of instructor. Methods and curriculum materials for teaching Visual Arts in the secondary schools.

EDVA 431 Two-Dimensional Instructional Materials Qtr. Hrs. - 3
PR: EDVA 401 or 402 or consent of instructor. Application of two-dimensional materials to appropriate levels of instruction: chalk, water colors, crayon, tempera, acrylics, mosaics, and fabrics.

EDVA 432 Three-Dimensional Instructional Materials Qtr. Hrs. - 3
PR: EDVA 401 or 402 or consent of instructor. Application of three-dimensional materials to appropriate levels of instruction: wood, paper, plaster, concrete, clay, wax, soap and fabrics.

EDVA 433 Graphic Instructional Materials Qtr. Hrs. - 3
PR: EDVA 401 or 402 or consent of instructor. Application of graphic materials to appropriate level of instruction: printing, woodcuts, silk screens, film-making, and projectuals.

EDVA 501 Contemporary Visual Arts Education Qtr. Hrs. - 3
PR: EDVA 401 and EDVA 402 or consent of the instructor. A study of current programs and innovations in public school Visual Arts Programs.

EDVA 502 Found Arts Qtr. Hrs. - 3
PR: EDVA 431 and EDVA 432 or consent of the instructor. Materials available for instruction in the public schools will be explored in depth in relation to their appropriateness and productive qualities.

EDVA 601 Two-Dimensional Instructional Materials Qtr. Hrs. - 3
PR: EDVA 401, 402, and 431, or consent of instructor. Application of two-dimensional materials to appropriate levels of instruction: chalk, water colors, crayon, tempera, acrylics, mosaics, fabrics, etc.

EDVA 602 Three-Dimensional Instructional Materials Qtr. Hrs. - 3
PR: EDVA 401, 402, 432, or consent of instructor. Application of three-dimensional materials to appropriate levels of instruction: wood, paper plaster, concrete, clay, wax, soap, fabrics, etc.

EDVA 603 Graphic Instructional Materials**Qtr. Hrs. - 3**

PR: EDVA 401, 402, and 433, or consent of instructor. Application of graphic materials to appropriate level of instruction: printing, woodcuts, silk screens, film-making, projectuals, etc.

ELECTRICAL ENGINEERING & COMMUNICATIONS SCIENCES**EECS 311 Introduction to Digital Circuits****Qtr. Hrs. - 4**

PR: COMP 205. Introduction to electrical components used in digital switching circuits and to the properties of magnetic materials; construction of basic logic gates and flip-flops; consideration of various practical problems including reliability, noise and packaging techniques. Intended primarily for computer science majors. Three lectures, three hours laboratory.

EECS 321 Electrical Networks**Qtr. Hrs. - 4**

PR: ENGR 321. Analysis of linear circuits. Laplace and Fourier transform techniques. State variable representation. Computer aided analysis techniques. Three lectures, three hours laboratory.

EECS 322 Electronic Engineering**Qtr. Hrs. - 4**

PR: ENGR 322. Electronic devices and circuits including small signal amplifiers, power amplifiers, and switching circuits. Three lectures, three hours laboratory.

EECS 331 Electromechanics**Qtr. Hrs. - 3**

PR: ENGR 323 Energy conversion by electromechanical methods.

EECS 341 Electromagnetic Fields**Qtr. Hrs. - 4**

PR: ENGR 322 and MATH 331. Introduction to electric fields and waves.

EECS 411 Logical Component Design**Qtr. Hrs. - 4**

PR: ENGR 322. Switching theory. Design and application of serial and parallel logical components including counters, registers, adders. Principles of stored program computers. Three lectures, three hours laboratory.

EECS 413 Digital Systems and Circuits**Qtr. Hrs. - 4**

PR: ENGR 323 and EECS 311. Investigation of digital components and their incorporation into circuits for digital applications. Three lectures, three hours laboratory.

EECS 412 Logical Systems Design**Qtr. Hrs. - 4**

PR: EECS 411. Systems investigation, design, and operation of digital computers; study of a basic hardware set and a basic software set.

EECS 414 Analog Computers**Qtr. Hrs. - 3**

PR: EECS 321. Theory, operation and application of analog computers.

- EECS 421 Electrical Networks** Qtr. Hrs. - 3
 PR: EECS 321 and 341. Traveling electromagnetic waves with application to distributed parameters. Two lectures, three hours laboratory.
- EECS 431 Electrical Machinery** Qtr. Hrs. - 3
 PR: EECS 331. Methods and techniques of systems analysis applied to the dynamics of electrical machinery. Two lectures, three hours laboratory.
- EECS 442 Microwaves** Qtr. Hrs. - 4
 PR: EECS 341. Microwave devices and systems. Three lectures, three hours laboratory.
- EECS 451 Communication Systems** Qtr. Hrs. - 4
 PR: EECS 321 and 322. Information transmission, modulation, and noise. Three lectures, three hours laboratory.
- EECS 461 Semiconductor Devices** Qtr. Hrs. - 3
 PR: EMS 411. Semiconductors with non-uniform impurity distribution; impurity diffusion, analysis of drift transistor with constant built-in field. Junction field-effect transistors. Two lectures, three hours laboratory.
- EECS 462 Solid State Systems** Qtr. Hrs. - 3
 PR: EECS 461. Theory of solid state devices.
- EECS 464 Solid State Electronics** Qtr. Hrs. - 3
 PR: EECS 461. Theory of solid state devices.
- EECS 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- EECS 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- EECS 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- EECS 497 Research** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- EECS 513 Pulse Circuits** Qtr. Hrs. - 4
 PR: Basic electronics course. Wave generating, shaping, and logic circuits. Three lectures, three hours laboratory.
- EECS 531 Environmental Control Systems** Qtr. Hrs. 3
 PR: ENGR 421 or equivalent. Modeling, control methods, stability, and optimization applied to environmental systems.
- EECS 535 Electric Power Generation and Distribution** Qtr. Hrs. - 3
 PR: ENGR 323 or equivalent. Introduction to electric energy sources. Concept of complex power in single and three phase systems. Synchronous machines, power transformer, and transmission lines.

- EECS 543 Coherent Optics Applications** **Qtr. Hrs. - 3**
 PR: EECS 341. Theory and design of coherent optical systems lasers, information, processing, communication, holography.
- EECS 553 Random Processes** **Qtr. Hrs. - 3**
 PR: CHEM 391 and ENGR 321. Random variables, averaging, sampling, elements of probability theory.
- EECS 611 Modern Circuit Design** **Qtr. Hrs. - 3**
 Application of computer aided methods for the analysis and synthesis of passive and active networks.
- EECS 613 Digital Circuits** **Qtr. Hrs. - 3**
 Analysis of logic circuits, design of digital systems using contemporary integrated circuits, laboratory project.
- EECS 621 Digital Computer Systems** **Qtr. Hrs. - 3**
 PR: EECS 613. Investigation of general purpose computer systems and their components.
- EECS 625 Computer Simulation of Environmental Systems** **Qtr. Hrs. - 3**
 PR: EECS 531 or equivalent. Modeling environmental systems using digital, analog, and hybrid computer techniques.
- EECS 631 Modern Control Theory** **Qtr. Hrs. - 3**
 State space method of analysis for discrete and continuous control, phase plane, lyapunov stability.
- EECS 645 Remote Sensing Optical Systems** **Qtr. Hrs. - 3**
 PR: EECS 341 or equivalent. Study of electromagnetic phenomena and systems at optical and near optical wavelengths and the use of such systems in environmental monitoring.
- EECS 651 Signal and System Analysis** **Qtr. Hrs. - 3**
 Representation of signals and linear systems in the frequency and time domains, transforms, sampling, random signals.
- EECS 653 Communication Theory** **Qtr. Hrs. - 3**
 Theory of communicating in the presence of noise, modulation, optimum filtering, phase-lock loop.

ENGINEERING CORE

- ENGR 100 Oceanography and Space** **Qtr. Hrs. - 4**
 Fundamentals of oceanography and space with emphasis on the engineering aspects and uses. May be used to satisfy Scientific Environment requirement of Environmental Studies Program.

ENGR 101 Engineering Graphics**Qtr. Hrs. - 3**

Spatial visualization, sketching, and graphical presentation as a form of engineering communication. Engineering drawing, descriptive geometry, manipulation of vectors and graphical solution techniques. Two lectures, one two-hour laboratory.

ENGR 103 Creative Design**Qtr. Hrs. - 3**

PR: Approval of instructor. Role of the engineer as a creative design professional. Emphasis on understanding the creative process and factors that influence it. Attitudes and viewpoints of the designer and an investigation of the techniques of analysis, synthesis, and evaluation used. Two lectures, two hours recitation-laboratory.

ENGR 111 Engineering Concepts**Qtr. Hrs. - 4**

CR: MATH 221. Introduction to the basic physical phenomena essential to the understanding of engineering structures, machines, processes, and systems. Primary emphasis on mechanics, materials behavior, and thermofluid mechanics phenomena. Lecture, demonstration, and recitation.

ENGR 151, 152 Chemical Foundations of Engineering**Qtr. Hrs. - 3,3**

PR: Satisfactory performance in one year of high school chemistry or physics. CR: MATH 211. Engineering applications of basic chemical concepts. Atomic and molecular structure, states of matter and their energies, chemical equilibria and reaction rates, organic compounds, and industrial processes. Lecture, demonstration, recitation.

ENGR 201 Engineering Design Case Studies**Qtr. Hrs. - 1**

PR: Sophomore standing and ENGR 103. Discussion of the role of various engineering disciplines in the creative design process. Invited guest speakers will review pertinent case studies covering a broad spectrum of engineering problems.

ENGR 221 Electrical Science**Qtr. Hrs. - 4**

PR: MATH 223 and ENGR 111. Basic concepts of electricity and magnetism. The development of fundamental laws and their engineering applications. Lecture and participative demonstration.

ENGR 311 Engineering Analysis — Dynamics**Qtr. Hrs. - 4**

PR: ENGR 211 and MATH 223. Kinematics and kinetics of particles, moving coordinate systems, Dynamics of systems of particles and rigid bodies.

ENGR 312 Mechanics of Materials**Qtr. Hrs. - 5**

PR: ENGR 211; CR: MATH 331. Concepts of stress and strain, Hooke's Law; strength and deflection of axial force members, shafts in torsion and beams in flexure; combined stress; stability of columns. Lecture, demonstration and laboratory.

ENGR 321 Principles of Electrical Engineering Qtr. Hrs. - 4
PR: ENGR 221; CR: MATH 331. Introduction to fundamental laws of electrical circuits, network analysis, magnetic properties, electromagnetic interaction, magnetic and electric fields, and electrical and magnetic properties of solids. Lecture, demonstration, and laboratory.

ENGR 322 Electronic Engineering Qtr. Hrs. - 4
PR: ENGR 322. Electronic circuits. Lecture, demonstration, and laboratory.

ENGR 323 Electrical Networks Qtr. Hrs. - 4
PR: ENGR 321. Mathematical analysis of networks and linear systems. Lecture, demonstration, and laboratory.

ENGR 331 Thermodynamics Qtr. Hrs. - 3
PR: ENGR 152. CR: MATH 321. Introduction to the basic postulates of classical thermodynamics. Application of thermodynamic principles to the analysis of engineering systems. Introduction to the second law.

ENGR 332 Fluid Mechanics Qtr. Hrs. - 4
PR: ENGR 311 and ENGR 331. Basic principles of continuum fluid mechanics and transport concepts. Lecture, demonstration, and laboratory.

ENGR 341 Engineering Economic Analysis Qtr. Hrs. - 3
PR: ECON 201 or consent of instructor. Economic evaluation of engineering alternatives. Time value of money and economic impact of taxes, risk, depreciation.

ENGR 342 Introduction to Systems Analysis Qtr. Hrs. - 3
PR: MATH 321; CR: MATH 331. Introduction to the mathematical analysis of linear systems. The behavior of linear systems as manifested by their characteristic functions. Introduction to Laplace transform, matrices, and state variable techniques. System simulation by digital and analog computers.

ENGR 351 Structure and Properties of Material Qtr. Hrs. - 3
PR: ENGR 152 and MATH 222. Electrons and bonding, crystals, noncrystalline solids, equilibrium diagrams, nonequilibrium phase transformations, and diffusion in solids.

ENGR 352 Materials of Engineering Qtr. Hrs. - 3
PR: ENGR 351. Chemical, mechanical and electrical properties of materials; structure and properties of engineering alloys; lecture, demonstration, and laboratory.

ENGR 361 Man and His Environment Qtr. Hrs. - 3
PR: ENGR 152 or equivalent. Man's interaction with the air, water, and land environment in which he lives. The role of engineering in control of the physical environment for the benefit of mankind.

- ENGR 371 Probability and Statistics for Engineers** **Qtr. Hrs. - 3**
 PR: MATH 223. Axioms of probability; combinatorial and geometrical probability; probability distributions; measures of location and dispersion; sampling and sampling distributions; estimation and tests of hypotheses; engineering applications. (Same as STAT 335.)
- ENGR 431 Thermodynamics and Transport Processes** **Qtr. Hrs. - 3**
 PR: ENGR 331. CR: ENGR 332. Consequences of the second law and combined first and second law analysis of thermodynamic systems. Introduction to heat transfer including conduction, convection, and radiation.
- ENGR 441 Technical Communications** **Qtr. Hrs. - 3**
 PR: Junior standing. Composition for technical papers, reports and scientific articles suitable for publication. Oral and written presentation.
- ENGR 442 Operations Research** **Qtr. Hrs. - 3**
 PR: ENGR 371. Mathematical methods of operations research; linear programming, techniques of optimizations.
- ENGR 443 Engineering Administration** **Qtr. Hrs. - 3**
 PR: ENGR 341 and senior standing. Engineering organization and administration; delegation of authority and responsibility; effective utilization of resources; compensation structure, labor-management relations; selected case studies.

ENGINEERING — INTERDISCIPLINARY COURSES

- ENGR 481 Man and Machine** **Qtr. Hrs. - 3**
 The influence and interrelationship of invention and technical progress on the evolution of social forms and institutions.
- ENGR 482 Engineering & Technology in History** **Qtr. Hrs. - 3**
 Important developments in engineering and technology and their effect on society and our socio-economic processes and institutions.
- ENGR 483 Technology and Social Change** **Qtr. Hrs. - 3**
 Review of existing theories of social change, analysis of the role of technology as related to social change, and study of contemporary events in technology and their possible impact on society.
- ENGR 484 Science in History** **Qtr. Hrs. - 3**
 Examination of the reciprocal relations of science and society from ancient to recent times.
- ENGR 485 Topics in Urban Development** **Qtr. Hrs. - 3**
 Production, distribution, and consumption of various commodities and engineering relationships to distribution, internal structure, and function of urban developments. Interrelationship of engineering, social, economic, and cultural phenomena.

ENGR 486 Science, Engineering, and Ethical Systems **Qtr. Hrs. - 3**
A study of the contributions of science and engineering to society in light of moral, social, and ethical principles. A systematic and critical consideration of representative ethical problems created by advancing technology.

ENGR 487 Historical Architecture **Qtr. Hrs. - 3**
Architecture as the realization of changing aesthetic and cultural ideals and the expression of changing forms of society. Development of understanding of our physical environment through a study of the forms, functions and determinants of architecture.

ENGR 488 Man and Environment **Qtr. Hrs. - 3**
PR: Permission of instructor. A discussion of environmental factors of importance to man, man's interaction with the environment, engineering and non-engineering measures to insure improvement and maintenance of environmental quality. Not intended for engineering students.

ENGR 489 Computers, Cybernetics and Society **Qtr. Hrs. - 3**
The effects of computers and the cybernetic revolution on the individual and society. Effects of positive and negative feedback on biological, technological, and social systems. Computers and their interactions with human system.

ENGR 490 Engineering in Human Affairs **Qtr. Hrs. - 2**
The impact of engineering on modern society. This course, primarily intended for the senior student, is offered as one of the Advanced Environmental Studies Seminars. Not open to students majoring in the College of Engineering.

ENGR 491 Special Topics **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.

ENGR 492 Seminar **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.

ENGR 494 Independent Study **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.

ENGR 497 Research **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.

ENGINEERING MATHEMATICS AND COMPUTER SYSTEMS

EMCS 421 Linear Control Systems **Qtr. Hrs. - 3**
PR: MATH 331, ENGR 332. Theoretical and experimental study of the dynamics of linear, lumped parameter models of mechanical, electrical, fluid, thermal and mixed systems as applied to control systems. Laplace transforms, analog computers, root-locus method, frequency response methods and performance improvement are investigated.

EMCS 423 Mathematics Review for Engineers **Qtr. Hrs. - 3**
Comprehensive review of college algebra, trigonometry, analytical geometry, vector calculus, and an introduction to differential equations for non-current engineering students wishing to pursue advanced work.

EMCS 431, 432, 433 Numerical Methods in Scientific Computation **Qtr. Hrs. - 3,4,4**

PR: MATH 221. Methods for the operational solution of problems in engineering, science, and applied mathematics. Synthesis and design of computer processing algorithms, including error analysis, stability analysis, and run time prediction. Review of existing software systems for numerical application.

EMCS 434 Computing Methods in Automatic Control **Qtr. Hrs. - 3**
PR: EMCS 421. Design, analysis, and implementation of computer based control systems, including analog, digital, and on-line schemes for process identification and control.

EMCS 471, 572 Engineering Mathematical Analysis **Qtr. Hrs. - 3,3**
PR: MATH 321, MATH 331. The application of mathematical methods to engineering problems including vector and tensor fields, state space techniques, orthogonal curvilinear coordinates and orthogonal functions.

EMCS 530 Engineering Data Reduction **Qtr. Hrs. - 3**
PR: ENGR 371. Methods for processing and analysis of scientific test and process data, including computer filtering schemes and data compression and recovery techniques.

EMCS 532 Automata Theory **Qtr. Hrs. - 3**
PR: EECS 411 or equivalent. Structural theory and performance characteristics of finite-state machines.

EMCS 573 Analytical Methods in Engineering **Qtr. Hrs. - 3**
PR: ENGR 471 or consent of instructor. The kinematics and dynamics of ideal field theory problems and their mathematical expression. Formulation of boundary conditions. Basic concepts of complex potential and conformal mapping with application to problems in fluid flow, thermal, and electrical potential.

EMCS 574 Analytical Methods in Engineering **Qtr. Hrs. - 3**
PR: ENGR 471 or consent of instructor. Engineering applications of partial differential equations and the concept of the mathematical modeling of physical problems. Development of characteristic properties of equations and methods of solutions, including separation of variables, transform techniques, and method of characteristics.

EMCS 575 Numerical Analysis in Engineering **Qtr. Hrs.- 3**
PR: MATH 321, MATH 331. Application of numerical techniques to the solution of complex engineering problems. Analysis and organization of practical programs for numerical solution of initial, boundary and eigenvalue problems.

ENGINEERING MECHANICS & MATERIALS SCIENCES

EMMS 351 Structural Mechanics

Qtr. Hrs. - 4

PR: ENGR 312. Deflections of statically determinate structures by direct and energy methods. Introduction to matrix algebra. Influence coefficients and diagrams. Analysis of statically indeterminate structures by methods of consistent displacements, slope-deflection and moment distribution. Identical to CEES 351.

EMMS 355 Structural Steel Design

Qtr. Hrs. - 3

PR: ENGR 312. Design of steel structural members. Selected topics in beam design, column design, plastic design, connections and built-up members. Identical to CEES 355.

EMMS 357 Structural Concrete Design

Qtr. Hrs. - 3

PR: ENGR 312. Principles of designing reinforced concrete members. Selected topics in concrete mixes, beams, columns and ultimate analysis. Identical to CEES 357.

EMMS 411 Semiconductor Materials and Devices

Qtr. Hrs. - 3

PR: ENGR 323 and ENGR 351. Electrical conduction in semiconductors; basic concepts of drift, diffusion, carrier generation and recombination. Physical theory and models for the junction diode and transistor. Representation in terms of linear, incremental, and nonlinear charge control models.

EMMS 412 Electronic Properties of Materials

Qtr. Hrs. - 3

PR: ENGR 351. Electronic processes in solids. Electrical, magnetic and optical properties of solids. Electron energies in solids. Superconducting materials.

EMMS 413 Thermodynamic Properties of Materials

Qtr. Hrs. - 3

PR: ENGR 351. Fundamental concepts of thermodynamics and kinetics are applied to the study of solid state phase transformations, equilibrium in multicomponent systems and diffusion in solids.

EMMS 414 Mechanical Properties of Materials

Qtr. Hrs. - 3

PR: ENGR 351. Fundamentals of mechanical behavior of engineering materials. Selected topics include fracture, creep, fatigue, and microscopic interpretation of results of mechanical testings.

EMMS 421 Theory of Crystalline Solids

Qtr. Hrs. - 3

PR: ENGR 351. Modern theory of crystalline materials. Topics treated include crystal structure, mechanical, thermal and transport properties.

EMMS 430 Structure and Properties of Alloys

Qtr. Hrs. - 3

PR: ENGR 351. Application of kinetic factors and phase equilibria to the study of the structure and properties of ferrous and non-ferrous alloys; correlation of properties with structure, chemical composition, and environmental factors.

EMMS 433 Physical Metallurgy

Qtr. Hrs. - 3

PR: ENGR 351. Principles underlying the study of diffusion, recovery and recrystallization, and solidification processes in metal systems.

EMMS 435 Structure and Properties of Ceramics and Polymers Qtr. Hrs. - 3
PR: ENGR 351. Structure of vitreous and crystalline non-metals; mechanical, thermal, and electrical properties of ceramics; structure and properties of organic polymers and composite materials.

EMMS 441 Matrix Methods of Structural Analysis I Qtr. Hrs. - 4
PR: EMMS 351 or permission of the instructor. Structural analysis of beams, frames, and plates by matrix methods. Identical to CEES 441.

EMMS 442 Matrix Methods of Structural Analysis II Qtr. Hrs. - 4
PR: EMMS 441. Extension of EMMS 441 to include selected topics in stability, vibration, and limit analysis of beams, frames and plates. Identical to CEES 442.

EMMS 491 Special Topics Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

EMMS 492 Seminar Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

EMMS 494 Independent Study Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

EMMS 497 Research Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

EMMS 501 Electron Microscopy of Crystalline Materials Qtr. Hrs. - 3
PR: ENGR 351, or permission of instructor. Introduction to the optics of the electron microscope, electron and electron diffraction contrast mechanisms in foils containing lattice defects and second phases, evaluation of methods of specimen preparation including thin foils and replicas; emphasis on the interpretation of images and diffraction effects.

EMMS 511 Phase Transformation in Solids Qtr. Hrs. - 3
PR: ENGR 351 or permission of instructor. Principles of phase transformations, including precipitation, recrystallization, eutectoids, and martensite; emphasis on the understanding of the thermodynamic and kinetic processes underlying these phenomena.

EMMS 541 Intermediate Mechanics of Materials Qtr. Hrs. - 4
PR: ENGR 312 and MATH 331. Stress and strain at a point; failure theories; elements of plane elasticity; curved beams; bending and torsion of thin-walled structures; theory of thin plates.

EMMS 600 Physical Metallurgy Qtr. Hrs. - 3
PR: EMMS 433 or consent of instructor. Theoretical examination of the basic metallurgical processes; diffusion, nucleation and growth, recovery and recrystallization; phase transformation; survey of recent advances in the field.

EMMS 610 Mechanical Metallurgy Qtr. Hrs. - 3
PR: EMMS 414. Theoretical treatment of solid solution hardening, strain hardening, and precipitation hardening; survey of recent advances in the field.

EMMS 621 Advanced Dynamics**Qtr. Hrs. - 3**

PR: EMCS 471 or equivalent. The study of the dynamics of particles and rigid bodies from an advanced viewpoint. Virtual work principle, Lagranges and Eulers equations of motion and Hamiltons principle applied to engineering problems.

EMMS 643 Mechanics of Continuous Media**Qtr. Hrs. - 3**

PR: EMMS 341 or permission of the instructor. Vectors and cartesian tensors. Stress in a continuous medium. Deformation and flow. Material properties. Behavior of elastic solidis; behavior of fluids.

ENGLISH**ENG 101 Composition I****Qtr. Hrs. - 3**

Expository writing, with emphasis on effective communication. Grammar and mechanics will not form a major part of this course; if the student is deficient, he will achieve proficiency through independent study. Writing topics to be based on selected readings.

ENG 102 Composition II**Qtr. Hrs. - 3**

PR: ENG 101 or equivalent. Writing practice involving the mechanics of research and evaluation of varied readings. A documented paper will demonstrate the student's grasp of writing principles studied.

ENG 103 Current Literature**Qtr. Hrs. - 3**

PR: ENG 101 or equivalent. Writing practice based on readings in contemporary prose and poetry selected to invite the interest of students in literature.

Note on Freshman English Program:

ENG 101, 102 and 103 may be taken to satisfy the State Department requirement for certification in secondary school teaching or for transfer to colleges that require one full year of Freshman English. Students who intend to major in English, English Education, or Library Science must take ENG 102 and 103, and must complete ENG 210 before enrolling in any English courses numbered above 210 with the exception of ENG 301.

ENG 208 Principles of Creative Writing**Qtr. Hrs. - 3**

For freshman and sophomore students. An exploratory course in the several types of creative writing; group analysis of original writing; critical reading of established authors. May be repeated once for credit.

ENG 210 Principles of Literature**Qtr. Hrs. - 3**

Literary terms, forms, and types, illustrated in a wide variety of readings.

ENG 211 Survey of English Literature to 1625**Qtr. Hrs. - 3**

- ENG 212 Survey of English Literature, 1626-1798 Qtr. Hrs. - 3
- ENG 213 Survey of English Literature, 1798-1914 Qtr. Hrs. - 3
- ENG 300 Expository Writing Qtr. Hrs. - 3
Training in advanced composition, primarily intended for students in the College of Education. Theory and practice of the several forms and applications of expository writing.
- ENG 301 Professional Report Writing I Qtr. Hrs. - 3
Emphasis on clear expository writing of memoranda, reports and articles in the student's particular field.
- ENG 302 Creative Writing Workshop I Qtr. Hrs. - 3
PR: Permission of instructor. Practice in writing in established forms: essay, short story, and poetry.
- ENG 303 Creative Writing Workshop II Qtr. Hrs. - 3
PR: ENG 302 or permission of instructor. Individualized practice in writing in one of the established forms; analytic study of the work of pertinent authors.
- ENG 304 Creative Writing Workshop III Qtr. Hrs. - 3
PR: ENG 302 or permission of instructor. Individualized practice in writing in one of the established forms; students who have completed ENG 303 will be expected to do intensive work in a different form from that practiced in the course; analytic study of the work of pertinent authors.
- ENG 305 English Versification Qtr. Hrs. - 3
Intensive study of the structural characteristics of English poetry, metrical systems, rhyme, scansion, and poetic rhetorical devices.
- ENG 310 Professional Report Writing II Qtr. Hrs. - 3
Instruction and practice in scientific writing including preparation of scientific reports in the student's particular field.
- ENG 311 Survey of American Literature, 1588-1865 Qtr. Hrs. - 3
- ENG 312 Survey of American Literature, 1865-1914 Qtr. Hrs. - 3
- ENG 313 Survey of American Literature Since 1914 Qtr. Hrs. - 3
- ENG 314 Survey of British Literature Since 1914 Qtr. Hrs. - 3
- ENG 316 Continental European Fiction Since 1900 Qtr. Hrs. - 3
A selection of significant works of fiction written in various languages during the present century, read in translation.

- ENG 321 Exploring Poetry** Qtr. Hrs. - 3
A broad, cultural approach to poetry, with emphasis upon the major themes and preoccupations of poets of all ages.
- ENG 361 Practical Criticism** Qtr. Hrs. - 3
Student evaluation of selected fiction, poetry, and drama through practical exercises in literary criticism.
- ENG 371 Principles of Linguistics** Qtr. Hrs. - 3
An overview of the modern linguist's approach to language. The nature of communication systems. Structure and function of the organs of articulation; language acquisition. Theory and analytic methods of phonology, morphology, syntax. Brief systematic survey of Idiolectology, Dialectology, Linguistic Prehistory.
- ENG 401, 402, 403 Senior Writing Workshop I (Non-fiction)** Qtr. Hrs. - 3,3,3
PR: Evidence of writing skill satisfactory to the instructor. Analysis of significant non-fiction; market research; intensive writing practice leading to a completed body of non-fiction writing suitable for publication.
- ENG 404, 405, 406 Senior Writing Workshop II (Fiction)** Qtr. Hrs. - 3,3,3
PR: Evidence of writing skill satisfactory to the instructor. Analysis of significant fiction; market research; intensive writing practice leading to a completed body of fiction writing suitable for publication.
- ENG 407, 408, 409 Senior Writing Workshop III (Verse)** Qtr. Hrs. - 3,3,3
PR: Evidence of writing skill satisfactory to the instructor. Analysis of significant poetry; market analysis; intensive writing practice leading to a completed body of verse suitable for publication.
- ENG 410 Contributions of Minority Groups to American Literature** Qtr. Hrs. - 3
Contributions of linguistic and ethnic groups of non-English origin to the literature of the United States.
- ENG 421 English Renaissance Literature I** Qtr. Hrs. - 3
Elizabethan poetry and prose, 1558 — 1603.
- ENG 422 English Renaissance Literature II** Qtr. Hrs. - 3
Jacobean and Caroline Poetry and prose, 1603 — 1642.
- ENG 423 English Renaissance Literature III** Qtr. Hrs. - 3
Commonwealth poetry and prose, 1642 — 1660, including Milton.
- ENG 424 Studies in Restoration English Literature** Qtr. Hrs. - 3
Literature of the Restoration.
- ENG 425 English Literature, 1700 — 1745** Qtr. Hrs. - 3
Prose and poetry of the first half of the 18th Century.
- ENG 426 English Literature, 1745 — 1798** Qtr. Hrs. - 3
Prose and poetry of the last half of the 18th Century.

ENG 427 Studies in 19th Century English Literature I	Qtr. Hrs. - 3
English literature from 1798-1832: the Romantic Triumph in poetry and prose.	
ENG 428 Studies in 19th Century English Literature II	Qtr. Hrs. - 3
English literature from 1832 to 1870: the early Victorians.	
ENG 429 Studies in 19th Century English Literature III	Qtr. Hrs. - 3
English literature from 1870 to 1914: later Victorians and transitional writers.	
ENG 430 Chaucer	Qtr. Hrs. - 3
<i>The Canterbury Tales, Troilus and Criseyde</i> , and other works.	
ENG 431 Shakespeare's Comedies	Qtr. Hrs. - 3
ENG 432 Shakespeare's Histories	Qtr. Hrs. - 3
ENG 433 Shakespeare's Tragedies	Qtr. Hrs. - 3
ENG 434 Milton	Qtr. Hrs. - 3
<i>Paradise Lost, Paradise Regained, Samson Agonistes</i> , shorter poems, and selected prose.	
ENG 441 English Drama to 1642 (exclusive of Shakespeare)	Qtr. Hrs. - 3
ENG 442 Restoration and 18th Century English Drama	Qtr. Hrs. - 3
ENG 444 The British Novel in the 18th Century	Qtr. Hrs. - 3
ENG 445 The British Novel in the 19th Century	Qtr. Hrs. - 3
ENG 446 The American Novel in the 19th Century	Qtr. Hrs. - 3
ENG 451 British and American Fiction Since 1900	Qtr. Hrs. - 3
ENG 452 British and American Poetry Since 1900	Qtr. Hrs. - 3
ENG 453 British and American Drama Since 1900	Qtr. Hrs. - 3
ENG 460 Historical Survey of Literary Criticism	Qtr. Hrs. - 3
Study of the major critics from classical antiquity through the modern era.	
ENG 461 British Literary Criticism to 1900	Qtr. Hrs. - 3
PR: ENG 460. Study of the major critics in England from the Renaissance through the Victorian period.	

- ENG 462 British Literary Criticism Since 1900** **Qtr. Hrs. - 3**
 PR: ENG 460. Study of the important critical theories and principles developed in England from the Edwardian era to the present.
- ENG 463 Literary Criticism in the United States** **Qtr. Hrs. - 3**
 PR: ENG 460. Study of American literary critics to the present.
- ENG 471 Modern English Grammar** **Qtr. Hrs. - 3**
 PR: ENG 371. Methods in the study of modern English grammar. Emphasis upon the analysis and comparison of traditional, structural, and transformational grammars.
- ENG 472 History of the English Language** **Qtr. Hrs. - 3**
 PR: ENG 371. Study of the English language and its development from Anglo-Saxon to Modern English. Attention given to Old, Middle, and Early Modern English grammar and syntax.
- ENG 473 English Linguistics** **Qtr. Hrs. - 3**
 PR: ENG 371. The application of modern linguistic methods to the phonology, morphology, and syntax of present-day English.
- ENG 491 Special Topics** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- ENG 492 Seminar** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- ENG 494 Independent Study** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- ENG 497 Research** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- ENG 520 Studies in Contemporary Fiction** **Qtr. Hrs. - 4**
 Fiction of the last 20 years in the United States and Britain.

ENVIRONMENTAL STUDIES PHYSICAL EDUCATION

The Environmental Studies Physical Education Elective Program is designed to enhance the physical and mental development of the student. A student may receive three quarter hours credit toward graduation by enrolling and satisfactorily completing any one of the following courses:

- ESPE 301 Aquatics** **Qtr. Hrs. - 3**
 A study and application of the physiological benefits of basic aquatic developmental skills — elementary and advanced strokes, water safety, springboard diving, and interval training. (2 hours lecture; 2 hours activity)

- ESPE 302 Body Development (M)** Qtr. Hrs. - 3
ESPE 303 Body Development (W) Qtr. Hrs. - 3
 A study and application of the metabolic, neuromuscular, and cardiovascular changes resulting from select physical activities. (2 hours lecture; 2 hours activity)
- ESPE 304 Golf** Qtr. Hrs. - 3
 A study of performance and application in basic and advanced skills, rules, and etiquette. Physiological and social values accruing from this carry-over activity. (2 hours lecture; 2 hours activity)
- ESPE 305 Tennis** Qtr. Hrs. - 3
 A study of performance and application in basic and advanced skills, rules, and etiquette. Physiological and social values accruing from this carry-over activity. (2 hours lecture; 2 hours activity)
- ESPE 306 Life Saving** Qtr. Hrs. - 3
 Instruction, training and certification in basic life saving swimming skills. (2 hours lecture; 2 hours activity)
- ESPE 307 Scuba Diving** Qtr. Hrs. - 3
 Instruction, training and certification in basic diving skills with self-contained underwater breathing apparatus. Students may be required to supply their own equipment. (2 hours lecture; 2 hours activity)
- ESPE 308 Interpretive Dance** Qtr. Hrs. - 3
 Instruction and analysis of creative dance performance as an art form. (2 hours lecture; 2 hours activity)

FINANCE

- FIN 301 Finance** Qtr. Hrs. - 5
 PR: ACCY 112 or ACCY 307, ECON 202 203. Fundamentals of obtaining and administering funds to meet short-term and long-term capital requirements.
- FIN 311 Risk and Insurance** Qtr. Hrs. - 4
 PR: Junior Standing or consent of instructor. Principles and methods of risk reduction and specialization, with particular emphasis on insurance.
- FIN 321 Investments** Qtr. Hrs. - 4
 PR: FIN 301 or consent of instructor. Principles and methods of risk reduction and specialization, with particular emphasis on insurance.
- FIN 331 Money and Banking** Qtr. Hrs. - 4
 PR: ECON 203 or consent of instructor. The nature of money, the functioning of the commercial banking system and its relation to the level of economic activity, and the activities of the Federal Reserve System and Treasury.

- FIN 341 Real Estate** **Qtr. Hrs. - 4**
 PR: Junior standing. Basic principles of real estate ownership, its use and transfer, brokerage, management, legislation, and importance to the economy.
- FIN 411 Financial Institutions** **Qtr. Hrs. - 4**
 PR: FIN 301. The operation of financial institutions and an analysis of their role in the economy.
- FIN 421 Security Analysis** **Qtr. Hrs. - 4**
 PR: FIN 301 and FIN 321. The problems of selecting securities for various investment purposes.
- FIN 431 Financial Management** **Qtr. Hrs. - 4**
 PR: FIN 301. Analytical techniques for dealing with financial problems and their application to corporate financial management.
- FIN 499 Undergraduate Research** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- FIN 601 Capital Budgeting and Financial Planning** **Qtr. Hrs. - 3**
 PR: Graduate standing. Financial planning and forecasting, sources of long-term capital, concepts of the cost of capital, and capital budgeting.
- FIN 611 Working Capital and Financial Problems** **Qtr. Hrs. - 3**
 PR: Graduate standing. Managing cash, receivables and inventories; sources of short-term funds; and special problems such as expansion, contraction, merger and failure.
- FIN 621 Financial Policy** **Qtr. Hrs. - 3**
 PR: FIN 601 and FIN 611. Formulation of financial policy in profit-making organizations. Evaluation of objectives, analysis of alternatives, and selection of criteria for decision-making.
- FIN 631 Analysis of Investment Opportunities** **Qtr. Hrs. - 3**
 PR: Graduate Standing. Gives the student a basis for critically evaluating practices of professional investors and introduces him to analytical methods for selecting and timing securities purchases and sales.

FOREIGN LANGUAGES

- FL 323 Comparative World Literature I** **Qtr. Hrs. - 4**
 Masterworks of world literature in translation from the Book of Job to Cervantes. Authors represented include Homer, Sophocles, Cicero, Virgil, St. Augustine, Dante, Chaucer, Montaigne, and Shakespeare. (Same as HUM 323.)

- FL 324 Comparative World Literature II** Qtr. Hrs. - 4
Continuation of FL 323, from the Renaissance to the 20th Century, including works by Pascal, Milton, Rousseau, Goethe, Wordsworth, Poe, Balzac, Chekov, Baudelaire, Yeats, Mann, and Camus. Need not be taken in sequence with FL 323. (Same as HUM 324.)

FRENCH

- FRE 101 Elementary French Language and Civilization** Qtr. Hrs. - 3
Designed to initiate the student to the major language skills; listening, speaking, reading, and writing, in addition to an introduction to French culture.
- FRE 102 Elementary French Language and Civilization** Qtr. Hrs. - 3
PR: FRE 101 or equivalent. Continuation of FRE 101.
- FRE 103 Elementary French Language and Civilization** Qtr. Hrs. - 3
PR: FRE 102 or equivalent. Continuation of FRE 102.
- FRE 201 Intermediate French Language and Civilization** Qtr. Hrs. - 3
PR: FRE 103 or equivalent. Designed to continue development of language skills at the intermediate level, together with a review of grammar, study of syntax, idiomatic expressions, extensive readings and further study of French culture.
- FRE 202 Intermediate French Language and Civilization** Qtr. Hrs. - 3
PR: FRE 201 or equivalent. Continuation to FRE 201.
- FRE 203 Intermediate French Language and Civilization** Qtr. Hrs. - 3
PR: FRE 202 or equivalent. Continuation of FRE 202 with greater emphasis on French civilization from the Middle Ages to the present.
- FRE 301 French Composition** Qtr. Hrs. - 4
PR: FRE 203 or equivalent. Development of skills in composition through systematic review of grammar, syntax, and development of style. Free and controlled written compositions required.
- FRE 303 French Conversation** Qtr. Hrs. - 4
PR: FRE 203 or equivalent. Development of skills in conversation and comprehension through practice and systematic review of phonology and grammatical structure.
- FRE 311 Survey of French Literature** Qtr. Hrs. - 3
PR: FRE 203 or equivalent. Main literary currents and works from the Middle Ages through the Renaissance.
- FRE 312 Survey of French Literature** Qtr. Hrs. - 3
PR: FRE 203 or equivalent. Main literary currents and works of the seventeenth and eighteenth centuries.

- FRE 313 Survey of French Literature** Qtr. Hrs. - 3
 PR: FRE 203 or equivalent. Main literary currents and works of the nineteenth and twentieth centuries.
- FRE 401 French Phonetics and Diction** Qtr. Hrs. - 2
 PR: FRE 303 or equivalent. French phonology with emphasis on phonic groupings.
- FRE 422 Seventeenth Century French Theater** Qtr. Hrs. - 3
 PR: FRE 312. Corneille, Racine, and Moliere. A study of the life and principal works of the authors.
- FRE 425 Seventeenth Century French Literature** Qtr. Hrs. - 3
 PR: FRE 312. Philosophers and Novelists of the Seventeenth Century and their writings.
- FRE 431 French Literature of the Eighteenth Century** Qtr. Hrs. - 3
 PR: FRE 312. The philosophical movement: Montesquieu, Vauvenargues, Voltaire, Diderot, Buffon.
- FRE 441 Nineteenth Century French Literature** Qtr. Hrs. - 3
 PR: FRE 313. Romanticism.
- FRE 442 Nineteenth Century French Literature** Qtr. Hrs. - 3
 PR: FRE 313. Realism and naturalism.
- FRE 443 Nineteenth Century French Literature** Qtr. Hrs. - 3
 PR: FRE 313. Parnassianism and symbolism.
- FRE 451 Twentieth Century French Literature** Qtr. Hrs. - 3
 Contemporary French drama and poetry.
- FRE 453 Twentieth Century French Literature** Qtr. Hrs. - 3
 PR: FRE 313. Contemporary French novel.
- FRE 481 Stylistics** Qtr. Hrs. - 3
 PR: FRE 301 or equivalent. An intense study of textual criticism. An examination of the relationship between language and literature; explications and linguistic analysis of literary texts.
- FRE 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of Instructor. May be repeated for credit.
- FRE 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- FRE 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.

GEOLOGY

GEOL 100 Introductory Geology

Qtr. Hrs. - 3

CR: GEOL 110. A survey of physical and historical geology with an introduction to basic scientific principles and methods. Designed for nonscience majors; appropriate for the Environmental Studies Program.

GEOL 101 Physical Geology

Qtr. Hrs. - 3

PR: Any one of the following: GEOL 100, ENGR 151, CHEM 161, or PHYS 208. CR: GEOL 111. The earth's inorganic materials and the processes by which they interact: crystals, minerals, rocks, volcanism, earthquake activity, erosion, sedimentation, glaciation, mountain-building, drifting of continents, movements of the sea-floor, origin of landforms. Lunar geology is also considered.

GEOL 102 Historical Geology

Qtr. Hrs. - 3

PR: GEOL 100 or GEOL 101. CR: GEOL 112. Evolution of the earth and of life on the earth as reconstructed from geologic evidence and fossil remains. Emphasis on North America, but other continents considered.

GEOL 110 Introductory Geology Laboratory

Qtr. Hrs. - 1

CR: GEOL 100 or GEOL 101. Provides first-hand experience with mineral crystals, rocks, fossils, with the processes of rock formation, and with geologic maps.

GEOL 111 Physical Geology Laboratory

Qtr. Hrs. - 1

CR: GEOL 101. Provides additional experience with physical materials and processes of geology and with the use of maps and stereo photographs for earth crust studies.

GEOL 112 Historical Geology Laboratory

Qtr. Hrs. - 1

CR: GEOL 102. Provides further experience with fossils and geologic evidence and exercises in reconstructing earth history.

GERMAN

GER 101 Elementary German Language and Civilization

Qtr. Hrs. - 3

Designed to initiate the student to the major language skills; listening, speaking, reading, and writing, in addition to an introduction to German culture.

GER 102 Elementary German Language and Civilization

Qtr. Hrs. - 3

PR: GER 101 or equivalent. Continuation of GER 101.

GER 103 Elementary German Language and Civilization

Qtr. Hrs. - 3

PR: GER 102 or equivalent. Continuation of GER 102.

- GER 201 Intermediate German Language and Civilization** Qtr. Hrs. - 3
 PR: GER 103 or equivalent. Designed to continue development of language skills at the intermediate level, together with a review of grammar, study of syntax, idiomatic expressions, extensive reading, and further study of German culture.
- GER 202 Intermediate German Language and Civilization** Qtr. Hrs. - 3
 PR: GER 201 or equivalent. Continuation of GER 201.
- GER 203 Intermediate German Language and Civilization** Qtr. Hrs. - 3
 PR: GER 202 or equivalent. Continuation of GER 202 with greater emphasis on German civilization from the Middle Ages to the present.
- GER 301 German Composition** Qtr. Hrs. - 4
 PR: GER 203 or equivalent. Development of skills in composition through systematic review of grammar, syntax, and development of style. Free and controlled compositions required.
- GER 303 German Conversation** Qtr. Hrs. - 4
 PR: GER 203 or equivalent. Development of skills in conversation and comprehension through practice and systematic review of phonology and grammatical structure.
- GER 321 Short Story** Qtr. Hrs. - 3
 PR: GER 203 or equivalent. German short prose works of the XIXth and XXth centuries.

HISTORY

- HIST 201 Western Culture and Civilization I** Qtr. Hrs. - 4
 Rise of culture and civilization in the West from earliest times to the eve of the Renaissance.
- HIST 202 Western Culture and Civilization II** Qtr. Hrs. - 4
 Continuation of HIST 201. Europe from its feudal-manorial state through the Napoleonic era.
- HIST 203 Western Culture and Civilization III** Qtr. Hrs. - 4
 Continuation of HIST 202. The Romantic era, the influence of liberalism, nationalism, and modern industrialism upon political, social, economic, and intellectual life.
- HIST 311 American History I** Qtr. Hrs. - 4
 An introduction to the culturally interrelated problems of American values and institutions; past and present. Historical basis of evolving institutions of the United States is demonstrated in economic life, government education, family life, and religion.

- HIST 312 American History II** Qtr. Hrs. - 4
Continuation of HIST 311. A topical study of America's evolving political institutions in response to population growth, national wealth, and changing needs in an age of science and technology; the urban-suburban revolution, social stratification, the family, and educational and religious institutions and values.
- HIST 313 American History III** Qtr. Hrs. - 4
Continuation of HIST 312. The public and private sectors of the American mixed economy; U. S. involvement in world affairs, economically, politically, and militarily.
- HIST 320 The Changing Frontier in American History** Qtr. Hrs. - 4
A survey of the types and geographic settings of the frontiers. Attention given to the impact of the frontier on American History.
- HIST 324 Black American History** Qtr. Hrs. - 4
The history of the Negro in Africa and in the United States. Emphasis is placed on the effects of an African heritage, slavery, and post-Civil War conditions on Black Americans. In addition, contemporary issues relating to Black Americans are analyzed.
- HIST 330 Latin American History: The Colonial Period** Qtr. Hrs. - 4
A survey course in Latin American history to the beginning of the Wars of Independence in 1810.
- HIST 331 Latin American History: The 19th Century** Qtr. Hrs. - 4
Continuation of HIST 330.
- HIST 332 Latin American History: The 20th Century** Qtr. Hrs. - 4
Continuation of HIST 331.
- HIST 412 United States History: 1492-1789** Qtr. Hrs. - 4
History of the British Colonies from their founding to the organization of U. S. Constitutional Government.
- HIST 413 United States History: 1789-1824** Qtr. Hrs. - 4
The writing of the Constitution, the Federalist decade, Jeffersonian Democracy, the War of 1812, and emergence of New Nationalism.
- HIST 414 United States History: 1820-1860** Qtr. Hrs. - 4
Administration of Andrew Jackson to the Civil War.
- HIST 415 United States History: 1860-1876** Qtr. Hrs. - 4
Civil War, Reconstruction, and impact of industrialism.
- HIST 416 United States History: 1876-1918** Qtr. Hrs. - 4
The Agrarian Revolt, the Spanish-American War, and the Progressive Era.
- HIST 417 United States History: 1914-1940** Qtr. Hrs. - 4
The Progressive Reforms of Woodrow Wilson, World War I, post-war prosperity, the Depression, and the New Deal.

- HIST 418 United States History: 1941-present** **Qtr. Hrs. - 4**
 Contemporary America from World War II.
- HIST 420 United States Diplomatic History: 1776-1917** **Qtr. Hrs. - 4**
 The evolution of American foreign policy with stress upon the international background and the constitutional and political problems in planning policy.
- HIST 421 United States Diplomatic History: 1917 to Present** **Qtr. Hrs. - 4**
 Continuation of HIST 420.
- HIST 430 Latin American History: The ABC Countries** **Qtr. Hrs. - 5**
 A survey of the histories of Argentina, Brazil, and Chile from the colonial period to the present.
- HIST 452 The Middle Ages and The Renaissance** **Qtr. Hrs. - 5**
 PR: HIST 201. The ideas and institutions of Medieval Europe; the great cultural and intellectual achievements of the 15th and 16th Centuries in Italy and Northern Europe; the rise of the territorial states; and the effects of nationalism on the political and social structure of Europe.
- HIST 455 The Age of the Reformation and the Enlightenment** **Qtr. Hrs. - 5**
 PR: HIST 202. Europe from the 16th Century to the 18th Century.
- HIST 457 Modern Europe: 1789-1918** **Qtr. Hrs. - 5**
- HIST 459 Modern Europe: 1918 to the Present** **Qtr. Hrs. - 5**
- HIST 461 English History to 1485** **Qtr. Hrs. - 4**
- HIST 462 English History: 1485-1815** **Qtr. Hrs. - 4**
- HIST 463 British History: 1815 to Present** **Qtr. Hrs. - 4**
- HIST 464 British Empire and Commonwealth** **Qtr. Hrs. - 4**
 Development of the British Empire and Commonwealth since the American Revolution.
- HIST 466 British History: Tudor-Stuart Period** **Qtr. Hrs. - 4**
 A study of the Tudor-Stuart period, with particular emphasis on the civil/religious conflicts of the time.
- HIST 470 History of Russia to 1856** **Qtr. Hrs. - 4**
- HIST 471 History of Russia: 1856-1917** **Qtr. Hrs. - 4**
- HIST 472 History of the Soviet Union: 1917 to the Present** **Qtr. Hrs. - 4**

- HIST 480 History and Historians** Qtr. Hrs. - 4
 PR: Permission of instructor. A general study of historiography, tracing the thoughts and works of the great historians. Attention is also given to the trends and interpretations of history in the areas of student specialization.
- HIST 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- HIST 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- HIST 497 Research** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.

HUMANITIES

- HUM 201 Western Humanities Survey** Qtr. Hrs. - 4
 A series of lectures on each of the major cultural epochs, designed to give the student a historical perspective and to equip him to select periods for intensive study from the Mind-and-Art Series.
- HUM 300 The Hebrew and Christian Heritage** Qtr. Hrs. - 4
 The religious, literary, and artistic influences of early Judaism and Christianity on Western Culture; their basis in the social and political context of the Fertile Crescent. (Same as REL 300.)
- HUM 301 The Mind and Art of Greece** Qtr. Hrs. - 4
 The principal monuments in philosophy, architecture, drama, poetry, and sculpture from the Minoan-Mycenaean to the Hellenistic Age.
- HUM 304 The Mind and Art of Rome** Qtr. Hrs. - 4
 Contributions to law, literature, architecture, and the ordering of culture, from the Etruscan period to the Age of Constantine.
- HUM 305 Mind and Art of the Middle Ages** Qtr. Hrs. - 4
 The merging of Classical, Christian, and Germanic influences during the age of faith, from St. Augustine to Dante; their expression in stone, in music, in poetry, in painting, and in philosophy.
- HUM 306 Mind and Art of the Renaissance** Qtr. Hrs. - 4
 The rebirth of humanistic art and free inquiry, particularly in Italy, from Giotto to Titian, with emphasis on the Neo-Platonic Academy, polyphonic music, and visual realism.

- HUM 307 Reformation and Early Baroque Era** Qtr. Hrs. - 4
 The growth of humanism and Protestantism in the North, Mannerism and Counter Reformation in the South; the age of Shakespeare, Cervantes, El Greco, and Bernini in the arts.
- HUM 308 Enlightenment and Late Baroque** Qtr. Hrs. - 4
 Literary and philosophical landmarks in the age of rational confidence and Newtonian astronomy; the music of Bach and Handel; the rise of a bourgeois and Rococo style in art.
- HUM 309 Revolution and Romanticism** Qtr. Hrs. - 4
 The intellectual and artistic tension between freedom and order, between pastoral and urban, between humanitarian reform and the appeal of the past, from Rousseau to Darwin; the great era of music from Haydn to Wagner.
- HUM 310 Mind and Art of the Recent Past** Qtr. Hrs. - 4
 The influence of evolution, science, and utilitarian thought on various literary, artistic, and musical styles from the mid-19th Century to World War I.
- HUM 311 Egypt and the Near East** Qtr. Hrs. - 4
 The life and thought of ancient civilizations as revealed through art and archaeology.
- HUM 315 China and Japan** Qtr. Hrs. - 4
 A study of the highest achievements in art, literature, and thought; an examination of the philosophical, spiritualistic, and rationalistic foundations of Confucianism, Taoism, Zen, and Shintoism. (Same as REL 315.)
- HUM 317 India** Qtr. Hrs. - 4
 The cultural traditions and the principal monuments in art and literature; a study of Hindu and Buddhist religious thought as it developed in India and Southeast Asia. (Same as REL 317.)
- HUM 318 Islamic Cultures** Qtr. Hrs. - 4
 An inquiry into the foundations and development of Islamic thought and culture in various geographical locations. (Same as REL 318.)
- HUM 321 Art and Thought of Eastern Europe** Qtr. Hrs. - 4
 Literature, philosophy, music, and art from the 19th and 20th centuries, including works by Dostoevsky, Babel, Kazantzakis, Moussorgski, Bartok, Brancusi, Kandinsky, and Chagall.
- HUM 323 Comparative World Literature I** Qtr. Hrs. - 4
 Masterworks of world literature in translation, from the Book of Job to Cervantes. Authors represented include Homer, Sophocles, Cicero, Virgil, St. Augustine, Dante, Chaucer, Montaigne, and Shakespeare. (Same as FL 323.)

- HUM 324 Comparative World Literature II** Qtr. Hrs. - 4
Continuation of HUM 323, from the Renaissance to the 20th Century, including works by Pascal, Milton, Rousseau, Goethe, Wordsworth, Poe, Balzac, Chekov, Baudelaire, Yeats, Mann, and Camus. Need not be taken in sequence with HUM 323. (Same as FL 324.)
- HUM 335 Afro-American Culture** Qtr. Hrs. - 4
The artistic influence of the Negro in America.
- HUM 351 Latin-American Cultures** Qtr. Hrs. - 4
The art and archaeological remains of Inca, Mayan, and Aztec civilizations; their influences on Latin-American music, art and literature.
- HUM 355 American Ideas I** Qtr. Hrs. - 4
A history of ideas course using the American Studies approach and emphasizing the significance of Puritanism, capitalism, nationalism, and the idea of progress in the development of American ideals.
- HUM 356 American Ideas II** Qtr. Hrs. - 4
Continuation of HUM 355 with emphasis on the effect of industrialism, pragmatism, individualism, and the cycles of reform and reaction.
- HUM 371 Contemporary Culture I** Qtr. Hrs. - 4
An integrated view of the fine arts and literature of our time; revealing the impact of depersonalization, alienation, revolt, and the search for self-awareness.
- HUM 372 Contemporary Culture II** Qtr. Hrs. - 4
The popular arts of our time--jazz, photography, science fiction, television, and film--as they reflect the influences of technology, relativism, protest, and innovation.
- HUM 413 The Romantic Mood** Qtr. Hrs. - 4
A comparative study of selected romantic art works in various periods and places, including modern America.
- HUM 415 Cultural Influences, East and West** Qtr. Hrs. - 4
A comparative study of Eastern and Western cultures, emphasizing their approaches to human problems. Primary works in art, philosophy, and literature may be considered.
- HUM 421 Purposes of Art** Qtr. Hrs. - 4
An introduction to the history and appreciation of the visual arts through an understanding of the various purposes art has fulfilled in man's effort to master and enjoy his environment. For visual arts education majors as well as for humanities majors.
- HUM 425 Religious Symbolism in the Visual Arts** Qtr. Hrs. - 3
A study of the origin, migration, and transmutation of religious signs, symbols and images in the history of art. (Same as ART 425.)

- HUM 441 Purposes of Music** **Qtr. Hrs. - 4**
 Religious and social functions of music and its relationships with other arts.
- HUM 451 The Epic** **Qtr. Hrs. - 4**
 The epic hero as a model of human ideals in various cultural settings.
- HUM 455 The Tragic View** **Qtr. Hrs. - 4**
 A study of tragedy as an archetype of human experience and a view of life; examples from the literature of Greece, Rome, France, England and America.
- HUM 459 The Comic View** **Qtr. Hrs. - 4**
 A definition of the comic and satiric views of life and a study of examples in literature from Aristophanes to Ionesco.
- HUM 461 The Secular View** **Qtr. Hrs. - 4**
 An examination of the philosophical foundations of secularism and of literary and political humanism, based on the work of Erasmus, Montaigne, Voltaire, Hobbes, Locke and Rousseau.
- HUM 471 Mythic Literature** **Qtr. Hrs. - 4**
 A comparative study of the significance of myth in the evolution of folk traditions: Oriental, Near Eastern, Greek, Scandinavian, American.
- HUM 473 Confession Literature** **Qtr. Hrs. - 4**
 A comparative study of works offering insight into the minds and personal lives of influential thinkers from St. Augustine to the present.
- HUM 475 Wisdom Literature** **Qtr. Hrs. - 4**
 An examination of several texts of aphorisms, parables, and tales, ranging from the Book of Proverbs to Kafka, from the later Chan Masters to the French Moralistes, in an attempt to unravel the common thread of human speculation on human affairs.
- HUM 491 Special Topics** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- HUM 494 Independent Study** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.

HUMANITIES AND FINE ARTS

- HFA 490 Senior Seminar: Humanities and Arts in Human Affairs** **Qtr. Hrs. - 2**
 A forum on the art and thought of the contemporary world as they provide insight into the recurring problems of human existence and as they relate to the search for fulfillment, self-awareness, and wholeness. Primarily intended for senior students. Offered as one of the Advanced Environmental Studies seminars. Not open to students in the College of Humanities and Fine Arts.

INDUSTRIAL ENGINEERING & MANAGEMENT SYSTEMS

IEMS 301 Management Standards

Qtr. Hrs. - 3

CR: ENGR 341 or equivalent. Management standards for evaluation and control of the performance and productivity of men and man-machine systems. Flow sequences, human physiological information processing capabilities and resultant work design principles, and measurement and evaluation of work with respect to time and wages. Laboratory assignments.

IEMS 311 Engineering Law

Qtr. Hrs. - 3

PR: Junior standing. Influence of contract, property, and tort law upon engineering activities; contracts, agency, partnerships, corporations, liens, and expert testimony.

IEMS 332 Statistical Quality Control

Qtr. Hrs. - 3

Statistical concepts and methods applied to the control of quality of manufactured products. (Same as STAT 332.)

IEMS 411 Industrial Administration

Qtr. Hrs. - 3

PR: ENGR 443. Role of the engineer in manufacturing management. Basic functions, departmentation, authority relationships, and methods of control.

IEMS 412 Safety Engineering

Qtr. Hrs. - 4

PR: Junior standing. Basic principles of accident prevention in relation to the factors involved in the accident prevention. Hazards within the workplace environment — plant layout and materials handling, machinery, electrical hazards, flammable materials and pressure vessels.

IEMS 415 Job Evaluation and Wage Incentives

Qtr. Hrs. - 3

PR: IEMS 301 or MGMT 324. Work measurement as a basis for industrial wage systems; consideration of work factor and task analysis in job classification and wage determination.



- IEMS 414 Industrial Facilities Planning and Design** Qtr. Hrs. - 3
PR: IEMS 301. Comprehensive design of an industrial production system. Problems involved in and the inter-relationships of plant location, product analysis, process design, equipment selection, materials handling, plant arrangement and supplementary services. Laboratory assignments.
- IEMS 418 Project Engineering** Qtr. Hrs. - 3
PR: Senior standing. Role of the project engineer in research and development, emphasizing the complete sequence of steps from project proposal to project completion. Analytical techniques such as CPM, PERT/COST will be considered.
- IEMS 422 Network Analysis** Qtr. Hrs. - 3
PR: ENGR 442. Development, application and computerized analysis of networks for systems analysis and control. Applications of CPM, PERT, GERT and maximal flow concepts, Laboratory Assignments.
- IEMS 423 Analysis of Industrial Operations** Qtr. Hrs. - 3
PR: Minimum of 12 credits of IEMS course work. An extensive and intensive analysis of industrial operations for optimum utilization of resources. Laboratory assignments.
- IEMS 424 Management Control Systems** Qtr. Hrs. - 3
PR: ENGR 371 or equivalent. Management decision rules, and mathematical and economic models of production, forecasting, scheduling, order control and inventory control. Application of the computer as a management tool to automate control of the production and inventory process.
- IEMS 431 Engineering Applications of Computer Methods** Qtr. Hrs. - 3
PR: MATH 223, ENGR 102 or approval of instructor. Methods of structuring engineering problems for computers; general characteristics and performance measures of computers and auxiliary equipment. Introduction to computer-aided design and time-sharing systems, case studies. Two hours lecture, two hours laboratory.
- IEMS 432 System Simulation with Digital Computers** Qtr. Hrs. - 3
PR: COMP 102 or equivalent. Methods and procedures for simulating large scale systems with digital computers, FORTRAN, CSMP and GPSS programming languages are used. Laboratory assignments.
- IEMS 443 Analysis of Decision Processes** Qtr. Hrs. - 3
PR: ENGR 371 and ENGR 341. Methods of making economic decisions; effects of risk, uncertainty, and strategy on managerial economic decision.
- IEMS 447 Numerical Methods in Systems Analysis** Qtr. Hrs. - 3
PR: ENGR 371. Application of vector space and matrix concepts to systems problems. Analysis of linear transformations and simultaneous linear equations. Introduction finite Markov processes.
- IEMS 450 Biomedical Engineering** Qtr. Hrs. - 3
PR: ENGR 342 or consent of instructor. An introduction to the engineering description and analysis of living systems. Application of modern technology to medicine and biology. Systems analysis and its application to biomedical and ecological systems.

- IEMS 452 Human Factors in Space Travel** Qtr. Hrs. - 3
 PR: IEMS 451. Artificial environments and environmental control of upper atmosphere and space.
- IEMS 461 Human Engineering** Qtr. Hrs. - 3
 PR: Senior standing. Man-machine systems; design and conduct of human engineering studies. Laboratory assignments.
- IEMS 462 Information Acquisition** Qtr. Hrs. - 3
 PR: IEMS 435. The design of systems to collect data for use in managerial decision models, job evaluation, wage payment, production standards, queueing studies, engineering evaluations and reliability predictions.
- IEMS 464 Design of Industrial Operations** Qtr. Hrs. - 3
 PR: IEMS 331. Planning, analyzing, controlling and evaluating production systems. Laboratory assignments.
- IEMS 470 Introduction to Public Systems Analysis** Qtr. Hrs. - 3
 PR: ENGR 371 or equivalent. Application of probability and statistics to the analysis of public systems data. Operations research models and applications; economic decision-models; cost/benefit analysis.
- IEMS 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- IEMS 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- IEMS 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- IEMS 497 Research** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- IEMS 502 Probability for Engineers** Qtr. Hrs. - 3
 PR: ENGR 371. Engineering application of probability, combinatorial analysis, sample space, events, probability, discrete and continuous random variables, and probability distributions.
- IEMS 503 Statistics for Engineers** Qtr. Hrs. - 3
 PR: ENGR 371. Engineering application of statistics, significance tests and confidence intervals, tests of hypotheses, simple and multiple regression and correlation.
- IEMS 510 Hospital Systems Analysis** Qtr. Hrs. 4
 PR: IEMS 301 or equivalent. The application of industrial engineering and systems analysis concepts and techniques to hospital management and operational systems. Hospital systems organization, effectiveness measures and improvement methods.

IEMS 524 Operations Research I**Qtr. Hrs. - 3**

PR: ENGR 442 or equivalent. The methods of operations research including formulation of models and derivation of solutions by various optimization techniques; introduction to deterministic models and techniques, sequencing and replacement, linear programming, geometric and dynamic programming.

IEMS 525 Operations Research II**Qtr. Hrs. - 4**

PR: IEMS 524. Introduction to stochastic models and techniques including queueing theory. Simulation, non-linear programming, calculus of variations, and forecasting.

IEMS 532 Management Information Systems I**Qtr. Hrs. - 4**

PR: COMP 102 or equivalent. Computer-based management information systems. Analysis of the management and control functions from the context of information processing requirements. Presentation of alternative system designs, including real-time, on-line computing systems.

IEMS 540 Systems Dynamics**Qtr. Hrs. - 4**

PR: COMP 102 or equivalent. Industrial dynamics and the information feedback characteristics of industrial systems. Construction, verification, and use of computer-based simulation models for the design, analysis, and improvement of organizational structures and management control policies. Introduction to the use of DYNAMO II computer simulation language.

IEMS 550 Biomedical Instrumentation**Qtr. Hrs. - 4**

PR: ENGR 342 or consent of instructor. Theory and techniques of biological instrumentation systems including transducers and computers applications. The nature of biological signals, their detection, analysis and display.

IEMS 562 Management Information Systems I**Qtr. Hrs. - 4**

PR: ENGR 102 or COMP 102. Computer-based management information systems. Analysis of the management and control functions from the context of information processing requirements. Presentation of alternative system designs, including real-time, on-line computing systems.

IEMS 602 Engineering Economic Analysis**Qtr. Hrs. - 3**

PR: ENGR 341. The engineering economic audit, breakeven point analysis, variable budget control of manufacturing costs, cost analysis and product pricing.

IEMS 610 Project Engineering**Qtr. Hrs. - 3**

PR: Graduate standing. Role of the project engineer in research and development, emphasizing the complete sequence of steps from project proposal to project completion. Analytical techniques such as CPM, PERT/COST will be considered.

IEMS 620 Queueing Systems**Qtr. Hrs. - 3**

PR: IEMS 502. Analysis of queueing systems and waiting line problems using analytical and Monte Carlo methods. Laboratory assignments.

IEMS 626 Linear Programming**Qtr. Hrs. - 4**

PR: ENGR 442 or equivalent. Theoretical and computational aspects of linear programming and related topics including simplex algorithms, duality theory, integer programming and stochastic linear programming. Applications to operational problems and computer solutions are emphasized.

IEMS 671 Public Works Economics**Qtr. Hrs. - 3**

PR: ENGR 341 or equivalent. Economic considerations in public works planning. The nature and objective functions of public works projects; cost estimating, cost allocation and pricing. Cost/benefit analysis on primary and secondary benefits from public works projects.

IEMS 672 Urban Dynamics**Qtr. Hrs. - 4**

PR: IEMS 540. Development of dynamic and community systems models. Use of computer simulation to analyze governmental and private sector policies in selected areas such as housing programs, industrial growth, worker training programs, environmental quality control, urban planning and land use planning.

IEMS 678 Public Operating Systems Analysis**Qtr. Hrs. - 3**

PR: ENGR 371 or equivalent. Establishment of data base for public operating systems, including identification of data requirements. Development of service demand and workload relationships, resource and manpower requirements.

IEMS 679 Public System Planning and Resource Allocation**Qtr. Hrs. - 3**

PR: IEMS 678. Forecasting work load, demand rates, public services by correlation with census factors in geographical grid network. Application of basic operations research techniques, computer simulation models and analytical operating models to optimize resource allocation and work assignment planning.

INHALATION THERAPY

IT 330 Cardiopulmonary Resuscitation**Qtr. Hrs. - 3**

PR: Permission of instructor. Resuscitative procedures in respiratory and cardiac emergencies; airway maintenance; defibrillation and post-resuscitative care. Drowning; underwater, aviation, and space physiology.

IT 331 Cardipulmonary Resuscitation Laboratory**Qtr. Hrs. - 1**

Adult intubation and available airways. Defibrillation practice. Taken concurrently with IT 330.

- IT 340 Introduction to Pharmacology** Qtr. Hrs. - 3
Regulatory agencies and the regulations concerning the use of drugs. Review of pharmacological mathematics. Drug absorption and distribution in the human body.
- IT 350 Introduction to Respiratory Equipment** Qtr. Hrs. - 3
Fundamental functions of basic inhalation therapy equipment; systems of oxygen storage; safety precautions; preparation for clinical practice.
- IT 351 Respiratory Equipment Function** Qtr. Hrs. - 1
Procedures in cleaning, sterilizing, maintenance, and repair of equipment. Taken concurrently with IT 350.
- IT 352 Respiratory Equipment Function** Qtr. Hrs. - 3
PR IT 350. Function of advanced respiratory equipment; arterial blood gas equipment; prolonged mechanical ventilation; bedside respiratory volumetric monitoring; evaluation prior to and during weaning from respirator.
- IT 353 Respiratory Equipment Function Laboratory** Qtr. Hrs. - 1
Care and sterilization of respirators; calibration of blood gas analyzers; care and standardization of bedside volumetric equipment. Taken concurrently with IT 352.
- IT 370 Pulmonary Physiology** Qtr. Hrs. - 3
PR: CHEM 113 and PHYS 281. Normal ventilation of respiration; response to gases and ions; lung reflexes; ventilatory; mechanical factors; pulmonary circulation; gas diffusion and transport; manual respiratory adjustments; manifestations of disease.
- IT 371 Pulmonary Physiology Laboratory** Qtr. Hrs. - 1
Experiments in ventilation mechanics, diffusion, circulation, and gas transport. Taken concurrently with IT 370.
- IT 380 Respiratory Pathology** Qtr. Hrs. - 3
PR: ZOOL 234. Cellular pathology with emphasis on pathology of respiratory and cardiovascular systems.
- IT 381 Respiratory Pathology Laboratory** Qtr. Hrs. - 1
Macro and microscopic identification of respiratory diseases. Gross pathology. Taken concurrently with IT 380.
- IT 410 Respiratory Physical Therapy** Qtr. Hrs. - 3
PR: Permission of instructor. The motor unit, exercise and fatigue. Therapeutic exercise, exercise in cardiopulmonary disease. Postural drainage, and vibration techniques.
- IT 411 Respiratory Physical Therapy Laboratory** Qtr. Hrs. - 1
Observation and assistance in respiratory physical therapy procedures performed on hospital patients. Taken concurrently with IT 410.
- IT 420 Respiratory Pediatrics** Qtr. Hrs. - 3
PR: Permission of instructor. Fetal lung development and circulation. Fetal and newborn regulation of respiration. Pulmonary function in congenital anomalies, infant infections, and hyaline membrane disease. Resuscitation at birth. Respiratory diseases of childhood.

- IT 421 Respiratory Pediatrics Laboratory** Qtr. Hrs. - 1
Review of pediatric equipment. Treatment of specific diseases. Infant resuscitative procedures and intubation. Taken concurrently with IT 420.
- IT 430 Cardiopulmonary Therapy** Qtr. Hrs. - 3
PR: IT 370. Introduction of diagnostic and surgical techniques in thoracic and general surgery.
- IT 431 Cardiopulmonary Therapy Laboratory** Qtr. Hrs. - 1
Student participation in cardiac catheterizations and cardiopulmonary bypass techniques. Assignment to the operating room area as observers during thoracic and general surgery. Taken concurrently with IT 430.
- IT 440, 442 Medical Pharmacology** Qtr. Hrs. - 3,3
PR: IT 340. Use of drugs in cardiovascular diseases; effects on the nervous system, gastrointestinal tract, and neuroeffectors. Depressants and stimulants; influence on metabolism and endocrine functions. Anesthetics. Chemotherapy. Poisons and antidotes.
- IT 460 Medicine** Qtr. Hrs. - 3
PR: IT 370. Disease states treated medically in conjunction with one or more modalities of respiratory therapy.
- IT 461 Equipment Selection and Use in Specific Diseases** Qtr. Hrs. - 1
The selection of proper equipment and use with common medically treated diseases. Taken concurrently with IT 460.
- IT 462 Pulmonary Function Studies** Qtr. Hrs. - 3
PR: Permission of instructor. Detailed procedures and tests to provide objective information for diagnosis of respiratory diseases.
- IT 463 Pulmonary Function Laboratory** Qtr. Hrs. - 1
Testing procedures and experiments in normal and abnormal respiratory functions. Taken concurrently with IT 462.

ITALIAN

- ITA 101 Elementary Italian Language and Civilization** Qtr. Hrs. - 3
Designed to initiate the student to the major language skills: listening, speaking, reading, and writing, in addition to an introduction to Italian culture.
- ITA 102 Elementary Italian Language and Civilization** Qtr. Hrs. - 3
PR: ITA 101 or equivalent. Continuation of ITA 101.
- ITA 103 Elementary Italian Language and Civilization** Qtr. Hrs. - 3
PR: ITA 102 or equivalent. Continuation of ITA 102.

JOURNALISM

- JRN 320 Press Photography** **Qtr. Hrs. - 3**
Learning the use of the still camera, darkroom procedures, role of the photographer.
- JRN 321 Copy Editing** **Qtr. Hrs. - 4**
PR: COM 319. Fundamentals of copy editing for printed media, including selection, processing and display of news.
- JRN 322 Information Processing** **Qtr. Hrs. - 4**
PR: JRN 321 or equivalent. Planning content and format of newspaper and other periodicals; layout; dummyming, departmental editing, copy desk management.
- JRN 330 History of American Journalism** **Qtr. Hrs. - 4**
Development of newspapers and magazines, the press associations and the growth of the electronic media.
- JRN 331 Film Criticism** **Qtr. Hrs. - 3**
PR: Consent of instructor. The practice of writing movie reviews: students will review at least one film a week during the course.
- JRN 420 Technical and Scientific Writing** **Qtr. Hrs. - 4**
PR: Consent of instructor. Practice in the gathering of materials for technical and scientific articles; digesting of technical information into more readable forms.
- JRN 421 Editorial and Column Writing** **Qtr. Hrs. - 4**
PR: Consent of instructor. Building the editorial page, backgrounding and interpreting the news.
- JRN 422 Public Affairs Reporting** **Qtr. Hrs. - 4**
PR COM 319 or permission of instructor. Study of community news sources, reporting courts, city and county government.
- JRN 423 Writing for the Mass Media** **Qtr. Hrs. - 4**
PR: Consent of instructor. Students write for a certain segment of the mass media of their own choosing. Will include creative writing, article writing, etc. May be repeated for credit.
- JRN 424 Critical Writing** **Qtr. Hrs. - 4**
PR: Consent of instructor. Practice in writing reviews of plays, concerts, and books.
- JRN 425 Feature Writing** **Qtr. Hrs. - 4**
PR: Consent of instructor. Writing of feature articles for newspapers and magazines.
- JRN 431 International Communication and the Foreign Press** **Qtr. Hrs. - 4**
A study of the news communicating systems of the world, the role of foreign correspondents, the foreign press.

JRN 433 Propaganda and psychological Warfare

Qtr. Hrs. - 4

Propoganda and psychological warfare principles with a study of the activities engaged in by nations.

JRN 436 Advertising Copy

Qtr. Hrs. - 4

PR: COM 434. The writing and preparation of advertising copy.

JRN 437 Advertising Campaigns

Qtr. Hrs. - 4

PR: JRN 436 or consent of instructor. The planning and execution of an advertising campaign; use of research and coordination of elements of the campaign.

JRN 491 Special Topics

Qtr. Hrs. - 2-5

PR: Consent of instructor. May be repeated for credit.

JRN 494 Independent Study

Qtr. Hrs. - 2-5

PR: Consent of instructor. May be repeated for credit.

LAW ENFORCEMENT

LENF 201 Law Enforcement

Qtr. Hrs. - 5

A comprehensive survey of the history and philosophy of law enforcement. The role of the police as a functional component in the broad system of criminal justice will be emphasized.

LENF 202 Administration of Justice

Qtr. Hrs. - 4

A study of the broad system of criminal justice in American, with an emphasis on the federal, state, and local courts, and parole and probation agencies.

LENF 205 Police Science and Technology

Qtr. Hrs. - 4

PR: LENS 201. Study of operational concepts of investigative and scientific professions as affecting discovery, preservation, and examination of physical tracings from negligent or criminal events. The specific advantages and limitations of scientific interpretations.

LENF 207 Criminal Investigation

Qtr. Hrs. - 4

A comprehensive survey of the modern methods and procedures used in the investigation and solution of criminal offenses.

LENF 300 Crime in America

Qtr. Hrs. - 4

Social factors and processes in criminal and delinquent behavior. Perspectives on criminal behavior and its varied patterns. Socialized criminals, the sociopathic offender, organized crime, white-collar crime, drug use and abuse, the sexual offender, and protest, politics and crime.

LENF 301 Criminal Law in Action

Qtr. Hrs. - 4

PR: Consent of instructor. Basic concepts of the criminal law, their origin and development in Anglo-American jurisdiction; constitutional and procedural restraints on law enforcement, their purpose and implementation; modern criminal procedures; Federal and State relationships in the administration of justice.

LENF 303 Municipal Police Administration II **Qtr. Hrs. - 5**
PR: MGMT 301 or an introductory course in Police Administration. Advanced study of contemporary operational concepts of administration with an emphasis on function, rather than structure. An examination of emerging ideas such as lateral entry, team policing, central staff control, and professionalization.

LENF 304 The Police Manager **Qtr. Hrs. - 5**
PR: MGMT 301. Elements of first-line supervision and executive development. Administrative leadership; its situational nature; methods and traits; recent theories and research on leadership.

LENF 400 Police and the Community **Qtr. Hrs. - 4**
Police relationships with the citizenry. Ethnic tension and conflict in relation to law enforcement. The police role in dealing with groups, crowds, gangs and nonconformist cultures.

LENF 401 Selected Problems in Law Enforcement **Qtr. Hrs. - 5**
PR: Upper division standing and consent of instructor. Classroom analysis of contemporary and emerging problems in law enforcement.

LENF 407 Comparative Police Systems **Qtr. Hrs. - 4**
A survey of the history and philosophy of foreign systems of law enforcement with special emphasis on the English, French, and German police.

LENF 410 Financial Administration and Budgeting **Qtr. Hrs. - 4**
PR: LENS 202 and 303. Police budgets as instruments of policymaking and management. Financial, fiscal, administrative and legal aspects of budgeting.

LENF 491 Special Topics **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.

LENF 494 Independent Study **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.

MANAGEMENT

MGMT 301 Management **Qtr. Hrs. - 5**
Fundamentals of management underlying the solution of problems relating to the organization and operation of business enterprises.

MGMT 324 Production Management **Qtr. Hrs. - 3**
PR: MGMT 301. Principles and methods of production viewed from a managerial decision-making level.

MGMT 364 Personnel Management **Qtr. Hrs. - 5**
PR: MGMT 301. An investigation of personnel practices and interpersonal relationships involved in managing employees. Internal problems of labor control and the utilization of human resources are considered.

MGMT 401 Organization Theory

Qtr. Hrs. - 5

PR: MGMT 301. Elements in organizations and the processes by which they develop and influence behavior are considered.

MGMT 424 Production Management Problems

Qtr. Hrs. - 3

PR: MGMT 324. Problems in the management of industrial enterprise. Management principles and mathematical analysis applied to manufacturing; product development and production; materials and production control; employee relations.

MGMT 464 Personnel Problems

Qtr. Hrs. - 3

PR: MGMT 364. Case studies in personnel problems directed toward the application of personnel management theory and concepts to organization problems.

MGMT 465 Industrial Relations

Qtr. Hrs. - 3

PR: MGMT 364. The impact of trade unionism on industrial relations; current problems, conflicts and trends; the development of managerial approaches to achieve labor-management cooperation.

MGMT 466 Human Relations in Management

Qtr. Hrs. 3

PR: MGMT 401. The individual, interpersonal and group relations and inter-group and organizational problems in business.

MGMT 497 Research

Qtr. Hrs. - 2-5

PR: Consent of instructor. May be repeated for credit.

MGMT 601 Management Process

Qtr. Hrs. - 3

PR: Graduate standing. The organization as a "natural system," its functional components and the processes whereby these components interact to accomplish organizational goals.

MGMT 611 Organizational Behavior

Qtr. Hrs. - 3

PR: Graduate standing. The relationship of human behavior to organization performance, including motivation, leadership, organizational environment, social environment and communication.

MGMT 621 Group Decisions and Analysis

Qtr. Hrs. - 3

PR: Graduate standing. Experience in company-wide management decision-making by groups using the management game technique. Analysis of the group decision-making process using video tapes.

MARKETING

MKTG 301 Marketing

Qtr. Hrs. - 5

Study of functions, institutions and basic problems in marketing of goods and services in our economy.

- MKTG 326 Consumer Market Behavior** **Qtr. Hrs. - 3**
PR: MKTG 301 and PSY 300 or 314. An analysis of consumer motivation, buying behavior, market adjustment and product innovation. Behavioral aspects of the marketing process from producer to ultimate user or consumer are considered.
- MKTG 334 Marketing Models** **Qtr. Hrs. - 3**
PR: MKTG 301, ECON 321. Qualitative and quantitative model building concepts applied to marketing problems with special emphasis on product planning, distribution, promotion strategy, and pricing problems.
- MKTG 344 Marketing Logistics** **Qtr. Hrs. - 3**
PR: MKTG 301 and ECON 321 or BADM 311. The ecology, analysis and development of integrated distribution systems; the application of quantitative tools, economic analysis, transportation and marketing management in the analysis and interpretation of the design and physical flow of goods through marketing network alternatives.
- MKTG 364 Advertising Management** **Qtr. Hrs. - 3**
PR: MKTG 301. Analysis of field of advertising; purposes, techniques, media, organization, and role of research; economic and social aspects of advertising.
- MKTG 367 Sales Management** **Qtr. Hrs. - 3**
PR: MKTG 301. Problems confronting sales manager; training in sales techniques; sales objectives and policies; organization; and administration of sales force.
- MKTG 384 Marketing Research** **Qtr. Hrs. - 5**
PR: MKTG 301 and ECON 321. Study of research procedures and techniques applicable to problem solving in marketing. The marketing management process is analyzed; the underlying concepts related to the information needed to serve the processes are explored; and the incorporation of information resources into the management function is demonstrated.
- MKTG 469 Channels of Distribution Management** **Qtr. Hrs. - 3**
PR: MKTG 301. Study of marketing activities and relationship within channels of distribution. Major attention given to decision making and formulation of policies appropriate for wholesalers, retailers, and vertically integrated marketing institutions.
- MKTG 485 Marketing Policies and Strategies** **Qtr. Hrs. - 4**
PR: MKTG 384 and consent of instructor. Marketing problems and policies are explored with emphasis placed on the decision-making process.
- MKTG 489 Current Marketing Problems** **Qtr. Hrs. - 3**
PR: Senior standing and consent of the professor. A course emphasizing the recognition and analysis of marketing problems arising from broad cultural, social, political, legal, economic, and competitive developments.

4KTG 497 Research**Qtr. Hrs. - 2-5****PR:** Consent of instructor. May be repeated for credit.**MKTG 601 Marketing Policy****Qtr. Hrs. - 3****PR:** Graduate standing. Marketing policy formulation and decision-making with respect to planning, pricing, promoting, and distributing.**MKTG 602 Current Marketing Problems****Qtr. Hrs. - 3****PR:** MKTG 301 or equivalent and graduate standing. Analysis of marketing problems stemming from broad social, economic, and political developments. Topics treated cover broad classes of marketing institutions.**MKTG 604 Sales Management and Control****Qtr. Hrs. - 3****PR:** Graduate standing and MKTG 301. A study of the principles and concepts of sales planning and control. Emphasis is placed on the organization of sales departments, the allocation and development of sales territories, and the training, motivation, and supervision of a sales force.**MATHEMATICS****MATH 100 Principles of Mathematics****Qtr. Hrs. - 4****PR:** Two years of high school mathematics. Selected topics in mathematics with primary emphasis on developing conceptual understanding and broadening insight into mathematics. Not intended for students in the Colleges of Business Administration, Engineering, or Natural Sciences.**MATH 101 Elementary School Mathematics I****Qtr. Hrs. - 4****PR:** Two years of high school mathematics. Logic, sets, the system of whole numbers, numeration systems, the system of integers, the system of rational numbers. Open only to majors in elementary education.**MATH 104 Fundamental Algebra****Qtr. Hrs. - 4**

Elementary algebra including factoring, plane coordinates, systems of linear equations, exponents and radicals, quadratic equations and inequalities, ratio, proportion, and logarithms. For those students whose preparation in mathematics is noncurrent or insufficient for MATH 110, 111.

MATH 110 Precalculus Mathematics I**Qtr. Hrs. - 4****PR:** MATH 104, or two years of high school algebra and one year of high school plane geometry. This course is intended to cover most of the topics usually found in college algebra emphasizing the notion of function.**MATH 111 Precalculus Mathematics II****Qtr. Hrs. - 4****PR:** MATH 110 or equivalent (e.g., a course in college algebra which required the mastery of the function concept). Exponential and logarithmic functions; circular and trigonometric functions; inverses of circular functions; complex numbers.

MATH 201 Elementary School Mathematics II **Qtr. Hrs. - 4**
PR: MATH 101. The system of real numbers, polynomials, linear equations and inequalities, systems of equations and inequalities, quadratic equations and inequalities, the complex numbers. Open only to majors in elementary education.

MATH 211 Analytic Geometry **Qtr. Hrs. - 3**
CR: MATH 111 or equivalent. Plane and three-dimensional analytic geometry developed with the aid of vectors. Topics include coordinate systems; vectors; lines in the plane; lines and planes in space; conic sections; polar coordinates; transformation of coordinates.

MATH 221,222,223, Calculus **Qtr. Hrs. - 4,4,4**
PR: MATH 110 and MATH 111, or equivalent. CR: MATH 211. The differential and integral calculus of elementary functions of one variable with attention to a variety of geometric and physical applications.

MATH 301 Elementary School Mathematics III **Qtr. Hrs. - 4**
PR: MATH 201 or consent of instructor. Algebraic structures, selected topics from number theory, experimental and formal geometry, points, lines, planes, angles, curves, regions, parallel and intersecting lines and planes, area, congruence, measurement, and space figures. Open only to majors in elementary education.

MATH 271 Logic and Proof in Mathematics **Qtr. Hrs. - 3**
PR: Four years of high school mathematics or equivalent. The course begins with basic mathematical logic and works up to methods of proof in mathematics using simple mathematical theorems as examples. Primarily for mathematics majors.

MATH 272 Mathematical Structures **Qtr. Hrs. - 3**
PR: MATH 271. An introduction to mathematical systems: number theory, group theory, the number system. Primarily for mathematics majors.

MATH 314 Boolean Algebra **Qtr. Hrs. - 4**
PR: MATH 223 or consent of instructor. Axiomatic development of Boolean algebra; the algebras of sets, logic and circuits as Boolean algebras.

MATH 315,316 Introduction to Number Theory **Qtr. Hrs. - 3,3**
PR: Consent of instructor. Divisibility; primes and composites; divisors; multiples; Euclid's algorithm; Diophantine equations; modulo arithmetic; simple continued fractions. Intended for prospective teachers of mathematics.

MATH 317 Matrices **Qtr. Hrs. - 3**
PR: MATH 223. Elementary properties of matrices; special, real and complex matrices; determinants and inverses; rank and systems of equations; transformations; eigenvectors; diagonalization; quadratic forms.

MATH 318,319 Linear Algebra

Qtr. Hrs. - 3,3

PR: MATH 223. A detailed analysis of finite dimensional linear spaces including bases, subspaces, dual spaces, quadratic forms, and applications to geometry.

MATH 321 Intermediate Calculus

Qtr. Hrs. - 4

PR: MATH 223. Differential and integral calculus of functions of several variables with applications. Topics include vector differential calculus; partial derivatives; multiple integrals; line and surface integrals.

MATH 331 Differential Equations

Qtr. Hrs. - 4

PR: MATH 321. First order ordinary differential equations; equations with constant coefficients; the method of variation of parameters; step-by-step integration; reduction of order; Picard's method, the method of Frobenius; introduction to input-output analysis and transform methods.

MATH 341 Vector Analysis

Qtr. Hrs. - 3

PR: MATH 321. Scalar and vector products; limits; derivatives and integrals of vector valued functions of real vectors; the directional derivative and vector operators; the theorems of Green, Gauss, and Stokes; generalized curvilinear coordinates; applications in engineering and physical sciences.

MATH 351 Foundations of Geometry

Qtr. Hrs. - 4

PR: Consent of instructor. Modern Euclidean geometry; logical defects in Euclid's geometry; simple axiomatic systems; introduction to finite and affine geometries. This course is intended for prospective teachers of mathematics.

MATH 411,412,413 Algebraic Structures

Qtr. Hrs. - 3,3,3

PR: MATH 223. An introduction to the properties of groups, rings, polynomial rings, integral domains and fields.

MATH 414 Semi-groups and Groups

Qtr. Hrs. - 3

PR: Consent of instructor. An axiomatic development of basic properties of semi-groups and groups.

MATH 420 Sequences and Series

Qtr. Hrs. - 3

PR: Consent of instructor. Convergence of infinite sequences and series; double series; infinite products. Intended for prospective teachers of mathematics.

MATH 421,422,423 Advanced Calculus

Qtr. Hrs. - 3,3,3

PR: MATH 321. Limits, sequences and concepts of continuity; differentiation and integration; derivatives of integrals; infinite series and concepts of convergence; the Bolzano-Weierstrass theorem and the Heine-Borel theorem; extensions in Euclidean n -space.

- MATH 424 Lebesgue Theory** **Qtr. Hrs. - 3**
PR: MATH 423. Inner and outer measure; measurable sets and functions; the Lebesgue integral.
- MATH 425 Techniques of Complex Variables** **Qtr. Hrs. - 3**
PR: MATH 321. Analytic functions; integration in the complex plane; Laurent series and residue calculus, inversion of Laplace transforms; conformal mappings; applications in engineering and the physical sciences.
- MATH 426,427 Theory of Complex Variables** **Qtr. Hrs. - 3,3**
PR: MATH 425. Analytic and harmonic functions; Cauchy's theorem and its implications; the maximum modulus principle; series expansions; decomposition of meromorphic functions into partial fractions; analytic continuation; asymptotic expansions; the Mittag-Leffler Theorem; integral functions of finite order; Riemann surfaces.
- MATH 428 The Number System** **Qtr. Hrs. - 3**
PR: Consent of instructor. An axiomatic development of the natural numbers followed by a constructive development of the real and complex numbers. Intended for prospective teachers of mathematics.
- MATH 429 Foundations of Calculus** **Qtr. Hrs. - 3**
PR: Consent of instructor. Functions; limits; continuity; differentiation and integration. This course is a study of the basic structure of the calculus and is recommended for prospective teachers of mathematics.
- MATH 431 Ordinary Differential Equations** **Qtr. Hrs. - 3**
PR: MATH 331. Systems of equations; the Wronskian; Abel's identity; integrating factors and adjoint equations.
- MATH 432 Theory of Differential Equations** **Qtr. Hrs. - 3**
PR: MATH 331. The existence and uniqueness of solutions; oscillation theory; asymptotic solutions; stability.
- MATH 434 Partial Differential Equations** **Qtr. Hrs. - 3**
PR: MATH 331. Separation of variables; orthogonality and Fourier series; classification of equations; solutions in different coordinate systems; methods of characteristics; the Fourier integral transform and Dirac's delta function.
- MATH 435 Boundary Value Problems** **Qtr. Hrs. - 3**
PR: MATH 434. Adjoint forms and Green's functions; applications in engineering and the physical sciences.

MATH 436 Special Functions**Qtr. Hrs. - 3**

PR: MATH 331. Special functions represented as series, products and integrals; generating functions and recursion formulas; orthogonal expansions and interrelations between special functions. Emphasis will be on the Bessel, Legendre, gamma and hypergeometric functions with an introduction to other polynomial sets.

MATH 437 Laplace Transforms**Qtr. Hrs. - 3**

PR: MATH 331. The Laplace and Z transforms; solutions of ordinary and partial differential equations; application to circuit analysis and difference equations.

MATH 438 Transform Calculus**Qtr. Hrs. - 3**

PR: MATH 331. Fourier, Hankel and other transforms with applications to physical problems; the transformations of distributions.

MATH 451, 452 Non — Euclidean and projective Geometry**Qtr. Hrs. - 3,3**

PR: MATH 351 or consent of instructor. Non-Euclidean geometry; projective plane, perspectivities, projectivities; projective theory of conics; analytic projective geometry; vector theory; and linear theory; and linear transformations in projective geometry.

MATH 461 Basic Topology**Qtr. Hrs. - 3**

PR: MATH 421 or MATH 420. Compactness; connectedness; general metric spaces; topological spaces; limit points.

MATH 462 Concepts in Topology**Qtr. Hrs. - 3**

PR: MATH 461. Topology of surfaces, Euler characteristic; spheres with handles and crosscaps; algebraic invariants; combinatorial topology.

MATH 490 History of Mathematics**Qtr. Hrs. - 3**

PR: Five hours of mathematics. A chronological study of the evolution of mathematical thought from primitive counting through modern ideas of the twentieth century. Recommended for prospective teachers of mathematics.

MATH 491 Special Topics**Qtr. Hrs. - 2-5**

PR: Consent of the instructor. May be repeated for credit.

MATH 492 Seminar**Qtr. Hrs. - 2-5**

PR: Consent of the instructor. May be repeated for credit.

MATH 494 Independent Study**Qtr. Hrs. - 2-5**

PR: Consent of the instructor. May be repeated for credit.

MATH 497 Research**Qtr. Hrs. - 2-5**

PR: Consent of the instructor. May be repeated for credit.

MECHANICAL ENGINEERING & AEROSPACE SCIENCES

MEAS 341 Mechanisms

Qtr. Hrs. - 3

PR: ENGR 311. Relative motions of machine parts; cams, rolling contact, gearing, and flexible connectors. Synthesis of mechanisms. Two lectures, two hours laboratory.

MEAS 342 Dynamics in Design

Qtr. Hrs. - 3

PR: MEAS 341. Experimental mechanics, dynamics, measurements; applications of dynamics in design.

MEAS 351 Measurement Systems

Qtr. Hrs. - 3

PR: ENGR 312 and 322. Application of system design concepts to measurements. Fundamental theory of static and dynamic measurements. Behavior of transducers individually and in open-loop systems. Validation of experimental data. Measurements are considered as information transfer accompanied by energy transfer. Two lectures, one laboratory lecture, two hours laboratory bi-weekly.

MEAS 371 Fluid Mechanics

Qtr. Hrs. - 4

PR: ENGR 332. Continuation of ENGR 332. Topics in gas dynamics, including shock waves, viscous flow analysis and solutions in boundary layer theory.

MEAS 372 Thermodynamics of Mechanical Systems

Qtr. Hrs. - 3

PR: ENGR 331, 431. Applied thermodynamics, availability analysis, thermodynamics of reactive and non-reactive mixtures, thermodynamic relations of properties. Thermodynamic design analysis of complete mechanical systems.

MEAS 411 Aerodynamics

Qtr. Hrs. - 3

PR: ENGR 332. Principles of subsonic and supersonic flight; airfoils in compressible and incompressible flow; flow about a body; thin airfoil and finite airfoil theory.

MEAS 413 Stability and Control

Qtr. Hrs. - 3

PR: MEAS 411. Application of elementary aerodynamic principles to static and dynamic stability and control surface theory.

MEAS 421 Space Mechanics

Qtr. Hrs. - 4

PR: ENGR 311. Dynamics with applications to aeronautical and astronautical problems, orbits and trajectories, motion in a resisting medium, performance and optimization of multistage rockets.

MEAS 423 Vibration Analysis

Qtr. Hrs. - 4

PR: ENGR 312. Undamped and damped vibrations of single degree of freedom systems. Forced vibrations, transient response. Many degrees of freedom systems, normal modes, vibration of elastic bodies.

- MEAS 424 Flight Vehicle Structures** Qtr. Hrs. - 3
 PR: CEES 351. Space structures; thin-walled structures; load factors; nonsymmetrical bending and transverse shear; shear center and shear flow; semimonocoque construction, fuselage rings; multicelled structures; sandwich panels, fatigue.
- MEAS 432 Propulsion Systems** Qtr. Hrs. - 3
 PR: MEAS 372. Analysis of jet propulsion systems including turbojets, ramjets, and rockets.
- MEAS 436 Mechanical Power Systems** Qtr. Hrs. - 3
 PR: MEAS 372. Analysis and design of large power generating systems and components thereof with emphasis on steam plants utilizing both chemical and nuclear fuels. Boiler, turbine, condenser, and auxiliary equipment design and performance analysis.
- MEAS 441,442 Principles of Design** Qtr. Hrs. - 3,3
 PR: MEAS 342. Design procedures; force and motion analysis; failure modes; stress and deflection analysis; stress concentration; fatigue; selected components.
- MEAS 451 Measurement Systems** Qtr. Hrs. - 3
 PR: MEAS 351. Extension of fundamental measurement principles; discussion of DC, sine wave and pulse carrier systems and of unbalance and reference-balance measuring methods; simple computing-type transducer. Two lectures, two hours lecture-laboratory.
- MEAS 472 Heat Transfer** Qtr. Hrs. - 4
 PR: ENGR 431, CR: MEAS 371 Steady state and transient conduction in one and two dimensions. Application of boundary layer theory to convective heat transfer analysis. Radiation heat transfer, analysis and design of heat exchangers. Lecture, demonstration and laboratory.
- MEAS 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- MEAS 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- MEAS 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- MEAS 497 Research** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- MEAS 523 Acoustics** Qtr. Hrs. - 3
 PR: Approval of instructor. Elements of vibration theory and wave motion; radiation, reflection, absorption, and transmission of acoustic waves; architectural acoustics; control and abatement of environmental noise pollution.

- MEAS 537 Energy Conversion** **Qtr. Hrs. - 3**
PR: MEAS 372 and PHYS 344. Unconventional methods of energy conversion; particular emphasis on fuel cells, thermoelectrics, thermionics, solar energy, photovoltaics, nuclear, and magnetohydrodynamics.
- MEAS 538 Environmental Thermodynamics** **Qtr. Hrs. - 3**
PR: ENGR 431 or equivalent. Thermodynamics of the environment, computation of energy requirements; physiological reactions to the environment, air and gas distributions, control systems and cleaning of air and the atmosphere.
- MEAS 571 Statistical Thermodynamics** **Qtr. Hrs. - 3**
PR: ENGR 331. Statistical approach to thermodynamic concepts, laws, and methods of analysis. Generalized p-v-T data. Special systems.
- MEAS 641 System Control** **Qtr. Hrs. - 3**
PR: ENGR 421 or equivalent. Theoretical, experimental and computer methods involved in the design of control systems. Emphasis on non-linear systems and advanced methods for control system analysis and optimization.
- MEAS 643 Mechanical Design** **Qtr. Hrs. - 3**
PR: MEAS 442 or equivalent. A study of the concepts, principles, phenomenological theories and techniques of analysis associated with failure prevention on mechanical design.
- MEAS 653 Experimental Measurements** **Qtr. Hrs. - 3**
PR: Approval of instructor. Principles of operation, analysis and design of measurement systems for engineering applications with emphasis upon the measurement of environmental parameters.
- MEAS 673 Transport Processes** **Qtr. Hrs. - 3**
PR: ENGR 431 or equivalent. Principles of the transport of mass, momentum and energy in fluids with applications to atmospheric and other environmental processes as well as equipment design.
- MEAS 674 Continuum Fluid Mechanics** **Qtr. Hrs. - 3**
CR: EMCS 471. Principal concepts and methods of fluid dynamics. Continuity, momentum, energy and constitutive relations for continuous fluids. Kinematics of fluid motion. Governing equations for motion of viscous and non viscous fluids. Navier Stokes equations and boundary layer theory.
- MEAS 676 Heat Transfer** **Qtr. Hrs. - 3**
CR: EMCS 574. Steady-state and transient-state conduction problems in heat and mass transfer solved for various constant and fluctuating boundary conditions. Problems in rectangular, cylindrical and spherical coordinates, and an introduction to numerical techniques. Heat transfer coefficients at high velocities and heat transfer-friction relationships in heat exchangers.

MEDICAL RECORDS SCIENCE

MRA 300 Medical Record Science I

Qtr. Hrs. - 3

Two hour lecture, two hour laboratory. An introduction to the field of Medical Record Administration with emphasis on evaluation and application of identification, storage and retrieval systems, preservation and retention of records.

MRA 301 Medical Record Science II

Qtr. Hrs. - 5

PR: MRA 300 and MRA 305; or consent of instructor. Three hour lecture, four hour laboratory. A study in depth of the medical record, its components, development and use, including health statistics and applications of legal concepts in Medical Record Administration.

MRA 302 Medical Record Science III

Qtr. Hrs. - 5

PR: MRA 301 or consent of instructor. Three hour lecture, four hour laboratory. Principles of coding and indexing procedures, special registries, research and statistical techniques.

MRA 305 Medical Terminology

Qtr. Hrs. - 5

A study of the language of medicine and allied health specialties, including word construction, definitions and application of terms.

MRA 370, 371 Directed Experience

Qtr. Hrs. - 1,1

PR: MRA 300. Four hours per week in a selected health care facility. Application of the principles discussed in MRA 300, 301, and 302.

MRA 403 Medical Record Science IV

Qtr. Hrs. - 5

PR: MRA 301 or consent of instructor. Three hour lecture, four hour laboratory. Principles of related health information systems of hospitals, nursing homes, extended health care facilities, psychiatric and other specialized institutions. Methods of establishing a medical reference library.

MRA 404 Medical Record Seminar

Qtr. Hrs. - 3

PR: MRA 421 or consent of instructor. Discussion and problem-solving by use of case-method approach for the purpose of coordinating the students' knowledge, skills and experience in medical record practice.

MRA 420,421 Medical Record Organization & Admin.

Qtr. Hrs. - 3, 3

PR: MRA 403, or consent of instructor. Two hour lecture, two hour laboratory. A study of the principles of control and management of departmental functions.

MRA 472 Directed Experience

Qtr. Hrs. - 2

PR: MRA 371. Eight hours per week in a selected health care facility. A supervised experience enabling the students to handle problems of medical record personnel. Provides the students with administrative experience in the usual activities and responsibilities of the department.

MRA 473 Directed Experience

Qtr. Hrs. - 2

PR: MRA 472. Eight hours per week in a selected health care facility. A supervised experience enabling the students to handle problems of medical record personnel. Provides the students with administrative experience in the usual activities and responsibilities of the department.

MRA 474 Directed Experience**Qtr. Hrs. - 2**

PR: MRA 473. Two weeks of affiliation (80 hours) at a selected health care facility serving in an administrative capacity under the direction of a qualified Medical Record Administrator.

MEDICAL TECHNOLOGY**MEDT 360,361 Clinical Microbiology****Qtr. Hrs. - 2,2**

Bacteria, parasites, and fungi harmful to man; their cultural and clinical characteristics; techniques of recovery and examination.

MEDT 362,363 Clinical Biochemistry**Qtr. Hrs. - 2,2**

Biochemistry of blood and other body fluids; theory and practical application of laboratory methods in biochemistry.

MEDT 375 Clinical Microscopy**Qtr. Hrs. - 3**

Microscopic examination of transudates and exudates.

MEDT 385 Blood Banking**Qtr. Hrs. - 3**

Immuno-hematology; blood transfusion; methods used in preservation and selection of properly matched blood.

MEDT 386,387 Clinical Hematology**Qtr. Hrs. - 2,2**

Microscopic study of normal and abnormal blood cells; methods of obtaining and preserving blood; aseptic techniques.

MEDT 388 Clinical Use of Isotopes**Qtr. Hrs. - 2**

Principles of radioisotopes detection and measurement, storage clinical use, and disposal.

MICROBIOLOGY**MICR 200 General Microbiology****Qtr. Hrs. - 4**

PR: 8 hours of biological science. Fundamentals of microbiology, morphology, metabolism and laboratory techniques.

MICR 210 Culture Media and Reagents**Qtr. Hrs. - 2**

PR: MICR 200. Preparation of differential, selective and enrichment media; reagents used in microbiology.

MICR 300 Advanced General Microbiology**Qtr. Hrs. - 4**

PR: MICR 200; CR: CHEM 121. Advanced fundamental theory and technique.

MICR 320 Pathogenic Microbiology**Qtr. Hrs. - 4**

PR: MICR 300 or consent of instructor. Microorganisms producing disease in man and other animals; means of transmission; protection against disease.

- MICR 322 Microbiology of Water and Waste** Qtr. Hrs. - 4
 PR: MICR 300. Organisms in water and their relationship to production and distribution of potable water; disposal of sewage.
- MICR 350 Microbial Ecology** Qtr. Hrs. - 4
 PR: BIOL 350 and MICR 300. Study of the roles of microbes in the environment.
- MICR 410 Diagnostic Microbiology** Qtr. Hrs. - 5
 PR: MICR 320. Techniques used in identifying bacteria which are pathogenic to man.
- MICR 430 Microbial Physiology** Qtr. Hrs. - 4
 PR: MICR 300 and CHEM 442, 444. Relationship between structure and function in microorganisms.
- MICR 440 Determinative Microbiology** Qtr. Hrs. - 4
 PR: MICR 300. Microbial classification, rules of nomenclature, bacterial code and identification of species.
- MICR 470 Virology** Qtr. Hrs. - 4
 PR: MICR 300 and CHEM 442. Nature of viruses and Rickettsiae, including their structure, propagation, isolation and identification.
- MICR 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- MICR 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- MICR 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- MICR 520 Sanitation and Public Health Microbiology** Qtr. Hrs. - 3
 PR: Graduate standing or consent of instructor. Principles of sanitation and public health. Includes theories of diseases, sanitary procedures on water purification, sewage disposal, refuse collection, food processing, swimming pools and air and water contamination.

MUSIC

Courses are classified as follows:

Music Theory and Composition: 101, 102, 103, 201, 202, 203, 301, 302, 303, 320, 321, 322, 350, 390, 401, 402, 403.

History and Literature: 104, 105, 106, 218, 219, 220, 221, 222, 223, 340, 341, 342, 399, 450, 451, 452.

Applied Music (Ensemble and Individual instruments): 111, 112, 113, 114, 115, 116, 117, 118, 211, 212, 213, 214, 215, 216, 217, 304, 307, 308, 309, 311, 312, 313, 314, 315, 316, 317, 411, 412, 413, 414, 415, 416, 417, 421, 422, 423, 424, 425, 426, 427.

MUS 101,102,103 Music Theory Qtr. Hrs. - 3,3,3

The fundamental course in basic musicianship integrating the various musical skills with the development of the student's musical perception and understanding. Required of all music majors.

MUS 104,105,106 Music Literature Qtr. Hrs. - 2,2,2

Analysis and discussion of important musical works, Baroque to contemporary periods; introduction to stylistic differences of the various musical eras. Primarily for music majors.

MUS 111 Class Piano Qtr. Hrs. - 2

May be repeated for credit.

MUS 112 Voice Qtr. Hrs. - 1

One half-hour private instruction per week. May be repeated for credit.

MUS 113 String Qtr. Hrs. - 1

One half-hour private instruction per week. May be repeated for credit.

MUS 114 Woodwind Qtr. Hrs. - 1

One half-hour private instruction per week. May be repeated for credit.

MUS 115 Brass Qtr. Hrs. - 1

One half-hour private instruction per week. May be repeated for credit.

MUS 116 Percussion Qtr. Hrs. - 1

One half-hour private instruction per week. May be repeated for credit.

MUS 117 Organ Qtr. Hrs. - 1

One half-hour private instruction per week. May be repeated for credit.

MUS 118 Piano Qtr. Hrs. - 1

One half-hour private instruction per week. May be repeated for credit.

MUS 201,202,203 Music Theory Qtr. Hrs. - 3,3,3

PR: MUS 103 or equivalent. Continuation of course content of MUS 101 through 103 integrated with intensive training in aural comprehension.

MUS 204 Voice Class Qtr. Hrs. - 1

Fundamental principles of the three areas of activity in singing, breathing, phonetic, and resonance.

MUS 205 String Class Qtr. Hrs. - 1

PR: Consent of instructor. Fundamental principles of string instrument technique. May be repeated for credit.

- MUS 206 Woodwind Class** **Qtr. Hrs. - 1**
 PR: Consent of instructor. Fundamental principles of woodwind instrument technique. May be repeated for credit.
- MUS 207 Brass Class** **Qtr. Hrs. - 1**
 PR: Consent of instructor. Fundamental principles of brass instrument technique. May be repeated for credit.
- MUS 211 Piano** **Qtr. Hrs. - 2**
 PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 212 Voice** **Qtr. Hrs. - 2**
 PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 213 String** **Qtr. Hrs. - 2**
 PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 214 Woodwind** **Qtr. Hrs. - 2**
 PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 215 Brass** **Qtr. Hrs. - 2**
 PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 216 Percussion** **Qtr. Hrs. - 2**
 PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 217 Organ** **Qtr. Hrs. - 2**
 PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 218,219,220 Piano Literature** **Qtr. Hrs. - 2,2,2**
 PR: Proficiency in an applied instrument or voice (200 level or above) or consent of instructor. Survey of stringed keyboard literature from the sixteenth century to the present with emphasis on technical, formal and performance problems.
- MUS 221,222,223 Song Literature** **Qtr. Hrs. - 2,2,2**
 PR: Proficiency in an applied instrument or voice (200 level or above) or consent of instructor. Survey of the development of the art song from the Middle Ages to the present with emphasis on technical, formal and performance problems.

MUS 301,302,303 Counterpoint

Qtr. Hrs. - 3.3.3

PR: MUS 203. Analysis and creative writing in the contrapuntal-harmonic technique of Baroque composers through the various methods of the twentieth century.

MUS 304 Madrigal Singers

Qtr. Hrs. - 1

PR: Consent of instructor by audition. May be repeated for credit. Participation in a select vocal ensemble for the study and performance of madrigals and similar works from the fourteenth century to the present.

MUS 307 Concert Choir

Qtr. Hrs. - 1

PR: Consent of instructor. May be repeated for credit. Study, rehearsal and performance of choral works of all styles and periods. Open to all students.

MUS 308 Band

Qtr. Hrs. - 1

PR: Consent of instructor. Participation in a chamber or large ensemble for purposes of studying and performing band literature. Open to all students. May be repeated for credit.

MUS 309 Orchestra

Qtr. Hrs. - 1

PR: Consent of instructor. Participation in a chamber or large ensemble for purposes of studying and performing symphonic orchestral literature. Open to all students. May be repeated for credit.

MUS 310 Chamber Music

Qtr. Hrs. - 1

PR: Consent of instructor. Participation in small ensemble for purposes of studying and performing chamber music literature. May be repeated for credit.

MUS 311 Piano

Qtr. Hrs. - 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

MUS 312 Voice

Qtr. Hrs. - 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

MUS 313 String

Qtr. Hrs. - 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

MUS 314 Woodwind

Qtr. Hrs. - 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

MUS 315 Brass

Qtr. Hrs. - 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

MUS 316 Percussion

Qtr. Hrs. - 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

MUS 317 Organ

Qtr. Hrs. - 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

MUS 320,321,322 Orchestration

Qtr. Hrs. - 3,3,3

PR: Proficiency in an applied instrument or voice (300 level or above) or Music Theory 203. Preliminary study of band and orchestral instruments. Scoring for band, orchestra and various instrumental combinations.

MUS 340,341,342 Music History

Qtr. Hrs. - 3,3,3

Music in Western Civilization traced from its primitive sources to the present; emphasis on composers' styles in relation to the cultural backgrounds of the various eras.

MUS 350 Composition

Qtr. Hrs. - 2-5

PR: MUS 303 or consent of instructor. May be repeated for credit. Creative work in large and small forms in the area of choral, instrumental and keyboard media.

MUS 351,352 Conducting

Qtr. Hrs. - 2

PR: Junior standing. Fundamental principles of instrumental and choral conducting techniques.

MUS 390 Fundamental Music Skills

Qtr. Hrs. - 3

(For non-majors). Primarily for the prospective teacher as an introduction to the basic music skills necessary for teaching in elementary and secondary schools; notation, rhythm, singing, basic piano skills and fundamentals of conducting.

MUS 399 Introduction to Music

Qtr. Hrs. - 3

(For non-majors). The study of music through listening, readings and discussions leading to greater enjoyment of music.

MUS 401,402,403 Form and Analysis

Qtr. Hrs. - 3,3,3

PR: MUS 303. Formal aspects of the styles of major composers with an emphasis on orchestral literature.

MUS 411 Piano

Qtr. Hrs. 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

MUS 412 Voice

Qtr. Hrs. - 2

PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.

- MUS 413 String** **Qtr. Hrs. - 2**
PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 414 Woodwind** **Qtr. Hrs. - 2**
PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 415 Brass** **Qtr. Hrs. - 2**
PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 416 Percussion** **Qtr. Hrs. - 2**
PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 417 Organ** **Qtr. Hrs. - 2**
PR: Consent of instructor. One hour private instruction per week. May be repeated for credit.
- MUS 421 Piano** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.
- MUS 422 Voice** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.
- MUS 423 String** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.
- MUS 424 Woodwind** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.
- MUS 425 Brass** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.
- MUS 426 Percussion** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.
- MUS 427 Organ** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.

- MUS 450,451,452 Music of the Twentieth Century** **Qtr. Hrs. - 3,3,3**
 Problems of contemporary style; electronic methods, literary and technical points of view; analysis of selected works from Satie, Debussy, Ravel, Stravinsky, Bartok, Schoenberg, Berg, Webern, Cage, Babbitt, Badings, Carter, Ives, Stockhausen, Messiaen, Xenakis, Varese, Henze and others.
- MUS 491 Special Topics** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- MUS 492 Seminar** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- MUS 494 Independent Study** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.

PHILOSOPHY

- PHI 105 Non-Formal Logic** **Qtr. Hrs. - 4**
 An examination of fallacies and other logical abuses in conjunction with an analysis of traditional modes in an attempt to encourage meaningful thought and usage.
- PHI 205 Elementary Formal Logic** **Qtr. Hrs. - 4**
 Basic analysis of patterns of inference; examination of logical form; development of elementary techniques for assessing validity of inferences.
- PHI 221 Introduction to Philosophy** **Qtr. Hrs. - 4**
 Inquiry into the meaning and justification of fundamental ideas and beliefs concerning reality, knowledge, and values; application to relevant topics in ethics, religion, and politics.
- PHI 305 Intermediate Formal Logic** **Qtr. Hrs. - 4**
 PR: PHI 205. Systematic study of propositional and first-order predicate logic; logistic systems and axiomatic methods; problems of metatheory, including consistency, completeness and decidability.
- PHI 312 Existentialism** **Qtr. Hrs. - 4**
 Study of existentialist analysis and criticism of the human situation as found in the writings of such philosophers as Kierkegaard, Nietzsche, Heidegger, Sartre, and Camus.
- PHI 314 Problems in Contemporary Philosophy** **Qtr. Hrs. - 4**
 Prominent issues in philosophies of the 20th century, apart from existentialism: logical positivism, linguistic analysis, phenomenology, and pragmatism.

- PHI 331 Ethics** Qtr. Hrs. - 4
 An examination of the nature of moral problems, judgments and principles with an emphasis on recent formulations in ethical theory.
- PHI 341 Aesthetics** Qtr. Hrs. - 4
 An investigation into the nature of human artistic experience with special reference to the problems of creativity.
- PHI 405 Philosophy of Religion** Qtr. Hrs. - 4
 Examination of basic ideas, beliefs, attitudes and functions of religion. The significance of religion in human experience.
- PHI 407 Philosophy of Literature** Qtr. Hrs. - 4
 An examination of fictional and non-fictional prose as it determines and reflects social, political economic, and religious institutions. Includes works by Sartre, Feuchtwanger, and Zola.
- PHI 409 Philosophy of Science** Qtr. Hrs. - 4
 An examination of the conceptual foundations and methodology of modern science.
- PHI 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- PHI 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.

PHYSICS

- PHYS 100,101 Physical Science** Qtr. Hrs. - 4,4
 Introduction to the basic principles of physical science. A study of selected topics emphasizing general concepts of the field. Familiarization with the basic laws governing our universe and man's environment. Recommended for satisfying the science requirements of the Environmental Studies Program.
- PHYS 103 Astronomy** Qtr. Hrs. - 4
 A descriptive survey of the properties of the solar system, the galaxies and the universe including the physical properties of stars as deduced from their radiation. Night observation sessions are included.
- PHYS 107,108 College Physics** Qtr. Hrs. - 4,3
 PR: Two years of high school mathematics. A study of classical mechanics, thermodynamics, electricity, magnetism, optics, and modern physics. Especially suited for students who desire to use physics to satisfy the science requirements of the Environmental Studies Program.
- PHYS 189 College Physics Laboratory** Qtr. Hrs. - 1
 PR: PHYS 107. Laboratory experimentation and instruction covering selected topics in physics. Three hours per week.

- PHYS 211, 212, 213 General Physics** **Qtr. Hrs. - 4,3,3**
 CR: MATH 211. An introductory course for students requiring a thorough study of the basic principles of physics. A study of classical mechanics, thermodynamics, electricity, magnetism, optics, and modern physics.
- PHYS 281 Scientific Instruments Laboratory** **Qtr. Hrs. - 4**
 PR: PHYS 107 or 103 or consent of instructor. A lecture-laboratory course in the fundamentals of mechanics, electrical circuitry, optics and nuclear physics as required in the application and operation of scientific instruments. Two three-hour classes per week.
- PHYS 282,283 General Physics Laboratory** **Qtr. Hrs. - 1,1**
 PR: PHYS 211. Laboratory experimentation and instruction covering selected topics in physics. Three hours per week.
- PHYS 304 Astronomy** **Qtr. Hrs. - 4**
 PR: PHYS 103 or equivalent. A continuation of PHYS 103 with emphasis on stellar and galactic evolution, and recent discoveries in astronomy. Appropriate for the Environmental Studies Program.
- PHYS 321 Intermediate Mechanics** **Qtr. Hrs. - 5**
 PR: PHYS 211, CR: MATH 223; or consent of instructor. A study of mechanics including vectors, coordinate transformations, fundamental theorems of Newtonian mechanics, rigid body dynamics and special relativity.
- PHYS 325 Special Relativity** **Qtr. Hrs. - 3**
 PR: PHYS 213 or equivalent, CR: MATH 223. Includes elementary special relativity invariants under Lorentz transformations in the four-vector formalism, and relativistic transformation of Coulomb's law to obtain the magnetic field of moving charges.
- PHYS 331 Intermediate Electricity and Magnetism** **Qtr. Hrs. - 5**
 PR: PHYS 212, CR: MATH 321; or consent of instructor. An introduction to scalar and vector fields, electrostatics, electrodynamics, magnetism, Maxwell's equations, radiation, waveguides, and physical optics.
- PHYS 341 Modern Physics** **Qtr. Hrs. - 5**
 PR: PHYS 213 and MATH 331 or consent of instructor. The study of black body radiation, the interaction of radiation and matter, atomic spectra, nuclear and high energy physics, particle accelerators, molecular, and solid state physics.
- PHYS 344 Modern Physics for Engineers** **Qtr. Hrs. - 3**
 PR: ENGR 221 and MATH 331. Selected topics in atomic, nuclear, molecular, and solid state physics. A study of spectroscopy, X-rays, nuclear radiation, and cosmic rays.

- PHYS 345 Astrophysics** **Qtr. Hrs. - 3**
PR: PHYS 213 or equivalent. Elementary physics of stellar systems, including the theories of evolution of stars and planets, models of stellar interiors, properties of stellar atmospheres and stellar spectra of all wavelengths. Includes night sessions for photography and spectroscopy of celestial objects.
- PHYS 354 Optics and Wave Motion for Engineers** **Qtr. Hrs. - 3**
PR: ENGR 211 and MATH 321. Selected topics in optics, acoustics, and related wave phenomena. A study of reflection, refraction, interference, and diffraction.
- PHYS 371 Statistical Physics** **Qtr. Hrs. - 5**
PR: PHYS 341 or consent of instructor. Quantum statistics in thermodynamics and kinetic theory.
- PHYS 381 Physics Laboratory — Electronics** **Qtr. Hrs. - 3**
PR: PHYS 212, CR: MATH 223; or consent of instructor. Lecture and laboratory work stressing electronic principles through the study of test equipment, power supplies, amplifiers, oscillators, and pulse circuits.
- PHYS 382, 383 Physics Laboratory — Intermediate** **Qtr. Hrs. - 3,3**
PR: PHYS 213 or consent of instructor. Laboratory work in basic measurements of physical constants; intermediate level experiments in electronics, modern physics, nuclear physics, optics and solid state physics.
- PHYS 451 Optics** **Qtr. Hrs. - 3**
PR: MATH and PHYS 331 or PHYS 354; or consent of instructor. A study of modern approaches to refraction, interference, diffraction, polarization, scattering absorption and stimulated emission, spectroscopy and lasers.
- PHYS 461 Solid State Physics** **Qtr. Hrs. - 3**
PR: PHYS 341 or consent of instructor. Properties of solids, crystal binding, free electron model, band theory of solids, Fermi surface, and solid state applications.
- PHYS 471 Quantum Mechanics** **Qtr. Hrs. - 3**
PR: PHYS 341 or consent of instructor. A study of the postulates of quantum mechanics, the Schrodinger equation, and an introduction to the statistics of many particle systems.
- PHYS 473 Atomic Physics** **Qtr. Hrs. - 3**
PR: PHYS 341 and MATH 331 or consent of instructor. An introduction to quantum mechanics, the hydrogen atom, multi-electron atoms, atomic and molecular spectra, Stark and Zeeman effects and molecular structure.
- PHYS 477 Nuclear Physics** **Qtr. Hrs. - 3**
PR: PHYS 341 and MATH 331; or consent of instructor. Nuclear force, structure moments and models. Alpha decay, beta decay, gamma-ray emission, nuclear reactions and applications of nuclear physics.

- PHYS 481, 482 Physics Laboratory — Advanced** Qtr. Hrs. - 3,3
 PR: PHYS 382 or consent of instructor. Advanced laboratory experiments in electronics, atomic and molecular physics, nuclear physics, optics, solid state physics and astrophysics. Major emphasis placed on experimental design, data analysis and scientific writing.
- PHYS 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- PHYS 492 Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- PHYS 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- PHYS 497 Research** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.

POLITICAL SCIENCE

- PCL 201 American National Government** Qtr. Hrs. - 4
 A study of the dynamics of American national government, including its structure, organization, powers, and procedures.
- PCL 203 Principles of Political Science** Qtr. Hrs. - 4
 Scope of political science and its development as a field with emphasis on areas of concern; analysis of major approaches to the study of politics; familiarization with recent developments in research and research approaches.
- PCL 300 State Government** Qtr. Hrs. - 4
 PR: PCL 210, 203 or consent of instructor. A comparative study of American state governments and political processes, with emphasis on Florida. Structures and functions of state governments will be considered as well as federal-state and state-local relations.
- PCL 305 Political Parties and Processes** Qtr. Hrs. - 4
 PR: PCL 201, 203 or consent of instructor. Study of American politics with major emphasis upon the role, organization, functions, and processes of parties in the American political system.
- PCL 308 The American Presidency** Qtr. Hrs. - 4
 PR: PCL 201, 203 or consent of instructor. Examination of the presidency as an institution and of the evolution in status, powers, administrative responsibilities, leadership and decision-making roles of the chief executive in the American political system.

PCL 310 Congress and the Legislative Process

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. The nature, role, and functions of the legislative process; the dynamics of executive-legislative relations and resultant problems.

PCL 321 International Relations

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. Analysis of the fundamental principles and factors affecting interstate relations; the foreign policy decision-making processes of states; the role and problem of power; conflict and methods of resolution.

PCL 323 Comparative International Politics

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. Application of the theory and fundamentals of international politics to contemporary world affairs with attention to the impact of twentieth century developments upon the international system and its actors.

PCL 341 Comparative European Politics

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. An analytical and comparative study of the major governments of Europe and their impact upon the development of types of political systems.

PCL 343 Politics of Developing Areas

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. An analysis of non-Western political systems with emphasis upon the problems of political, socio-economic, and cultural development as they affect attempts to achieve the transformation to modernization.

PCL 360 American Political Philosophy

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. A survey of the chief contributions of American political thought, their sources and background as focused within the context of American historical and institutional development.

PCL 403 Political Behavior

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. A study of the role and impact of group behavior and interest articulation in a pluralistic society and their effect upon the political process.

PCL 405 Political Theory

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. Examination of various normative and empirical approaches to the study of political science, stressing contemporary developments in the field.

PCL 410 Public Administration

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. Analysis of administrative theories and the process of implementing public policies in a democratic society.

PCL 413 Metropolitan Politics

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. Analysis of political patterns, processes and issues in American communities.

PCL 414 Metropolitan Adminsitration I

Qtr. Hrs. - 4

PR: PCL 410 or 413 or consent of instructor. Study of the formal and informal socio-political structures that govern urban areas; emerging patterns of government, and management practices in urban and suburban settings.

PCL 415 Metropolitan Administration II

Qtr. Hrs. - 4

PR: PCL 410 or 413 or consent of instructor. The study of the legislative, administrative, and judicial aspects of government participation in urban development processes, and of the devices and techniques that have been developed to guide and implement these activities.

PCL 416 Public Administration Internship

Qtr. Hrs. - 12-15

PR: Consent of instructor. Internship in municipal, county, state or federal government, including generalist assignments or concentrations in such fields as personnel, planning, budget and fiscal, procurement, public safety, or housing and urban development for one quarter.

PCL 427 American Foreign Policy

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. An analysis of the traditions and development of American foreign policy with major emphasis on the role and policies of the United States in the contemporary world.

PCL 430 International Organizations

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. The nature and growth of international agencies of cooperation. Attention focused on the problems and development of functional, regional, and universal organizations.

PCL 433 International Law

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. An introduction to the nature of evolution, and sources of international law and its role in interstate relations.

PCL 435 Coercion in International Politics

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. An inclusive examination of the role and utility of coercive techniques of interaction among states in a nuclear age ranging from low-tension producing techniques of diplomatic intervention through theories of nuclear strategy and deterrence.

PCL 440 Comparative Public Administration I

Qtr. Hrs. - 4

PR: PCL 201, 203 or consent of instructor. An analysis of administrative structures and processes of selected countries, including an evaluation of the influence of economic, social and political environment on bureaucratic functions and the role of the executive.

- PCL 441 Comparative Public Administration II** **Qtr. Hrs. - 4**
 PR: PCL 201, 203 or consent of instructor. A case study approach to the problems of administration in diverse political environments stressing such functional aspects of bureaucratic and administrative behavior and process as patterns of organization, personnel systems, field services, administrative style and the political power position of the bureaucracy.
- PCL 450 American Public Policy** **Qtr. Hrs. - 4**
 PR: PCL 201, 203 or consent of instructor. The American policy-making process with a focus upon contemporary problems including the political impact of the "New Economics," government and business relations, wealth and income inequality, the malapportionment of societal power, and social conflict.
- PCL 461 Political Philosophy** **Qtr. Hrs. - 4**
 PR: PCL 201, 203 or consent of instructor. Study of the development of political and social ideas in Western thought from early Greece to the Renaissance.
- PCL 462 Political Philosophy** **Qtr. Hrs. - 4**
 PR: PCL 201, 203 or consent of instructor. Renaissance to the 19th Century.
- PCL 463 Political Philosophy** **Qtr. Hrs. - 4**
 PR: PCL 201, 203 or consent of instructor. Study of contemporary Western political and social thought in the 19th and 20th Centuries.
- PCL 471 American Constitutional Law** **Qtr. Hrs. - 5**
 PR: PCL 201, 203 or consent of instructor. The impact of judicial decision-making upon the growth of American political institutions and processes.
- PCL 473 American Constitutional Law** **Qtr. Hrs. - 5**
 PR: PCL 201, 203 or consent of instructor. The role of the judiciary in the focusing and refinement of individual rights and civil liberties in American society.
- PCL 492 Seminar** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- PCL 494 Independent Study** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- PCL 497 Research** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.

PSYCHOLOGY

- PSY 201,202 General Psychology** **Qtr. Hrs. - 3,3**
 The basic principles, theories, and methods of contemporary psychology.

- PSY 300 Applied Psychology** Qtr. Hrs. - 3
Applications of principles of psychology to personal adjustment, industry, and education.
- PSY 301 Basic Learning Processes** Qtr. Hrs. - 4
PR: PSY 201, 202. A survey of theories and research findings from basic laboratory investigation of learning phenomena. Lec-lab.
- PSY 302 Complex Human Learning** Qtr. Hrs. - 4
PR: PSY 201, 202. Selected topics from theories and research on complex human learning and problem solving. Lec-lab.
- PSY 303 Physiological Psychology** Qtr. Hrs. - 4
PR: PSY 201, 202. Physiological bases of behavior.
- PSY 304 Perception** Qtr. Hrs. - 4
PR: PSY 201, 202. Consideration of physical and psychological variables in perceptual phenomena, Lec-lab.
- PSY 305 Psychological Measurement** Qtr. Hrs. - 4
PR: PSY 201, 202, STAT 201. Theory of test construction and consideration of selected measures of psychological characteristics.
- PSY 306 Psychology of Adjustment** Qtr. Hrs. - 4
Psychological principles of adjustment, application of psychology to problems in living.
- PSY 307 Motivation** Qtr. Hrs. - 4
PR: PSY 201, 202. Psychological and physiological aspects of human motivation.
- PSY 308 Social Psychology** Qtr. Hrs. - 4
PR: PSY 201, 202. Effects of social situations and social variables on the behavior of individuals.
- PSY 309 Personality Theory** Qtr. Hrs. - 4
PR: PSY 201, 202. A survey of theory and research on the development of personality characteristics. Lec-lab.
- PSY 310 Abnormal Psychology** Qtr. Hrs. - 4
PR: PSY 201, 202. Classification, causation, and treatment of deviant patterns of behavior.
- PSY 311 Methods of Psychological Research** Qtr. Hrs. - 3
PR: PSY 201, 202. Critical evaluation of research methods in psychology, considerations of internal and external validity.

- PSY 312 Clinical Psychology** Qtr. Hrs. - 4
PR: PSY 309, 310. Consideration of psychodiagnostics, behavioral modification techniques and clinical research. Lec-lab.
- PSY 313 Developmental Psychology** Qtr. Hrs. - 4
PR: PSY 201, 202. The effects of genetic, psychological, maturational, and social factors on behavior at various stages of development.
- PSY 314 Industrial Psychology** Qtr. Hrs. - 4
PR: PSY 201, 202, STAT 201. Psychological principles of employee selection, training, and morale.
- PSY 321 Principles of Behavior Modification** Qtr. Hrs. - 4
PR: PSY 301. An examination of the control of behavior through applications of principles and theories of learning. Examples are drawn from clinical and social psychology, and from child rearing.
- PSY 322 Clinical Psychology Research Practicum** Qtr. Hrs. - 4
PR: PSY 301, 310, 311. Research and practicum experience in mental health related facilities located in the immediately surrounding area.
- PSY 323 Comparative Psychology** Qtr. Hrs. - 4
PR: PSY 201, 202. A study of comparative behaviors of lower animals.
- PSY 333 Development of Language and Conceptual Behavior** Qtr. Hrs. - 4
PR: PSY 301. Normal ontogeny of language and conceptual behavior from infancy to adulthood; disorders of linguistic and conceptual development and their remediation; key theoretical interpretations.
- PSY 340 Environmental Psychology** Qtr. Hrs. - 3
PR: PSY 201, 202, STAT 201. An investigation of theory and research relevant to the relationship between the physical environment and the behavior of man.
- PSY 343 Educational Psychology** Qtr. Hrs. - 4
PR: STAT 201, 202. Application of psychological principles and research methods to classroom behavior and learning.
- PSY 390 Undergraduate Field Work** Qtr. Hrs. - 1-3
Placement in a community agency for supervised experience in applications of psychology to community problems.
- PSY 401 Senior Research Proposal** Qtr. Hrs. - 2
PR: STAT 401 and senior standing. Study in depth of bibliography and methods of psychological research. Each student will write, and have approved, a proposal for an original piece of research.
- PSY 403 Introduction to Neuropsychology** Qtr. Hrs. - 4
PR: 303A. Study of brain function with particular emphasis on human behavior. LEC LAB.

- PSY 405 History and Systems of Psychology** Qtr. Hrs. - 4
PR: PSY 301, 309. Historical development of psychology with emphasis on classical theoretical positions.
- PSY 408 Experimental Social Psychology** Qtr. Hrs. - 4
PR: PSY 201, 202, STAT 201. Study of experimental investigations of the social behavior of animal and man. Lec-lab.
- PSY 415 Individual Intelligence Testing** Qtr. Hrs. - 5
PR: PSY 305. A consideration of the nature of intelligence and its measurement. Supervised training in Stanford-Binet and Wechsler testing. Lec-lab.
- PSY 492 Seminar** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- PSY 494 Independent Study** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- PSY 497 Research** Qtr. Hrs. - 2-5
PR: Consent of instructor.
- PSY 601 Human Learning and Cognitive Processes** Qtr. Hrs. - 4
PR: Graduate admission and Consent of Instructor. Consideration of the basic theories and research findings from laboratory and field investigation of human learning phenomena.
- PSY 605 Psychological Testing I** Qtr. Hrs. - 4
PR: Graduate admission. Status and Consent of Instructor. Theory of test construction including problems of test reliability and validity.
- PSY 606 Psychological Testing II** Qtr. Hrs. 4
PR: Graduate admission and Consent of Instructor. An examination of the most commonly used instruments in psychological testing and a critical evaluation of their potential utility.
- PSY 607 Human Motivation** Qtr. Hrs. - 4
PR: Graduate admission and Consent of Instructor. Survey of the area of human motivation with emphasis on empirical findings.
- PSY 608 Advanced Social Psychology and Group Processes** Qtr. Hrs. - 4
PR: Graduate admission and Consent of Instructor. Consideration of the results of studies in group processes, including communication networks, leadership, and interpersonal bargaining behavior.
- PSY 609 Experimental Personality** Qtr. Hrs. - 4
PR: Graduate admission and Consent of Instructor. Survey of the area of personality theory with emphasis on the experimental foundations of the various theories.

- PSY 610 Psychology of Individual Differences** **Qtr. Hrs. - 4**
PR: Graduate admission and Consent of Instructor. A survey of the problems or measurement and areas of difference between individuals.
- PSY 612 Counseling Psychology** **Qtr. Hrs. - 4**
PR: Graduate admission and Consent of Instructor. Various theories of counseling and their evaluated efficiency, including the problems of research in counseling techniques.
- PSY 615 Counseling Practicum** **Qtr. Hrs. - 4**
PR: Graduate admission and Consent of Instructor. Application of counseling techniques in a supervised setting.
- PSY 620 Information Processing and Decision Making** **Qtr. Hrs. - 4**
PR: Graduate admission and Consent of Instructor. Application of statistical principles and decision theories to the decision making process. Application of computers to managerial decisions.
- PSY 640 Consumer Psychology** **Qtr. Hrs. - 4**
PR: Graduate admission and Consent of Instructor. Application of psychology to consumer behavior. Survey of research in product selection, markets, and advertising.
- PSY 641 Organizational Psychology** **Qtr. Hrs. - 4**
PR: Graduate admission and Consent of Instructor. Survey of present theories in Organizational Psychology. Application of psychological research to organizational functioning.
- PSY 650 Job Analysis and Personnel Selection** **Qtr. Hrs. - 4**
PR: Graduate admission and Consent of Instructor. Research in and application of job evaluation methods and selection models.
- PSY 651 Training and Performance Appraisal** **Qtr. Hrs. - 4**
PR: Graduate admission and Consent of Instructor. Survey of problems of industrial training and performance appraisal. Analysis of relevant research in problems of evaluation of training effectiveness.
- PSY 660 Industrial Psychology Practicum I** **Qtr. Hrs. - 3**
PR: Graduate admission and Consent of Instructor. Supervised research in industry.
- PSY 661 Industrial Psychology Practicum II** **Qtr. Hrs. - 3**
PR: Graduate admission and Consent of Instructor. Supervised research in industry.
- PSY 662 Industrial Psychology Practicum III** **Qtr. Hrs. - 3**
PR: Graduate admission and Consent of Instructor. Supervised research in industry.
- PSY 670 Teaching and Training Evaluation** **Qtr. Hrs. - 3**
PR: Graduate admission and Consent of Instructor. Evaluation of effective teaching methods and practicum experience.

RADIO/TELEVISION

- RTV 140 Foundations of Broadcasting** **Qtr. Hrs. - 4**
Nature of the media, the mechanics of operation, history, economics, programming, and internal and external controls.
- RTV 240 Broadcast Techniques** **Qtr. Hrs. - 2**
Introduction, utilization and proficiency development of studio and remote operating techniques and equipment (consoles, recorders, cameras, etc.) application in broadcasting, education and institutions. (2 hrs. lecture, 2 hrs. lab)
- RTV 241 Television Graphics** **Qtr. Hrs. - 2**
A study of the unique design, production and evaluation of print, slides and studio displays required for televised non-verbal communications. (2 hrs. lecture, 2 hrs. lab).
- RTV 340 Audio Production** **Qtr. Hrs. - 4**
PR: RTV 240 or consent of instructor. The production of music (live and recorded), talk, interview, discussion, sports, and documentary including performance (talent and announcing) and direction.
- RTV 341 Television Production** **Qtr. Hrs. - 4**
PR: RTV 240 and 241 or consent of instructor. Emphasis on the coordination of talent, cameras, visuals, audio and lighting with the dramatic values of the presentation.
- RTV 342 Broadcast Journalism I** **Qtr. Hrs. - 4**
PR: COM 319 or Consent of Instructor. Historical, legal, and quasi-legal influences on broadcast news; introduction to news sources, writing and interviewing techniques for radio-television news.
- RTV 344 Broadcast Continuity and Programming I** **Qtr. Hrs. - 4**
Practice in the preparation of written materials for all kinds of radio and television programs except news, documentary, and drama. Examination of program practices, development, and traffic systems.
- RTV 345 Film for Television** **Qtr. Hrs. - 4**
Principles and practices of 8mm and 16mm film usage within the television industry.
- RTV 441 Television Directing** **Qtr. Hrs. 4**
PR: RTV 341. The planning, preparation and directing of programs with emphasis on dramatic values of composition, movement, position, action, timing, pacing, climax, ascendant and descendant values; intergration of the parts to the whole.
- RTV 444 Broadcast Continuity and Programming II** **Qtr. Hrs. - 4**
PR: RTV 344 or consent of instructor. Preparation of documentaries and dramatic writing for radio and television.

- RTV 445 Television Film Production** **Qtr. Hrs. - 4**
 PR: Consent of instructor. Planning and preparation of filmed documentaries, public service and commercial productions. (Laboratory hours to be arranged.)
- RTV 446 Radio, Television and Society** **Qtr. Hrs. - 4**
 Impact of electronic media upon the habits, customs and thinking of our times. Considerations of internal media problems.
- RTV 448 Broadcast Regulations** **Qtr. Hrs. 4**
 PR: RTV 140 or RTV 342. Federal, state, local and self-regulator agencies and practices which govern electronic media.
- RTV 450 Broadcast Journalism II** **Qtr. Hrs. - 4**
 PR: RTV 342. Principles and practice of news preparation for electronic media. RTV 470 required for students taking RTV 450.
- RTV 451 Radio-Television Advertising** **Qtr. Hrs. - 3**
 PR: COM 434 or Consent of Instructor. Radio and television as advertising media; advertisers' demands and budget; appropriate programs for the sponsors' needs; writing of commercial continuity.
- RTV 452 Broadcast Criticism** **Qtr. Hrs. - 4**
 Evaluation and criticism of past and present radio and television programs, policies, and critics. Concentration on the problem of criteria development.
- RTV 453 Educational Broadcasting** **Qtr. Hrs. - 4**
 Values and potentials of radio and television in education, with particular emphasis on current use of the media in elementary and secondary schools, colleges and universities, and adult education.
- RTV 454 Instructional Broadcasting** **Qtr. Hrs. - 4**
 Learning theory applied to the creation, production, and dissemination of lessons via electronic media. Introduction to and practicum in radio and television studios as well as lesson presentation.
- RTV 455 International Broadcasting** **Qtr. Hrs. 4**
 PR: Consent of Instructor. Comparative analysis of national broadcast systems. World broadcasting as a social political and economic force.
- RTV 458 Broadcast Management** **Qtr. Hrs. - 4**
 PR: RTV 448. Consideration of broadcast management problems in station operations at the local, regional, and national levels.
- RTV 491 Special Topics** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- RTV 494 Independent Study** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.

RELIGION

- REL 300 The Hebrew and Christian Heritage Qtr. Hrs. - 4
Same as HUM 300.
- REL 315 The Religious Heritage of China & Japan Qtr. Hrs. - 4
Same as HUM 315.
- REL 317 The Religious Heritage of India Qtr. Hrs. - 4
Same as HUM 317.
- REL 318 The Religious Heritage of Islam Qtr. Hrs. - 4
Same as HUM 318.
- REL 321 Religion in America Qtr. Hrs. - 4
The effect of Puritan, Quaker, Anglican, and Catholic traditions on various regions; the phenomenon of evangelism; the rise of new sects such as Mormonism.
- REL 441 Modern Theology Qtr. Hrs. - 4
An exploration of the revolution in religious thought based on the work of Kierkegaard, Jaspers, Heidegger, Tillich, Barth, Niebuhr, Bonhoeffer, Bultmann, Altizer, and Teilhard de Chardin.
- REL 491 Special Topics Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

RUSSIAN

- RUS 101 Elementary Russian Language and Civilization Qtr. Hrs. - 3
Designed to initiate the student to the major language skills; listening, speaking, reading, and writing, in addition to an introduction to Russian culture.
- RUS 102 Elementary Russian Language and Civilization Qtr. Hrs. - 3
PR: RUS 101 or equivalent. Continuation of RUS 101.
- RUS 103 Elementary Russian Language and Civilization Qtr. Hrs. - 3
PR: RUS 102 or equivalent. Continuation of RUS 102.
- RUS 201 Intermediate Russian Language and Civilization Qtr. Hrs. - 3
PR: RUS 103 or equivalent. Designed to continue development of language skills at the intermediate level, together with a review of grammar, study of syntax, idiomatic expressions, extensive reading, and further study of Russian culture.
- RUS 202 Intermediate Russian Language and Civilization Qtr. Hrs. - 3
PR: RUS 201 or equivalent. Continuation of RUS 201.

RUS 203 Intermediate Russian Language and Civilization **Qtr. Hrs. - 3**
PR: RUS 202 or equivalent. Continuation of RUS 202 with greater emphasis on Russian civilization from the Middle Ages to the present.

RUS 301 Russian Composition **Qtr. Hrs. - 4**
PR: RUS 203 or equivalent. Development of skills in composition through systematic review of grammar, syntax, and development of style. Free and controlled written compositions required.

RUS 303 Russian Conversation **Qtr. Hrs. - 4**
PR: RUS 203 or equivalent. Development of skills in conversation and comprehension through practice and systematic review of phonology and grammatical structure.

SCIENCE

SCI 490 Senior Seminar: Science in Human Affairs **Qtr. Hrs. - 2**
The impact of science on modern society. This course, primarily intended for the senior student, is offered as one of the Advanced Environmental Studies seminars.

SOCIAL SCIENCE

SSC 490 Senior Seminar: Social Sciences in Human Affairs **Qtr. Hrs. - 2**
An overview of the development, purposes, and functioning of the social sciences in modern society. Primarily intended for senior students. Offered as one of the Advanced Environmental Studies seminars. Not open to the students in the College of Social Sciences.

SOCIOLOGY

Introductory Sequence: SOC 201, 202.

Theory and Research Sequence: SOC 304, 306, 307, 499.

Social Psychology Area: SOC 352, 353, 354, 451.

Anthropology Concentration: SOC 310, 311, 314, 315, 316, 402.

Social Welfare Concentration: SOC 340, 341, 342, 343, 412, 498.

Social Organization: SOC 325, 326, 333, 335, 407, 411, 416.

Social Deviance: SOC 331, 345, 346, 348, 350.

SOC 201, 202 General Sociology **Qtr. Hrs. - 3,3**
An introduction to the principles of sociology. Primary emphasis is given to the understanding and application of such concepts as human interaction, the nature of the group and group interrelationships, social and cultural systems, the individual as a reflection of his group associations.

- SOC 304 The Development of Social Thought** Qtr. Hrs. - 4
 PR: SOC 201. An overview of theories concerning the nature of man as a "social being." The nature of society, from the beginnings of the scientific study of man's social life to World War II.
- SOC 306 Modern Sociological Thought** Qtr. Hrs. - 4
 PR: SOC 201, 304. A study of major European and American contributors to, and schools of, modern sociology from World War II to the present.
- SOC 307 The Sociology of Religion** Qtr. Hrs. - 4
 Patterns in religious behavior in various societies with primary emphasis on myth, rite, taboo and festival as social phenomena.
- SOC 310 Physical Anthropology & Archeology** Qtr. Hrs. - 4
 An introduction to the principles of anthropology. Inquiry into the natural history of mankind, man's place among the primates, and evolution. Review of evidence of earlier sociocultural framework, prehistory, and archeological background bearing on man's past achievements.
- SOC 311 Social Anthropology** Qtr. Hrs. - 4
 Framework and principles of sociocultural organization as exemplified among various cultures and ethnic groups around the world. Deals with kinship subsistence techniques, political structure language, culture and personality, and other topics which combine to form the "holistic approach" of anthropology.
- SOC 312 Old World Prehistory** Qtr. Hrs. - 4
 PR: SOC 310, 311. An introduction to the emergence of prehistoric archaeology as a discipline, review of fundamental theoretical approaches to prehistory, and survey of the archaeological evidence for prehistoric cultural manifestations in the Old World from earliest times to the emergence of certain civilizations.
- SOC 313 New World Prehistory** Qtr. Hrs. - 4
 PR: SOC 310, 311. An introduction to the development of archaeological methods and theories in the New World, development of certain space-time frameworks and surveys of some findings concerning Pre-Columbian peoples.
- SOC 314 Cultural Anthropology** Qtr. Hrs. - 4
 PR: SOC 310, 311. Emergence and history of man's cultures, their evolution and development, and the structure and functioning of human cultures in every time and place.
- SOC 315 Physical Anthropology** Qtr. Hrs. - 4
 PR: SOC 310, 311. The study of man as a product of the evolutionary process. Study and analysis of diversity among present human populations.
- SOC 316 Comparative Social Organization** Qtr. Hrs. - 4
 PR: SOC 310, 311. Introduction to anthropological viewpoints on role of marriage, family, kin groups, and descent as focal points for the study of economic, political and ideological aspects of social organization.

- SOC 317 Comparative Cultures: People and Societies of Africa** Qtr. Hrs. - 4
 PR: 310, 311. A survey of past native African cultures, and an ethnographic inquiry into cultural diversity in African tribal societies. A consideration of cultural changes, the impact of colonialism, and the emergence of new African states.
- SOC 320 Collective Behavior** Qtr. Hrs. - 4
 PR: SOC 201. An analysis of the way in which new social groupings arise from unstructured situations. Standard topics include behavior of mobs, riots, crowds and spatially dispersed collectives.
- SOC 325 Urban Sociology** Qtr. Hrs. - 4
 PR: SOC 201. Historical roots of urbanization. Impact of city life on social actions, social relationships, social institutions and the types of civilizations derived from and based on urban modes of living.
- SOC 326 Rural Sociology** Qtr. Hrs. - 4
 PR: SOC 201, Rural American life, its resources, and the problems of changing patterns of rural social structure.
- SOC 331 Social Problems** Qtr. Hrs. - 4
 PR: SOC 201. Major social problems created by the complex social situations of modern life. Sociological analysis of such problem areas as crime and delinquency, poverty, racial tensions, over-population, and drug addiction.
- SOC 333 Industrial Sociology** Qtr. Hrs. - 4
 PR: SOC 201. Application or development of principles of sociology relevant to the industrial mode of production and the industrial way of life.
- SOC 335 Social Institutions** Qtr. Hrs. - 4
 PR: SOC 201. Social institutions, social differentiation, and social control, with emphasis on American and other modern societies.
- SOC 336 Social Stratification** Qtr. Hrs. - 4
 PR: SOC 201. Study of class, status and power; cultural variations in stratification system; patterns of mobility and change.
- SOC 340 Social Welfare: A Social Institution** Qtr. Hrs. - 4
 PR: SOC 201. An introduction to social welfare as an institution. The historical and philosophical development of social welfare as related to current social welfare objectives and programs.
- SOC 341 Social Work: Principles and Methods** Qtr. Hrs. - 4
 PR: SOC 340. A theoretical consideration of the concepts and methods of social work practice and the values, activities and roles of social workers in various practice settings.
- SOC 342 Government and Social Welfare** Qtr. Hrs. - 4
 PR: SOC 340. The role of federal, state, and local government in social welfare. Laws, policy formulation, administration, and current issues will be examined.

- SOC 343 The Community and Social Welfare** Qtr. Hrs. - 4
PR: SOC 340. The community as a social system in meeting human needs. Emphasis on private agencies, including their organization, functions, interrelationships and coordination with governmental agencies.
- SOC 344 Sociology of Deviant Behavior** Qtr. Hrs. - 4
PR: SOC 201. An examination of the nature, types and societal reactions to deviant behavior; special emphasis on the process of stigmatization and the emergence of deviant subcultures.
- SOC 345 Juvenile Delinquency** Qtr. Hrs. - 4
PR: SOC 201. Types of delinquent behavior found among juveniles, possible causes and ways society attempts to treat the various forms of delinquency.
- SOC 346 Criminology** Qtr. Hrs. - 4
PR: SOC 201. Chief causes of antisocial behavior and current methods of prevention and reform. Effects of heredity and environment, prevalence of delinquency and crime, penal institutions.
- SOC 348 Sociology of Alcoholism** Qtr. Hrs. - 4
PR: SOC 201. Introduction to the nature of alcoholism and review of its impact on society.
- SOC 352 Race and Ethnic Minorities in the United States** Qtr. Hrs. - 4
PR: SOC 201. Causes and consequences of group conflict, with emphasis upon majority-minority relations, prejudice and discrimination, alternative theories of prejudice, the effects of minority status on individuals and possibilities for attitude and behavior change.
- SOC 353 Culture and Personality** Qtr. Hrs. - 4
PR: SOC 201. Theories of the variations in personality in relation to culture and group life in tribal and modern societies.
- SOC 354 Sociology of Adolescence** Qtr. Hrs. - 4
PR: SOC 201. An examination of the transition to adulthood in various societies with primary emphasis on initiation and the contemporary American problems centering around the "adolescent crisis."
- SOC 360 Social Change: A Historical and Theoretical Approach** Qtr. Hrs. - 4
PR: SOC 201. Concerned with the context and essential sources of social development and change.
- SOC 362 Contemporary Woman and Society** Qtr. Hrs. - 4
PR: SOC 201. An introduction to the changing system of the American Woman in contemporary society with emphasis on the political, historical, economic, and cultural forces influencing her role.
- SOC 380 Afro-American Social Problems** Qtr. Hrs. - 4
PR: SOC 201 or consent of instructor. A study of contemporary Afro-American social problems in the United States.

- SOC 402 Method and Theory in Anthropology** Qtr. Hrs. - 4
 PR: SOC 310, 311. Central methodological and theoretical concerns of anthropology in its emergence as a separate discipline and field of study. Cultural evolutionism, diffusionism, historical particularism, functionalism and their role in the development of anthropology.
- SOC 403 Anthropological Linguistics** Qtr. Hrs. - 4
 PR: SOC 310, 311, ENG 371. Survey of anthropological linguistic field techniques in non-native cultures and application of linguistic theories to study of socio-cultural systems.
- SOC 406 Social Gerontology** Qtr. Hrs. - 4
 PR: SOC 201. An examination of the sociological aspects of aging in the contemporary United States. Special needs of the aged in housing, leisure, employment income maintenance, recreation and health, will be considered as well as programs and services designed to meet their needs.
- SOC 407 The Family** Qtr. Hrs. - 4
 PR: SOC 201. The study of the family as a social institution. The family through history, and the family cross-culturally. The modern American family as a distant social and cultural complex. Changes in the family system. Courtship and marriage.
- SOC 408 Social Change in Developing Areas** Qtr. Hrs. - 4
 PR: SOC 201 and one course in statistics. A study of growth problems in the emerging nations of Africa and Latin America.
- SOC 411 Demography** Qtr. Hrs. - 4
 PR: SOC 201. Concerned with the study of human population, its distribution, composition and change.
- SOC 412 Field Experience and Seminar** Qtr. Hrs. - 5
 PR: SOC 340, 341, 342, 343 and Senior standing. Supervised learning experiences in local social agencies relating theory and academic preparation with practice. Eight hours per week plus two hour weekly seminar.
- SOC 416 Human Ecology** Qtr. Hrs. - 4
 PR: SOC 201. Principles governing the spatial distribution of human populations and activities within an area.
- SOC 451 Contemporary Social Movements** Qtr. Hrs. - 4
 PR: SOC 201. Causes and effects of various social movements in American society compared to large-scale upheavals throughout the West. Considers various theories of explanation.
- SOC 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- SOC 494 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. For graduating seniors in Sociology. May be repeated for credit.

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| SOC 495 Undergraduate Research Methods | Qtr. Hrs. - 2-5 |
| PR: Consent of instructor. May be repeated for credit. | |
| SOC 497 Undergraduate Research | Qtr. Hrs. - 2-5 |
| PR: Consent of instructor. May be repeated for credit. | |

SPANISH

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| SPA 101 Elementary Spanish Language and Civilization | Qtr. Hrs. - 3 |
| Designed to initiate the student to the major language skills; listening, speaking, reading, and writing, in addition to an introduction to Spanish culture. | |
| SPA 102 Elementary Spanish Language and Civilization | Qtr. Hrs. - 3 |
| PR: SPA 101 or equivalent. Continuation of SPA 101. | |
| SPA 103 Elementary Spanish Language and Civilization | Qtr. Hrs. - 3 |
| PR: SPA 102 or equivalent. Continuation of SPA 102. | |
| SPA 201 Intermediate Spanish Language and Civilization | Qtr. Hrs. - 3 |
| PR: SPA 103 or equivalent. Designed to continue development of language skills at the intermediate level, together with a review of grammar, study of syntax, idiomatic expressions, extensive reading, and further study of Spanish culture. | |
| SPA 202 Intermediate Spanish Language and Civilization | Qtr. Hrs. - 3 |
| PR: SPA 201 or equivalent. Continuation of SPA 201. | |
| SPA 203 Intermediate Spanish Language and Civilization | Qtr. Hrs. - 3 |
| PR: SPA 202 or equivalent. Continuation of SPA 202 with greater emphasis on Spanish civilization from the Middle Ages to the present. | |
| SPA 301 Spanish Composition | Qtr. Hrs. - 4 |
| PR: SPA 203 or equivalent. Development of skills in composition through systematic review of grammar, syntax and development of style. Free and controlled written composition required. | |
| SPA 303 Spanish Conversation | Qtr. Hrs. - 4 |
| PR: SPA 203 or equivalent. Development of skills in conversation and comprehension through practice and systematic review of phonology and grammatical structure. | |
| SPA 311 Survey of Spanish Literature | Qtr. Hrs. - 3 |
| PR: SPA 203 or equivalent. Main literary currents and works from the Middle Ages through the Renaissance and Baroque. | |

- SPA 312 Survey of Spanish Literature** Qtr. Hrs. - 3
 PR: SPA 203 or equivalent. Main literary currents and works of the eighteenth and nineteenth centuries.
- SPA 313 Survey of Spanish Literature** Qtr. Hrs. - 3
 PR: SPA 203 or equivalent. Main literary currents and works from the Generation of 1898 to the present.
- SPA 316 Survey of Latin-American Literature I** Qtr. Hrs. - 3
 PR: SPA 203 or equivalent. Main literary currents and works from the colonial period to the nineteenth century.
- SPA 317 Survey of Latin-American Literature II** Qtr. Hrs. - 3
 PR: SPA 203 or equivalent. Main literary currents and works of the nineteenth century.
- SPA 318 Survey of Latin-American Literature III** Qtr. Hrs. - 3
 PR: SPA 203 or equivalent. Main literary currents and works of the twentieth century.
- SPA 401 Spanish Phonetics and Diction** Qtr. Hrs. - 2
 PR: SPA 303 or equivalent. Spanish phonology with emphasis on phonic groupings.
- SPA 421 Golden Age Drama** Qtr. Hrs. - 3
 PR: SPA 311. A study of the drama of the Golden Age with special emphasis on Lope, Tirso, Alarcon, and Calderón. The controversies on the Spanish theatre and its influence abroad.
- SPA 423 Cervantes I** Qtr. Hrs. - 3
 PR: SPA 311. *Don Quixote*. (Part I).
- SPA 424 Cervantes II** Qtr. Hrs. - 3
 PR: SPA 311. *Don Quixote* (Part II)
- SPA 441 Nineteenth Century Spanish Literature** Qtr. Hrs. - 3
 PR: SPA 312. Romanticism in Spanish literature.
- SPA 442 Nineteenth Century Spanish Literature** Qtr. Hrs. - 3
 PR: SPA 312. The realistic and naturalistic novel in Spain.
- SPA 443 The Generation of 1898** Qtr. Hrs. - 3
 PR: SPA 313. A study of the Generation's main authors and their works.
- SPA 451 Twentieth Century Spanish Literature** Qtr. Hrs. - 3
 PR: SPA 313. The contemporary Spanish novel.
- SPA 452 Twentieth Century Spanish Literature** Qtr. Hrs. - 3
 PR: SPA 313. Contemporary Spanish drama and poetry.

- SPA 491 Special Topics** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- SPA 492 Undergraduate Seminar** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.
- SPA 498 Independent Study** Qtr. Hrs. - 2-5
 PR: Consent of instructor. May be repeated for credit.

SPEECH

- SPE 101 Fundamentals of Oral Communication** Qtr. Hrs. - 3
 Use of the body and voice; participation in various speaking situations; planning, organizing, and delivering public speeches.
- SPE 261 English Phonetics and American Dialects** Qtr. Hrs. - 5
 Physiological description and visual notation of speech sounds; regional dialects of American English.
- SPE 262 Psychology of Oral Communication** Qtr. Hrs. - 3
 Psychological principles involved in the communicative process with application to individuals and groups.
- SPE 340 Problems of Articulation, Delayed Speech and Language** Qtr. Hrs. - 4
 PR: SPE 261, 263 and PSY 333. Aspects of diagnosis; emphasis on planning and executing correctional programs.
- SPE 345 Basic Audiology** Qtr. Hrs. - 4
 PR: SPE 263. An introduction to hearing problems: measurement, diagnosis, habilitation. Supervised practice in hearing measurement.
- SPE 350 Hearing Habilitation and Voice Therapy** Qtr. Hrs. - 5
 PR: PSE 261, 263, 345, and PSY 333. Lip reading, auditory training, speech conservation and speech improvement for the hearing handicapped; training for voice problems of varying origin.
- SPE 360 Argumentation and Debate** Qtr. Hrs. - 4
 PR: SPE 101 or consent of instructor. Study and practice in the preparation and delivery of argumentative speeches emphasizing argument, evidence and organization.
- SPE 361 Persuasion: Motivation** Qtr. Hrs. - 4
 PR: SPE 101 or consent of instructor. A study of motivational factors involved in persuasive speaking to secure belief and action.
- SPE 362 Platform Speaking** Qtr. Hrs. - 4
 PR: SPE 101 or consent of instructor. Theory and method; training in selecting and organizing materials for various types of speeches; practice in thinking and speaking before an audience; contemporary speeches as examples.

- SPE 364 Physical Bases of Speech and Hearing** **Qtr. Hrs. - 5**
An introduction to the anatomical, physiological, and physical elements underlying the communication process.
- SPE 365 Parliamentary Procedure** **Qtr. Hrs. - 2**
Principles and rules governing participation and leadership in the conduct of informal business meetings.
- SPE 366 Speech Composition** **Qtr. Hrs. - 4**
PR: SPE 101 or consent of instructor. Study and practice in the preparation and delivery of speeches from manuscripts with emphasis on the development of oral style.
- SPE 371 Speech and Human Relations** **Qtr. Hrs. - 3**
Introduction to semantics; symbols and meaning and the relationship with human behavior.
- SPE 452 Speech and Language Problems in Stuttering and Organic Disorders** **Qtr. Hrs. - 5**
PR: SPE 261, 263, 340, and PSY 333. A survey of team diagnostic and planning approaches; the Speech Pathologist's role in management of communication aspects of disorders.
- SPE 453 Observation and Clinical Practice I** **Qtr. Hrs. - 4**
PR: SPE 340, 350, 452, or consent of instructor. Directed participation in planning and carrying out therapeutic programs with varied speech and hearing problems.
- SPE 454 Observation and Clinical Practice II** **Qtr. Hrs. - 4**
PR: SPE 340, 350, 452, or consent of instructor. Directed participation in planning and carrying out therapeutic programs with varied speech and hearing problems.
- SPE 468 Survey of Rhetoric** **Qtr. Hrs. - 5**
General Survey: Major rhetorical trends from the classical era to the present. Comparison of Aristotelian and non-Aristotelian rhetorics. Contributions of principal figures will be discussed.
- SPE 469 Survey: Language and Speech Problems** **Qtr. Hrs. - 4**
A survey of speech, language and hearing problems. For classroom teachers, administrators and anyone interested in an introduction to the field of Speech Pathology.
- SPE 470 History and Criticism of American Public Address** **Qtr. Hrs. - 4**
Rhetorical criticism of speaking and writing of American statesmen who have had an influence on political, social, and economic milieu of their times.

- SPE 471 History and Criticism of British Public Address** Qtr. Hrs. - 4
Rhetorical criticism of speaking and writing of British statesmen who have had an influence on political, social, and economic milieu of their times.
- SPE 472 Rhetoric of Social and Political Action** Qtr. Hrs. - 4
PR: Junior standing. A critical investigation of social and political speaking within contemporary American society including agitative rhetoric of social and political dissent.
- SPE 473 Directing Extracurricular Speech Activities** Qtr. Hrs. - 3
Debate, extemporaneous speech and other speech events; selection and training of contestants; interschool and intramural speech activities.
- SPE 491 Special Topics** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- SPE 494 Independent Study** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
- SPE 495 Undergraduate Research Methods** Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

STATISTICS

- STAT 201 Principles of Statistics** Qtr. Hrs. - 4
A lecture-laboratory course designed to introduce the student to statistical concepts in modern society. An introduction to basic principles, frequency distributions, measures of location and dispersion, probability, probability distributions, statistical inference.
- STAT 301 Fundamentals of Probability and Statistics** Qtr. Hrs. - 4
PR: Four years of high school mathematics or MATH 110 or equivalent.
A lecture-laboratory course designed to introduce students to the ideas of statistical inference and prepare them for other courses in statistics.
- STAT 321 Business and Economic Statistics** Qtr. Hrs. - 3
PR: ECON 203, MATH 115, and one course in statistics. The use of statistical methods as scientific tools in the analysis of economic and business problems. Emphasis is placed on the collection, analysis, and interpretation of quantitative economic and business data. (Same as ECON 321.)
- STAT 322 Business and Economic Statistics Laboratory** Qtr. Hrs. - 1
CR: STAT 321. Use of computers in problem solving for STAT 321. (Same as ECON 322.)
- STAT 332 Statistical Quality Control** Qtr. Hrs. - 3
Statistical concepts and methods applied to the control of quality of manufactured products. (Same as IEMS 332.)

STAT 335 Probability and Statistics for Engineers**Qtr. Hrs. - 3**

PR: MATH 321. Axioms of probability; combinatorial and geometrical probability; probability distributions; measures of location and dispersion; sampling and sampling distributions; estimation and tests of hypotheses; engineering applications. (Same as ENGR 371.)

STAT 341, 342, 343 Mathematical Statistics**Qtr. Hrs. - 3,3,3**

PR: MATH 223 and a course in statistics. Sample space, probability axioms, distribution functions, sampling distributions, point and interval estimation, hypothesis testing, multivariate normal, regression and correlation, linear models, analysis of variance, distribution-free methods, an introduction to stochastic processes.

STAT 401, 402 Statistical Methods**Qtr. Hrs. - 4,4**

PR: One course in statistics or graduate standing. A lecture-laboratory course designed to introduce the student to the role of statistics in research; methods of analyzing data from experiments and surveys; statistical concepts and models; estimation; tests of hypotheses; regression and correlation; analysis of variance and covariance; an introduction to the principles of the statistical design of experiments and surveys.

STAT 411 Experimental Design**Qtr. Hrs. - 3**

PR: STAT 402. Methods of constructing and analyzing designs for experimental investigations; concepts of blocking, randomization, and replication; experimental unit technique; complete block designs; confounding in factorial experiments; incomplete block designs; response surface methodology.

STAT 421 Survey Design**Qtr. Hrs. - 3**

PR: STAT 402. Methods of constructing and analyzing designs for survey investigations; simple random, stratified, multistage, and multiphase sampling designs; questionnaire construction; methods of estimation; techniques of survey investigation.

STAT 435 Probability for Engineers**Qtr. Hrs. - 3**

PR: STAT 335. Combinatorial analysis, sample space, events probability, discrete and continuous random variables, probability distributions with applications in engineering. (Same as IEMS 435.)

STAT 436 Statistics for Engineers**Qtr. Hrs. - 3**

PR: STAT 335. Significance tests and confidence intervals, tests of hypotheses, simple and multiple regression and correlation with applications in engineering. (Same as IEMS 436.)

STAT 447, 448 Probability Theory and Applications**Qtr. Hrs. - 3,3**

PR: MATH 321. Axioms of probability, discrete and continuous random variables, characteristic functions, Markov chains, recurrent events, sequences of random variables, random walk, simple stochastic processes.

STAT 491 Special Topics	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
STAT 492 Undergraduate Seminar	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
STAT 494 Independent Study	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	
STAT 497 Undergraduate Research	Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.	

THEATRE

THA 180 Study of Drama and Theatre	Qtr. Hrs. - 3
Nature of drama and the theatre, and basic principles of play analysis.	
THA 230 Interpretation I	Qtr. Hrs. - 3
Analysis of thought; development of imagination; oral presentation of literary forms, individual problems in interpretive reading. (Recommended for students majoring in English and preparing to teach literature.)	
THA 240 Technical Theatre Production	Qtr. Hrs. - 4
History, theory, and practice of technical theatre production.	
THA 280 Introduction to Acting	Qtr. Hrs. - 4
Prepares the beginning actor for University Theatre productions. Emphasis on movement, motivation, voice, characterizational techniques, makeup, and other basic requirements for acting.	
THA 290 Theatre Practicum	Qtr. Hrs. - 2
PR: Permission of instructor. Open to all students interested in participating in the productions of the University Theatre. Primarily an activity course; student will have the opportunity for supervised work in all phases of theatrical production. May be repeated for credit.	
THA 310 History of the Motion Picture	Qtr. Hrs. - 4
Development of the film industry; its social and economic impact. (Same as COM 310.)	
THA 320, 321, 322 Theatre Practice II	Qtr. Hrs. - 1,1,1
PR: THA 220, 221, or 222. Practical experience in designing and operating technical aspects of dramatic productions. (Service on crews is required.)	
THA 330 Interpretation II	Qtr. Hrs. - 3
PR: THA 230 or the equivalent and junior standing. Selecting and abridging literary material for platform use; preparation and presentation of program for special and general occasions.	

- THA 331 History of the Theatre: Classic and Renaissance** **Qtr. Hrs. - 3**
Development of theatre art from the earliest times through the sixteenth century.
- THA 332 History of the Theatre: XVII and XVIII Centuries** **Qtr. Hrs. - 3**
Development of theatre art from the Renaissance through the neo-classic period to the beginning of the Romantic Movement.
- THA 333 History of the Theatre: XIX and XX Centuries** **Qtr. Hrs. - 3**
Development of theatre art from the Romantic Period to the modern theatre.
- THA 341 Drama Development I** **Qtr. Hrs. - 4**
A study of dramatic works in translation of the Greeks, Romans, and the Medieval Theatre. Extensive readings in the plays of these periods should be expected.
- THA 342 Drama Development II** **Qtr. Hrs. - 4**
A study of dramatic works in translation of the French, German, Spanish, and Italian theatres in the 16th and 17th centuries. Extensive readings in the plays of these periods should be expected. Continuation of THA 341.
- THA 343 Drama Development III** **Qtr. Hrs. - 4**
Continuation of THA 341-342 tracing the development of dramatic works in translation of the 18th and 19th centuries. Extensive readings of plays from the French, German, English, Spanish, Italian, and Russian theatres.
- THA 380 Directing I** **Qtr. Hrs. - 3**
Fundamental principles of play-directing; demonstrations of theory in group exercises. Each student is required to direct two short scenes for laboratory presentation and criticism. (Laboratory hours to be arranged, and work in departmental productions.)
- THA 381 Scene Design I** **Qtr. Hrs. - 4**
Study and practice of scene design; perspective drawing, fundamentals of design, and techniques of scene painting. (Service on crew as required.)
- THA 382 Stage Lighting** **Qtr. Hrs. - 4**
PR: Junior standing. Study of stage lighting techniques, practices, and equipment. (Service on light crew is required.)
- THA 421 Dramatic Theory** **Qtr. Hrs. - 3**
PR: Consent of instructor. The theory and philosophy of the theatre; analysis of various types of plays, both modern and historical, from the point of view of their production on a stage.
- THA 422 High School Play Directing** **Qtr. Hrs. - 3**
Introduction to the theory and practice of directing and producing, with particular emphasis upon methods practicable in high school and junior college play production.

- THA 423 Contemporary Theatre and Drama** **Qtr. Hrs. - 3**
Trends in theatrical production and dramatic literature in Italy, France, Germany, Russia, and the Scandinavian countries.
- THA 424 Principles of Motion Picture Art** **Qtr. Hrs. - 3**
PR: THA 310 or consent of instructor. Aesthetic consideration of the motion picture as art; critical criteria and stylistic comparisons are established through the viewing of films, reading assignments, and discussion.
- THA 425 Dramatic Criticism** **Qtr. Hrs. - 3**
PR: Consent of instructor. Analysis of the nature of past and present day criticism of the drama; practical work in such criticism.
- THA 434 Modern Motion Picture Technique** **Qtr. Hrs. - 3**
PR: THA 310 or consent of instructor. An examination of the techniques of motion picture art; directing, acting, editing, writing, cinematography.
- THA 480 Directing II** **Qtr. Hrs. - 3**
PR: THA 380. Further theories and techniques of play direction, study of dramatic values, plot structure, style, mood, composition, and directing approach. Each student will direct scenes in class and laboratory and serve as assistant director or stage manager on a major production.
- THA 481 Acting II** **Qtr. Hrs. - 3**
PR: THA 280. Study and practical experience in creating roles in plays of different types, style, and period, with emphasis on developing flexibility of actor's equipment. (Laboratory hours to be arranged and work in departmental productions.)
- THA 483 Advanced Scene Design** **Qtr. Hrs. - 4**
A continuation of THA 381 in which the emphasis is placed on independent planning and execution of a scene design. The student will be expected to work with the production group on a selected production.
- THA 486 American Theatre and Drama: XVIII & XIX Centuries** **Qtr. Hrs. - 3**
An examination of the social, cultural and economic influences on the American drama and theatre. Trends in theatrical production and dramatic types, Revolutionary Drama, Social Comedy, Romantic Verse Drama, ethnic characters, and Naturalism.
- THA 487 American Theatre: XX Century** **Qtr. Hrs. - 3**
A continuation of THA 486, with emphasis placed upon the aesthetic and literary development of the theatre in this century. The New Stagecraft, Agitprop Theatre, Federal Theatre, Antiwar Drama, the Absurdist and the avant-garde theatres will be dealt with in detail.

- THA 488 Creative Dramatics and Children's Theatre** **Qtr. Hrs. - 3**
 An introduction to the aesthetical and psychological bases of theatre production for and by young people. The production of children's theatre, play selection, scenery, costumes, management, and touring.
- THA 489 Studies in Oral Interpretation** **Qtr. Hrs. - 3**
 PR: THA 230. Individual oral reading projects; an intensive study of the literature for interpretation.
- THA 491 Special Topics** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- THA 492 Undergraduate Seminar** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.
- THA 494 Independent Study** **Qtr. Hrs. - 2-5**
 PR: Consent of instructor. May be repeated for credit.

ZOOLOGY

- ZOOL 100 General Zoology** **Qtr. Hrs. - 4**
 PR: BIOL 100 or 103. Introduction to zoology; structure, function and representative groups; current concepts in zoological sciences.
- ZOOL 220, 221 Comparative Vertebrate Anatomy** **Qtr. Hrs. - 4, 4**
 PR: ZOOL 100 or equivalent. Structure of the human body. Not open to students with credit in ZOOL 220, 221 or equivalent.
- ZOOL 224 Human Anatomy** **Qtr. Hrs. - 5**
 PR: BIOL 100 or equivalent. Structure of the human body. Not open to students with credit in ZOOL 220, 221 or equivalent.
- ZOOL 240 Invertebrate Zoology** **Qtr. Hrs. - 5**
 PR: ZOOL 100. Taxonomy, anatomy and ecology of the invertebrate animals.
- ZOOL 310 Histological Technique** **Qtr. Hrs. - 4**
 PR: ZOOL 100 or consent of instructor. Preparation of tissues for microscopic study; paraffin and cryostat methods; use of microtome; staining procedures; whole mounts.
- ZOOL 320 Comparative Vertebrate Embryology** **Qtr. Hrs. - 5**
 PR: ZOOL 220-221. Embryology of the vertebrates; fertilization of egg; stages of cleavage; development of organs and systems.
- ZOOL 322 Vertebrate Histology** **Qtr. Hrs. - 4**
 PR: ZOOL 100. Anatomy, structure and function of major cell types and tissues.

- ZOOL 330 Animal Physiology** Qtr. Hrs. - 5
 PR: BIOL 332 or consent of instructor. Function and interrelationships of nervous, endocrine, muscle, reticulo-endothelial, reproductive, excretory, respiratory and digestive systems.
- ZOOL 334 Human Physiology** Qtr. Hrs. - 3
 PR: BIOL 100 or equivalent. The physiology and interrelationships of organ systems of the body.
- ZOOL 335 Human Physiology Laboratory** Qtr. Hrs. - 2
 PR: BIOL 100 or equivalent. Laboratory exercises illustrating the physiological principles included in ZOOL 334. Must be taken concurrently with ZOOL 334 when required by curriculum.
- ZOOL 340 Vertebrate Zoology** Qtr. Hrs. - 4
 PR: 8 hours of zoology or consent of instructor. Emphasis on evolution and classification followed by an introduction to vertebrate ecology, natural history and behavior.
- ZOOL 345 General Entomology** Qtr. Hrs. - 4
 PR: ZOOL 100. Introduction to insects; their identification, biology and ecology.
- ZOOL 355 Game Conservation and Management** Qtr. Hrs. - 3
 PR: ZOOL 100. Principles of conservation and management; habitat improvement; wildlife techniques; public relations.
- ZOOL 370 Animal Parasitology** Qtr. Hrs. - 5
 PR: ZOOL 100. Identification and life histories of representative parasitic protozoa and helminths emphasizing host-parasite relationships; techniques of animal examination; emphasis on human parasites.
- ZOOL 375 Vertebrate Ethology** Qtr. Hrs. - 3
 PR: ZOOL 100. Classical ethology, modern experimental ethology and behavioral ecology are considered.
- ZOOL 440 Principles of Zoological Systematics** Qtr. Hrs. - 3
 PR: BIOL 460 and 15 hours of zoology courses of 300 level or above. Theory and practice of taxonomy and classification of animals; introduction to the International Code of Zoological Nomenclature.
- ZOOL 445 Ichthyology** Qtr. Hrs. - 4
 PR 8 hours of zoology or consent of instructor. Introduction to the biology of the fishes, their classification, evolution and life histories.
- ZOOL 446 Herpetology** Qtr. Hrs. - 4
 PR: 8 hours of zoology or consent of instructor. Introduction to the biology of the amphibians and reptiles, their classification, evolution and life histories.

- ZOOL 447 Ornithology** **Qtr. Hrs. - 4**
PR: 8 hours of zoology or consent of instructor. Introduction to the biology of birds, their classification, evolution and life histories.
- ZOOL 448 Mammalogy** **Qtr. Hrs. - 4**
PR: 8 hours of zoology or consent of instructor. Introduction to the biology of mammals, their classification, evolution and life histories.
- ZOOL 450 Fishery Biology** **Qtr. Hrs. - 4**
PR: BIOL 450 and ZOOL 445. Life histories, distribution and identification of fresh water game fishes of North America with particular emphasis on the southeastern United States; interrelationship of biology and management.
- ZOOL 452 Lake and Stream Management** **Qtr. Hrs. - 4**
PR: ZOOL 450. The ecology of freshwater fishes; techniques of aquatic research.
- ZOOL 453 Zoogeography** **Qtr. Hrs. - 3**
PR: BIOL 350. Principles and concepts concerning regional patterns of distribution of the animals of the world, both past and present.
- ZOOL 473 Medical Entomology** **Qtr. Hrs. - 4**
PR: ZOOL 345. A consideration of the recognition characteristics, biology and control of insects and other arthropods of importance to the health of man, livestock and wildlife.
- ZOOL 491 Special Topics** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.
- ZOOL 492 Undergraduate Seminar** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.
- ZOOL 494 Independent Study** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.
- ZOOL 497 Undergraduate Research** **Qtr. Hrs. - 2-5**
PR: Consent of instructor. May be repeated for credit.
- ZOOL 547 Field Zoology** **Qtr. Hrs. - 4**
PR: 12 hours in biological sciences; or science teaching experience; or consent of instructor. Classification and identification among major animal groups with emphasis on field experience. Major reference sources reviewed.
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*EMMS 434 Experimental Techniques for Materials

Qtr. Hrs. - 3

PR: ENGR 351. Theoretical and experimental study of the application of optical microscopy, X-ray diffraction and electron microscopy for materials analysis. Two lectures and two hours laboratory.
