FLORIDA TECHNOLOGICAL UNIVERSITY

1970-1971

REVISED COURSE DESCRIPTION

OBSOLETE PREVIOUS (SEPT. 1969) BULLETIN

EFFECTIVE JUNE 15 1970
ACCOUNTANCY

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

ACCY 307 Accounting Concepts
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
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
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
PR: ACCY 311. A continuation of ACCY 311.

ACCY 321 Cost Accounting
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

ACCY 341 Governmental Accounting
ACCY 411 Advanced Accounting  
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  
PR: ACCY 411 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  
PR: ACCY 412 or consent of instructor. Cases of enterprises in distress; estates and trusts. Also a study of controversial areas of accounting, with particular reference to current literature and theory. Seminar approach.

ACCY 433 Auditing  
PR: ACCY 312. The audit concept. Understanding evidence as applied to the audit. Fundamental techniques, practices and procedures.

ACCY 434 Auditing II  
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  
PR: ACCY 312. History, theory and basic concept of federal income taxation principles.

ACCY 452 Federal Income Tax Accounting  

ACCY 461 Computer Applications to Accounting Problems  
PR: ACCY 411. 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  
PR: Consent of instructor. May be repeated for credit.

ACCY 601 Managerial Accounting  
(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  
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 496 Special Topics  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

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

AHS 498 Independent Study  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

AHS 499 Undergraduate 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Qtr. Hrs.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 341</td>
<td>Photography</td>
<td>3</td>
<td>Consideration of basic technical and aesthetic factors in using still photography as a vehicle for visual, artistic expression.</td>
</tr>
<tr>
<td>ART 351</td>
<td>Painting</td>
<td>3</td>
<td>PR: Three quarter hours in Design Fundamentals and three quarter hours in Drawing Fundamentals or consent of the instructor.</td>
</tr>
<tr>
<td>ART 361</td>
<td>Printmaking</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>ART 371</td>
<td>Sculpture</td>
<td>3</td>
<td>PR: Six quarter hours in Design Fundamentals, to include three quarter hours in three-dimensional work, or consent of the instructor.</td>
</tr>
<tr>
<td>ART 381</td>
<td>Ceramics</td>
<td>3</td>
<td>PR: ART 203 or consent of the instructor. Basic concepts of ceramic design, experience in processes of forming, decorating, glazing, and firing pottery.</td>
</tr>
<tr>
<td>ART 391</td>
<td>Experiments in Art and Technology</td>
<td>3</td>
<td>PR: Consent of the instructor.</td>
</tr>
<tr>
<td>ART 402</td>
<td>Advanced Graphic Design</td>
<td>3</td>
<td>PR: ART 301 and ART 302. May be repeated for credit.</td>
</tr>
<tr>
<td>ART 405</td>
<td>Advanced Three-Dimensional Design</td>
<td>3</td>
<td>PR: ART 305. May be repeated for credit. Advanced problems in three-dimensional materials, processes, form.</td>
</tr>
<tr>
<td>ART 408</td>
<td>Advanced Jewelry Design</td>
<td>3</td>
<td>PR: ART 308. May be repeated for credit.</td>
</tr>
<tr>
<td>ART 411</td>
<td>Advanced Drawing</td>
<td>3</td>
<td>PR: ART 311. May be repeated for credit.</td>
</tr>
<tr>
<td>ART 433</td>
<td>Theory and Criticism of the Visual Arts</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>ART 434</td>
<td>Art and Technology</td>
<td>3</td>
<td>The impact of technological developments in the visual arts of the 20th Century.</td>
</tr>
<tr>
<td>ART 441</td>
<td>Advanced Photography</td>
<td>3</td>
<td>PR: ART 341. May be repeated for credit.</td>
</tr>
</tbody>
</table>
ART 451 Advanced Painting  
PR: ART 351. May be repeated for credit.  
Qtr. Hrs. - 3

ART 461 Advanced Printmaking  
PR: ART 361. May be repeated for credit.  
Qtr. Hrs. - 3

ART 471 Advanced Sculpture  
PR: ART 371. May be repeated for credit.  
Qtr. Hrs. - 3

ART 481 Advanced Ceramics  
PR: ART 381. May be repeated for credit.  
Qtr. Hrs. - 3

ART 491 Advanced Experiments in Art and Technology  
PR: ART 391. May be repeated for credit.  
Qtr. Hrs. - 3

ART 493 Senior Studio and Exhibition  
PR: Senior standing and consent of the studio areas faculty. Required of all art majors with a studio concentration.  
Qtr. Hrs. - 3

ART 496 Special Topics  
PR: Consent of the instructor. May be repeated for credit.  
Qtr. Hrs. - 2-5

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

ART 498 Independent Study  
PR: Consent of instructor. May be repeated for credit.  
Qtr. Hrs. - 2-5

ART 499 Undergraduate Research  
PR: Consent of the instructor. May be repeated for credit.  
Qtr. Hrs. - 2-5

BIOLOGY

BIOL 100 General Biology I  
Qtr. Hrs. - 4  
Basic principles emphasizing the unifying concepts of biology and their relationships to diversity in living organisms. Laboratory illustrates basic principles in biology.

BIOL 105 General Biology II  
Qtr. Hrs. - 4  
PR: BIOL 100. An integrated approach to the Botanical and Zoological Sciences; the effect of society on the environment and its biological implications. Laboratory illustrates basic principles that are significant in today's environment. This course is for non-majors and is suitable, with BIOL 100, for meeting Environmental Studies Program requirements.

BIOL 330 Immunology  
Qtr. Hrs. - 3  
PR: MICR 300. Basic principles of the immune reaction; antigens, antibody formation, hypersensitivity and autoimmunity.
<table>
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<tr>
<th>Course Code</th>
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<th>Qtr. Hrs.</th>
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</thead>
<tbody>
<tr>
<td>BIOL 331</td>
<td>Serology</td>
<td>- 2</td>
</tr>
<tr>
<td>PR: BIOL 330</td>
<td>Laboratory exercises in the production of antibodies, agglutination and precipitin reactions; quantitative techniques and isohemoagglutination.</td>
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<tr>
<td>BIOL 332</td>
<td>Cell Physiology</td>
<td>- 5</td>
</tr>
<tr>
<td>PR: 11 hours in biological sciences and CHEM 123. Basic physiological processes, cellular organization, exchange of materials, conversion of energy, irritability and contractibility.</td>
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<tr>
<td>BIOL 350, 351</td>
<td>Principles of Ecology</td>
<td>- 4,4</td>
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<tr>
<td>PR: 12 hours in biological sciences. A sequence of courses covering basic ecological processes. Weekend field trips are required.</td>
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<tr>
<td>BIOL 360</td>
<td>Genetics</td>
<td>- 4</td>
</tr>
<tr>
<td>PR: BIOL 100</td>
<td>Basic principles of heredity as applied to plants and animals. Laboratory will emphasize work with Drosophila.</td>
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<tr>
<td>BIOL 420</td>
<td>Cytology</td>
<td>- 4</td>
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<tr>
<td>PR: 11 hours in biological sciences and CHEM 123. Structure of vegetative and reproductive cells; cytoplasmic differentiation; mitosis, meiosis, chromosomal aberrations.</td>
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<tr>
<td>BIOL 450, 451, 452</td>
<td>Limnology</td>
<td>- 3,4,3</td>
</tr>
<tr>
<td>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.</td>
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<tr>
<td>BIOL 460</td>
<td>Organic Evolution</td>
<td>- 3</td>
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<tr>
<td>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.</td>
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<tr>
<td>BIOL 470</td>
<td>History of Biology</td>
<td>- 3</td>
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<tr>
<td>PR: Junior standing. People and events from Aristotelian times to the present; development of science of biology.</td>
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<tr>
<td>BIOL 491</td>
<td>Contemporary Biology</td>
<td>- 3</td>
</tr>
<tr>
<td>PR: Consent of instructor. Concepts, experiments, problems and advanced topics included in courses such as BSCS biology and other modern approaches to secondary school biology. For prospective teachers of biology. (Same as EDSE 491).</td>
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<tr>
<td>BIOL 496</td>
<td>Special Topics</td>
<td>- 2-5</td>
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<tr>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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<tr>
<td>BIOL 497</td>
<td>Undergraduate Seminar</td>
<td>- 2-5</td>
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<tr>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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<tr>
<td>BIOL 498</td>
<td>Independent Study</td>
<td>- 2-5</td>
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<tr>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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</table>
BIOL 499 Undergraduate Research
PR: Consent of instructor. May be repeated for credit.

BOTANY

BOT 100 General Botany
PR: BIOL 100. Introduction to botany; plant structure and function, including a survey of the plant kingdom giving special emphasis to forms important to man. Laboratory exercises illustrate basic principles in botany.

BOT 270 Economic Botany
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
The selection, placement, propagation, and care of ornamental plants in residential, commercial, and industrial areas. Not recommended for botany majors.

BOT 310 Botanical Histology and Microtechnique
PR: BOT 100. Morphogenesis and structure of flowering plants, with instruction on laboratory microtechnique.

BOT 320, 321 Comparative Morphology of Plants
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 330 Plant Physiology
PR: BIOL 332 and MICR 200. Chemical and physical activities of plants; absorption, transpiration, mineral nutrition, photosynthesis and growth.

BOT 340 Phycology
PR: BOT 321 or consent of instructor. A lecture-laboratory course to survey the diversity and classification of marine, terrestrial and freshwater algae.

BOT 341 Mycology
PR: BOT 321, 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 345, 346 Systematics of Flowering Plants
PR: BOT 100. A sequential biosystematic study of the angiosperms and special topics.

BOT 442 Bryology
PR: BOT 321 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.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Quarters</th>
<th>Hours</th>
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<tbody>
<tr>
<td>BOT 453</td>
<td>Plant Geography</td>
<td></td>
<td>3</td>
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<tr>
<td>PR: BIOL 351 and BOT 346. The major climax formations of the world and their representative plant taxa; the distribution of plants in time.</td>
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<tr>
<td>BOT 470</td>
<td>Plant Pathology</td>
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<tr>
<td>PR: BOT 341 and MICR 200. A survey of the microorganisms causing plant diseases, emphasizing fungi, especially those forms which are important in Florida.</td>
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<tr>
<td>BOT 472</td>
<td>Botanical Nomenclature</td>
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<td>2</td>
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<tr>
<td>BOT 496</td>
<td>Special Topics</td>
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<td>2-5</td>
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<tr>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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<tr>
<td>BOT 497</td>
<td>Undergraduate Seminar</td>
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<td>2-5</td>
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<tr>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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<tr>
<td>BOT 498</td>
<td>Independent Study</td>
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<td>2-5</td>
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<tr>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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<tr>
<td>BOT 499</td>
<td>Undergraduate Research</td>
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<td>2-5</td>
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<tr>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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**BUSINESS ADMINISTRATION**

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<tr>
<th>Course Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>BADM 101</td>
<td>Business</td>
<td></td>
<td>4</td>
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<tr>
<td>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.</td>
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<tr>
<td>BADM 301</td>
<td>Business Concepts</td>
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<tr>
<td>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.</td>
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<tr>
<td>BADM 302</td>
<td>Personal Investments</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>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.</td>
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<tr>
<td>BADM 311, 312 Mathematical Applications to Business</td>
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<td>3,3</td>
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<tr>
<td>PR: MATH 115 or 221. A study of a wide range of quantitative decision</td>
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</tbody>
</table>
procedures as applied to problems in business administration.

BADM 371 Business Law  
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  
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  
PR: BADM 372. 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  
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  
PR: BADM 373 or consent of instructor. Includes bailments, real and personal property, and security interests therein, insurance, suretyship and guaranty.

BADM 484 Operations Research  
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  
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 495 Business Policies  
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 601 Quantitative Analysis for Business Decisions  
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  
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 699 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 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 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  
PR or CR: MATH 223. A course in 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. - 3,3  
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. - 3  
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 263 or CHEM 367. A laboratory course stressing 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
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
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
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
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
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
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
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
PR: CHEM 362 or CHEM 369. Discussion of fundamental particles, nuclear reactions, radioactivity, radiation chemistry, and isotope chemistry.

CHEM 474 Radiochemical Techniques
PR: CHEM 351. A lecture-laboratory course stressing radiochemical handling techniques, radiation safety, and the detection and measurement of nuclear radiation.

CHEM 491 Contemporary Chemistry
PR: Consent of instructor. Concepts, experiments, problems, and advanced topics included in courses such as CHEM Study and other
modern approaches to secondary school chemistry. For prospective teachers of chemistry. (Same as EDSE 492).

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<tr>
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<tbody>
<tr>
<td>CHEM 496 Special Topics</td>
<td>2-5</td>
<td>Consent of instructor. May be repeated for credit.</td>
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<tr>
<td>CHEM 497 Undergraduate Seminar</td>
<td>2-5</td>
<td>Consent of instructor. May be repeated for credit.</td>
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<tr>
<td>CHEM 498 Independent Study</td>
<td>2-5</td>
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<td>CHEM 499 Undergraduate Research</td>
<td>2-5</td>
<td>Consent of instructor. May be repeated for credit.</td>
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CIVIL ENGINEERING & ENVIRONMENTAL SCIENCES

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<tr>
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<tbody>
<tr>
<td>CEES 221 Surveying</td>
<td>3</td>
<td>MATH 221. Theory and field practice in engineering, geological and land surveys. Two lectures, three hours laboratory.</td>
</tr>
<tr>
<td>CEES 321 Engineering Geology</td>
<td>3</td>
<td>ENGR 152 or equivalent. Physical geology with special emphasis on structural geology, ground water, soil genesis, and relation of geology to problems in soil mechanics. Two lectures, three hours laboratory.</td>
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<tr>
<td>CEES 361 Transportation Engineering</td>
<td>3</td>
<td>ENGR 342. Elementary investigation of all forms of transport—highway, rail, water, air. Systems approach to planning, design, construction, operation, and administration of transportation networks.</td>
</tr>
<tr>
<td>CEES 371 Urban Planning</td>
<td>3</td>
<td>ENGR 342 and 371. History and principles of planning; contemporary urban problems; current urban planning techniques.</td>
</tr>
<tr>
<td>CEES 411 Environmental Engineering</td>
<td>4</td>
<td>ENGR 361. Man's environment, water resources, hydrologic cycle, chemistry of natural water, quality requirements and water treatment, water distribution systems.</td>
</tr>
<tr>
<td>CEES 412 Environmental Engineering</td>
<td>4</td>
<td>CEES 361. Drainage systems, collection and transmission of wastewater, the carbon cycle and biochemistry of wastes, principles of</td>
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wastewater treatment and disposal.

CEES 414 Sanitary Systems Design
PR: CEES 411 or 412. Planning capacity and design of water distribution and domestic and storm drainage systems.

CEES 415 Atmospheric Pollution
PR: CEES 411. Atmospheric composition and dynamics; origins and chemistry of contamination and biological significance; engineering methods of measurement and control.

CEES 416 Epidemiology and Public Health Engineering
PR: Approval of instructor. Selected topics in occurrence and transmission of diseases, mathematical theory of epidemics, sanitation, and public health engineering and administration.

CEES 417 Environmental Health
PR: Approval of instructor. Selected topics in industrial hygiene, occupational and radiological health hazards, effects of pollution on the natural environment, pollution control concepts, and regulatory agencies.

CEES 431 Soil Mechanics
PR: CEES 321 and ENGR 312. Index properties and engineering characteristics of soils. Compaction, shear, compressibility, and permeability. Two lectures, three hours laboratory.

CEES 433 Site Foundation Engineering
PR: CEES 431. Geological investigations for engineering purposes, case histories, interpretation of geologic maps, major aspects of geologic structure, weathering, river mechanics, glacial deposits,olian deposits in the site location for an engineering structure.

CEES 441 Computer Applications in Structural Analysis

CEES 443 Continuum Mechanics

CEES 451 Structural Design
PR: CEES 351. Design of steel and reinforced concrete structural members. Two lectures, three hours laboratory.

CEES 461 Transportation Engineering
PR: CEES 361. Advanced topics in transportation system analysis.
CEES 462 Traffic Engineering  Qtr. Hrs. - 3
PR: CEES 361. Study of operator and vehicle characteristics, street capacity, signals, signs and markings, etc. All phases of traffic engineering as applied to urban areas.

CEES 471 Urban Planning  Qtr. Hrs. - 3
PR: CEES 371. Municipal organization and administration, public health, public utilities, services, zoning, replanning, critical studies.

CEES 481, 482 Water Resources Engineering  Qtr. Hrs. - 3,3
PR: ENGR 332 and 361. Engineering systems for development, utilization and control of water resources. Physical hydrology, economic analysis, case studies.

CEES 496 Special Topics  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

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

CEES 498 Independent Study  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

CEES 499 Undergraduate Research  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

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 300 Communication Theory as Related to the Mass Media  Qtr. Hrs. - 3
Comparative study of views and theories of communication through the printed and spoken media; theories of perception and communication; information and recall involving printed media, public platform and electronic media.

COM 301 Communication as a Behavioral Science  Qtr. Hrs. - 3
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 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 401 Communicative Process in Government  Qtr. Hrs. - 3
Creation of public opinion on issues, candidates, governmental policies in
the struggle for power; use of communication in democratic processes.

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

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

COM 498 Independent Study  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

COM 499 Undergraduate Research  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

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. 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. Functions and procedures, numerical applications.

COMP 207 Algorithmic Processes III
Qtr. Hrs. - 3
CR: COMP 206. Trees, compiling, text-editing, other non-numerical applications.

COMP 301, 302, 303 Data Structures
Qtr. Hrs. - 3,3,3
PR: COMP 202. Basic concepts of data; linear lists, strings, arrays, and orthogonal lists; representation of trees and graphs; storage systems and structures, and storage allocation and collection; multilinked structures, symbol tables and searching techniques; ordering or sorting techniques; formal specification of data structures, data structures in programming languages and generalized data management systems; recursion; string and list processing languages; compiler design and implementation.

COMP 305 Assembly Language Programming Laboratory
Qtr. Hrs. - 3
PR: 9 hours of COMP. 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: 9 hours of COMP. 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, MATH 314. Processor characteristics; peripheral equipment characteristics; information representation; introduction to data communications.

COMP 405, 406 Data Structures
Qtr. Hrs. - 3,3
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, 409 Programming Languages  Qtr. Hrs. - 3,3
PR: 9 hours of COMP. Formal definition of programming languages; global properties of algorithmic languages; 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, 483 Computer Processing of Statistical Data  Qtr. Hrs. - 3,3,3
PR: MATH 321, STAT 402, and COMP 102, 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 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 496 Special Topics  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

COMP 497 Undergraduate Seminar  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
COMP 498 Independent Study  
PR: Consent of instructor. May be repeated for credit.  
Qtr. Hrs. - 2-5

COMP 499 Undergraduate Research  
PR: Consent of instructor. May be repeated for credit.  
Qtr. Hrs. - 2-5

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

*May be repeated.
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 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 and Employment Theory Qtr. Hrs. - 4
PR: ECON 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. - 3
PR: ECON 203, MATH 115 and one prior course in statistics. 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 322 Business and Economic Statistics Laboratory Qtr. Hrs. - 1
Use of computers in problem solving for ECON 321. Must be taken
concurrently with ECON 321 (same as STAT 322).

ECON 325 Probability and Applications to Economic Decision Theory Qtr. Hrs. - 3
PR: STAT 201 or STAT 301. Probability and sampling theories as applied
to decision-making in cases of uncertainty.

ECON 331 Economics of Labor Qtr. Hrs. - 3
PR: ECON 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
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: ECON 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
PR: ECON 203. Agriculture in a developed economy. The nature of agricultural markets, their structure and national farm policy issues.

ECON 371 Mathematical Economics
PR: ECON 203 and MATH 223. An introduction to the mathematical tools of modern economic analysis.

ECON 381 Economics of Public Utilities
PR: ACCY 112 or 307 and ECON 203 or consent of instructor. The nature of public utilities, the economics of rate determination, and regulatory policy.

ECON 401 Managerial Economics
PR: ECON 203. The uses of economic analysis in economic decision-making and business policy formulation.

ECON 411 Comparative Economic Systems
PR: ECON 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

ECON 431 Public Finance in the American Economy
PR: ECON 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
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
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
PR: ECON 203. The processes and problems of economic development.

ECON 451 Econometrics
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 203. A survey of the most significant public policies affecting business firms.

ECON 471 History of Economic Thought Qtr. Hrs. - 3  
PR: ECON 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 203. An analysis of the economic problems arising from and associated with the growth of cities and suburban areas within metropolitan districts.

ECON 499 Undergraduate 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 analysis, sampling procedures, and forecasting techniques.

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  
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  
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  
PR: EDBE 103, and EDBE 203 or equivalents. Development and refinement of sustained shorthand dictation, speed and vocabulary development.

EDBE 301 Shorthand Dictation  
PR: EDBE 103, and EDBE 203 or equivalents. Continued development and refinement of shorthand dictation and introductory communications productions.

EDBE 302 Shorthand Transcription  
PR: EDBE 102, and EDBE 301. Gregg Shorthand dictation and refinement of communications production.

EDBE 305 Office Technology  
PR: EDBE 103 or equivalent. Basic operation and function of technological media in modern business offices.

EDBE 405 Principles of Business - Vocational Education  
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  
PR: EDBE 302 and 305. 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  
PR: CI. 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  
PR: 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 Instruction  
PR: 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
PR: EDTA 603 or 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: 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.

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
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
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
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
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
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
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
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 401 Programs in Early Childhood Education
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
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
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 Diagnosis and Treatment of Reading Difficulties
Qtr. Hrs. - 3
PR: EDEL 311 and 312. Principles and techniques of diagnosis and remedial teaching with the disabled reader; factors related to reading problems - physiological, psychological, cultural; materials for instruction.

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 604 Leadership in Elementary Education
Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Current issues with emphasis on classroom interaction as a variable related to effectiveness of instruction.
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 consent of instructor. Analysis of historical development and current trends in reading research.

EDEL 631 Diagnosis of Difficulties in Elementary School Reading  
Qtr. Hrs. - 3  
PR: EDEL 630. Study and uses of tests regarding the symptoms and causes of specific learning skills in reading.

EDEL 632 Remediation of Difficulties in Elementary School Reading  
Qtr. Hrs. - 3  
PR: EDEL 631. Selection of materials and techniques for a remedial program based on individual diagnosis.

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.

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

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

EDLS 451 Introduction to Educational Media  
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  
Selection, evaluation, and production of instructional materials with emphasis on production of projected materials; display and presentation techniques.

PHYSICAL EDUCATION — DEVELOPMENTAL

EDPE 305 Rehabilitation Training Techniques  
PR: Admission to Phase II or consent of instructor. Recognition and rehabilitation of sports injuries, including first aid.

EDPE 306 Administration and Coaching  
PR: Admission to Phase II or consent of instructor. Development of optimal individual and team performance in interscholastic athletics.

EDPE 307 School and Community Recreation  
PR: Admission to Phase II or consent of instructor. Knowledge and skills of after school activity and summer recreational programs.

EDPE 308 Human Performance Learning  
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 309 Kinesiology  
PR: Admission to Phase II or consent of instructor. The application of the structure of man to the study of human movement. (Includes lecture and laboratory).

EDPE 321 Exercise Physiology - Cardiovascular  
EDPE 322 Exercise Physiology
Respiratory
PR: ZOOL 234. A study of metabolic costs and respiratory adjustment to exercise.

EDPE 324 Instructional Analysis in Tennis
Mechanical analysis of neuromuscular performances and optimal approach to specific motor learning patterns.

EDPE 325 Instructional Analysis in Aquatics
Mechanical analysis of neuromuscular performances and optimal approach to specific motor learning patterns.

EDPE 326 Instructional Analysis in Gymnastics and Tumbling
Mechanical analysis of neuromuscular performances and optimal approach to specific motor learning patterns.

EDPE 327 Instructional Analysis in Golf
Mechanical analysis of neuromuscular performances and optimal approach to specific learning patterns.

EDPE 328 Instructional Analysis in Wrestling (M)
Mechanical analysis of neuromuscular performances and optimal approach to specific learning patterns.

EDPE 329 Choreography of Contemporary Dance (W)
Dance production as an art form.

EDPE 330 Rhythms, Notation, Meter and Form
Elements common to music and movement.

EDPE 405 Organization and Administration of Secondary School Physical Education
Nature and scope of secondary school physical education; athletic, intramural and adaptive programs.

EDPE 406 Organization and Administration of Elementary School Physical Education
Nature and scope of elementary school physical education; athletic, intramural and adaptive programs.

EDPE 407 Family Living Concepts
The ideas and principles of healthy family living.

EDPE 408 Contemporary Health Hazards
The effects of drugs and other mood modifiers.

EDPE 601 Philosophical Foundations of Physical Education
PR: Rank III Certificate or CI. Analysis of the forces and events leading to the development of current concepts in physical education.

EDPE 602 Trends and Readings in Physical Education
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

PR: Rank III Certificate or consent of instructor. Study of physical education and its existing organization. Emphasis on ethics, values, principles and issues.

EDPE 611 Physiology of Exercise - Environmental

PR: Rank III Certificate or consent of instructor. A study of physiological adaptation resulting from prescribed physical activity programs.

EDPE 612 Primate Gross Anatomy Dissection

PR: Rank III Certificate or consent of instructor. Dissection, identification, and analysis of select vertebrate morphology.

EDPE 613 Perceptual Motor Learning

PR: Rank III Certificate or consent of instructor. A study of optimal human factors controlling performance.

EDPE 621 School Recreation

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

EDPE 622 Kinesthetic Analysis of Individual Activities

PR: Rank III Certificate or consent of instructor. A kinesiological approach to select individual movement activities.

EDPE 623 Kinesthetic Analysis of Dual and Team Activities

PR: Rank III Certificate or consent of instructor. A kinesiological approach to select dual and team activities.

EDPE 624 Rhythms

PR: Rank III Certificate or consent of instructor. Instructional analysis in classical and modern rhythms.

PROFESSIONAL LABORATORY — APPLICATION

EDPL 320 Elementary School Student Teaching - Block A

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

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


EDPL 408 Teaching Strategies

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

EDPL 458 Supervision of Professional Laboratory Experiences
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 459 Supervision of Professional Laboratory Experiences
PR: Consent of instructor. Participation as a Teacher Education Associate or Supervising Teacher in the Florida Technological University laboratory experience program. May be taken concurrently with EDPL 458.

EDPL 466, 466 Teaching Practicum
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
PR: Admission to Phase II. A study of the public school curriculum, kindergarten through grade twelve.

EDSE 304 Instructional Techniques
PR: Admission to Phase II. Procedures, applications, and evaluation of technical skills a teacher may employ in the classroom.

EDSE 305 Secondary School Curriculum
PR: Admission to Phase II. Study of total school patterns with emphasis on new trends, including individual subject areas, administration, supervision, school services and school related activities.

EDSE 306 Business Instructional Analysis-I
PR: Admission to Phase II. Techniques, materials, and instructional
media; psychological principles, evaluation, and current trends in typewriting instruction.

**EDSE 307 English Instructional Analysis**
**Qtr. Hrs. - 4**
**PR:** Admission to Phase II. Study of course objectives for the high school curriculum and survey of methods and material having special application for teaching English.

**EDSE 308 Mathematics Instructional Analysis**
**Qtr. Hrs. - 4**
**PR:** Admission to Phase II. Study of course objectives for the high school curriculum and survey of methods and materials which have special application for teaching mathematics.

**EDSE 309 Science Instructional Analysis**
**Qtr. Hrs. - 4**
**PR:** Admission to Phase II. Study of course objectives for the high school curriculum and survey of methods and materials which have special application for teaching science.

**EDSE 405 Business Instruction Analysis-II**
**Qtr. Hrs. - 3**
**PR:** Admission to Phase II. Techniques, materials, and instructional media; psychological principles, evaluation, and current trends in shorthand and related instruction.

**EDSE 406 Business Instructional Analysis-III**
**Qtr. Hrs. - 3**
**PR:** Admission to Phase II. Techniques, materials, and instructional media; psychological principles, evaluation, and current trends in accounting and basic business instruction.

**EDSE 407 Foreign Language Instructional Analysis**
**Qtr. Hrs. - 4**
**PR:** Admission to Phase II. Study of course objectives for the high school curriculum and survey of methods and materials having special application for teaching foreign language.

**EDSE 408 Physical Education Instructional Analysis**
**Qtr. Hrs. - 4**
**PR:** Admission to Phase II. Study of course objectives for the high school curriculum and survey of methods and materials having special application for teaching physical education.

**EDSE 409 Social Science Instructional Analysis**
**Qtr. Hrs. - 4**
**PR:** Admission to Phase II. Study of instructional programs in Social Sciences; objectives; materials; techniques; organization of instruction; evaluation procedures; current research.

**EDSE 410 Speech Instructional Analysis**
**Qtr. Hrs. - 4**
**PR:** Admission to Phase II. Study of Instructional Programs in Speech; objectives, materials, techniques, organization for instruction, evaluation procedures, current research.

**EDSE 415 Reading in the Secondary School**
**Qtr. Hrs. - 3**
**PR:** Admission to Phase II or consent of instructor. Developmental reading for the junior and senior high school pupil.
EDSE 441 Literature for Adolescents  Qtr. Hrs. • 3
Selecting and evaluating books for adolescents with emphasis on the uses of books in the development of young people.

EDSE 475 Secondary School Curriculum  Qtr. Hrs. • 4
PR: Bachelor's degree or consent of instructor. Advanced study of secondary school curriculum; patterns of organization, school services, individual subject areas, school related activities; investigation of trends, research and new curricula.

EDSE 476, 477 Directed Study in Secondary Education  Qtr. Hrs. • 2-5, 2-5
Workshop for improvement of the secondary school curriculum. Open to in-service teachers.

EDSE 478 Instructional Analysis in Business  Qtr. Hrs. • 4
PR: Bachelor's degree or consent of instructor. Advanced study of the instructional programs in Business; objectives; materials; techniques; organization for instruction; evaluation procedures; current research.

EDSE 479 Instructional Analysis in English  Qtr. Hrs. • 4
PR: Bachelor's degree or consent of instructor. Advanced study of instructional programs in English; objectives; materials; techniques; organization for instruction; evaluation procedures; current research.

EDSE 485 Instructional Analysis in Foreign Language  Qtr. Hrs. • 4
PR: Bachelor's degree or consent of instructor. Advanced study of instructional programs in Foreign Language; objectives; materials; techniques; organization for instruction; evaluation procedures; current research.

EDSE 486 Instructional Analysis in Mathematics  Qtr. Hrs. • 4
PR: Bachelor's degree or consent of instructor. Advanced study of instructional programs in Mathematics; objectives; materials; techniques; organization for instruction; evaluation procedures; current research.

EDSE 487 Instructional Analysis in Physical Education  Qtr. Hrs. • 4
PR: Bachelor's degree or consent of instructor. Advanced study of instructional programs in Physical Education; objectives; materials; techniques; organization for instruction; evaluation procedures; current research.

EDSE 488 Instructional Analysis in Science  Qtr. Hrs. • 4
PR: Bachelor's degree or consent of instructor. Advanced study of instructional programs in Science; objectives; materials; techniques; organization for instruction; evaluation procedures; current research.

EDSE 489 Instructional Analysis in Social Sciences  Qtr. Hrs. • 4
PR: Bachelor's degree or consent of instructor. Advanced study of instructional programs in Social Sciences; objectives; materials; techniques; organization for instruction; evaluation procedures; current research.
EDSE 491 Contemporary Biology Qtr. Hrs. - 3
PR: Admission to Phase II or consent of instructor. Concepts, experiments, problems and advanced topics included in courses such as BSCS biology and other modern approaches to secondary school biology. (Same as BIOL 491.)

EDSE 492 Contemporary Chemistry Qtr. Hrs. - 3
PR: Admission to Phase II or consent of instructor. Concepts, experiments, problems, and advanced topics included in courses such as CHEM Study and other modern approaches to secondary school chemistry. (Same as CHEM 491.)

EDSE 493 Contemporary Mathematics Qtr. Hrs. - 3
PR: Admission to Phase II or consent of instructor. Concepts, problems, and advanced topics included in courses such as SMSG mathematics and other modern approaches to secondary school mathematics. (Same as MATH 491.)

EDSE 494 Contemporary Physics Qtr. Hrs. - 3
PR: Admission to Phase II or consent of instructor. Concepts, experiments, problems and advanced topics included in courses such as PSSC physics and other modern approaches to secondary school physics. (Same as PHYS 491.)

EDSE 541 English Programs in the Secondary School Qtr. Hrs. - 3
PR: Consent of the instructor. Concepts, problems, and advanced topics in such courses as Project English and other secondary school English projects.

EDSE 561 General Science Programs in the Secondary School Qtr. Hrs. - 3
PR: Consent of instructor. Basic concepts, philosophies, and formats of experimental secondary school general science programs (may be repeated).

EDSE 571 Social Science Programs in the Secondary School Qtr. Hrs. - 3
PR: Consent of instructor. Concepts, problems, experiments and advanced topics in high school social studies (may be repeated).

EDSE 601 Curriculum Planning Qtr. Hrs. - 3
PR: Rank III Certificate or CI. Identifying major concepts, writing objectives, listing activities and developing course layouts for a secondary school subject area.

EDSE 602 Theory and Application of Group Behavior in the Classroom Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Understanding, predicting, and guiding persons who are members of small groups.

EDSE 603 Teaching Systems of Cognition Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. A study of the thinking process and experimentation with specific practical techniques for helping
to develop students' thinking skills.

EDSE 604 Simulation Techniques in Instruction Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Survey and experimental application of selected simulation and game techniques.

EDSE 605 Analysis of Classroom Interaction Qtr. Hrs. - 3
PR: Rank III Certificate or consent of instructor. Methods of recording classroom interactions; significant research results; and skill building in using selected instruments.

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 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: Rank III Certificate or consent of instructor. Design, organization and development of special materials related to selected conceptual specializations. (To be taken in conjunction with six hours of content related to concept specialization).

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: Admission to Phase II. 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: Admission to Phase II. 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 405 Teaching Analysis Qtr. Hrs. - 4
PR: Bachelor's degree or consent of instructor. Advanced study, examination, and participation in general and specific dimensions of the
teaching task in current American Society.

EDTA 406 Human Development
Qtr. Hrs. - 4
PR: Bachelor's degree or consent of instructor. Advanced study of basic principles and their application in physical, intellectual, emotional and social development from conception through adolescence.

EDTA 407 Learning Theory
Qtr. Hrs. - 4
PR: Bachelor's degree or consent of instructor. Analysis and advanced study of the applications of learning theory as applied to teaching in the elementary and secondary classroom.

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 Social Factors in American Education
Qtr. Hrs. - 3
PR: Rank III Certificate or CI. Analysis of general and specific aspects of American education as they relate to Social and Behavioral Sciences.

EDTA 602 Education, Human Development and Learning
Qtr. Hrs. - 3
PR: Rank III Certificate or CI. Recent research in Human Development and learning relevant to contemporary American education.

EDTA 603 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 604 Research Design and Techniques in Education
Qtr. Hrs. - 3
PR: EDTA 603 or CI. Design rationale and construction, sampling methods, control and limits.

EDTA 606 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 695 Research Report
Qtr. Hrs. - 4-6
PR: Admission to Candidacy. A report based on a concentrated application of theory, research and the student's creative effort toward investigating a problem germane to his area of concentration. The student's project is subject to his graduate adviser's approval.

EDTA 696 Special Topics
Qtr. Hrs. - 2-5
PR: Rank III Certificate or consent of instructor. (May be repeated for credit).
EDV A 401 Secondary School Art Instructional Analysis Qtr. Hrs. - 3
Methods and curriculum materials for teaching Visual Arts in the secondary schools.

EDV A 402 Elementary School Art Instructional Analysis Qtr. Hrs. - 3
Methods and curriculum materials appropriate for teaching Visual Arts in the elementary schools.

EDV A 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.

EDV A 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.

EDV A 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 434 Found Arts Qtr. Hrs. - 3
PR: EDVA 431 and 432 or consent of instructor. Materials available for instruction in the public schools will be explored in depth in relation to their appropriateness and productive qualities.

EDVA 491 Contemporary Visual Arts Education Qtr. Hrs. - 3
PR: EDVA 401 and 402 or consent of instructor. A study of current programs and innovations in public school Visual Arts Programs.
EECS 322 Electronic Engineering  Qtr. Hrs.  • 4  
Continuation of ENGR 323. Three lectures, three hours laboratory.

EECS 331 Electromechanics  Qtr. Hrs.  • 3  
PR: ENGR 322. 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.  • 3  

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 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 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 and 421. Microwave devices and systems. Three lectures, three hours laboratory.

EECS 443 Coherent Optics Applications  Qtr. Hrs.  • 3  
PR: EECS 341. Theory and design of coherent optical systems lasers, information, processing, communication, holography.

EECS 451 Communication Theory  Qtr. Hrs.  • 4  
PR: EECS 321 and 322. Information transmission, modulation, and noise. Three lectures, three hours laboratory.
EECS 453 Random Processes
PR: MATH 321 and ENGR 321. Random variables, averaging, sampling, elements of probability theory.

EECS 461 Semiconductor Devices
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

EECS 464 Solid State Electronics

EECS 496 Special Topics
PR: Consent of instructor. May be repeated for credit.

EECS 497 Undergraduate Seminars
PR: Consent of instructor. May be repeated for credit.

EECS 498 Independent Study
PR: Consent of instructor. May be repeated for credit.

EECS 499 Undergraduate Research
PR: Consent of instructor. May be repeated for credit.

ENGINEERING CORE

ENGR 101 Engineering Graphics
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
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
CR: MATH 211. Introduction to the basic physical phenomena essential to the understanding of engineering structures, machines, processes, and systems. Primary emphasis on mechanics, materials behavior, and thermo-fluid 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 211 Engineering Analysis-Statics  Qtr. Hrs. - 4
PR: MATH 321. Force systems, resultants, equilibrium, distributed forces. First and second moments of areas and masses.

ENGR 221 Electrical Science  Qtr. Hrs. - 4
PR: MATH 321 and ENGR 311. Basic concepts of electricity and magnetism. The development of fundamental laws and their engineering application. Lecture, demonstration, and laboratory.

ENGR 311 Engineering Analysis — Dynamics  Qtr. Hrs. - 4
PR: ENGR 211. 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 Electrical Networks  Qtr. Hrs. - 4
PR: ENGR 321. Mathematical analysis of networks and linear systems. Lecture, demonstration, and laboratory.

ENGR 323 Electronic Engineering  Qtr. Hrs. - 4
PR: ENGR 322. Electronic circuits. Lecture, demonstration, and laboratory.

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

ENGR 341 Engineering Economic Analysis  
PR: MATH 221. Economic evaluation of engineering alternatives.

ENGR 342 Systems Analysis  
PR: ENGR 341; CR: ENGR 371. Integrated systems approach to the analysis, design, and optimization of engineering hardware and software.

ENGR 351 Structure & Properties of Materials  
PR: ENGR 152 and MATH 222. Quantum mechanical introduction to atomic bonding. Classification of solids. Crystal structures and the diffraction of X-rays by crystals. Effects of imperfections on physical properties.

ENGR 352 Materials of Engineering  
PR: ENGR 351. Properties and behavior of engineering materials. Laboratory investigations and text criteria. Lecture demonstrations and laboratory.

ENGR 361 Man and His Environment  
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  
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 STAT 335.)

ENGR 421 Linear Control Systems  
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.

ENGR 431 Transport Processes  
PR: ENGR 332. Analogous development and application of the principles of viscous fluid flow, conduction and convective heat transfer, and mass diffusion processes.

ENGR 441 Technical Communications  
PR: Junior standing. Composition for technical papers, reports and scientific articles suitable for publication. Oral and written presentation.
ENGR 442 Operations Research  
PR: ENGR 371. Mathematical methods of operations research; linear programming.

ENGR 443 Engineering Administration  
PR: Senior standing. Engineering organization and administration; delegation of authority and responsibility; effective utilization of resources; compensation structure, labor-management relations.

ENGR 471, 472 Engineering Mathematical Analysis  
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.

ENGR 473 Analytical Methods in Engineering  
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 electric potential.

ENGR 474 Analytical Methods in Engineering  
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.

ENGR 475 Numerical Analysis in Engineering  
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 — INTERDISCIPLINARY COURSES

ENGR 481 Man and Machine  
The influence and interrelationship of invention and technical progress on the evolution of social forms and institutions.

ENGR 482 Engineering & Technology in History  
Important developments in engineering and technology and their effect on society and our socio-economic processes and institutions.

ENGR 483 Technology and Social Change  
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
Examination of the reciprocal relations of science and society from ancient to recent times.

ENGR 485 Topics in Urban Development
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
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
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
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.

ENGR 490 Engineering in Human Affairs
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 496 Special Topics
PR: Consent of instructor. May be repeated for credit.

ENGR 497 Undergraduate Seminar
PR: Consent of instructor. May be repeated for credit.

ENGR 498 Independent Study
PR: Consent of instructor. May be repeated for credit.

ENGR 499 Undergraduate Research
PR: Consent of instructor. May be repeated for credit.

ENGINEERING MATERIALS SCIENCES

EMS 411 Semiconductor Materials and Devices
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.

EMS 412 Electronic Properties of Materials
Qtr. Hrs. - 3

EMS 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.

EMS 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.

EMS 431 Engineering Materials and Processes
Qtr. Hrs. - 3
PR: Senior standing. Basic properties and metallurgy of engineering materials, including ferrous and nonferrous metals and alloys; studies of cermets and plastics; production and processing of engineering materials. Two lectures, three hours laboratory.

EMS 432 Metallurgy
Qtr. Hrs. - 3
PR: EMS 431. Extraction of metals, crystal and atomic structure, phase transformations, tests and properties of high temperature metals and refractories, and introduction to spectroscopy. Two lectures, three hours laboratory.

EMS 441 Materials Processing
Qtr. Hrs. - 3
PR: ENGR 351. Phase transformations, crystallography, growth processes, kinetics of solid state transformations; technology of high and low temperatures, vacuum systems, high pressure, and clean environments.

EMS 451 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.

EMS 452 Engineering Materials
Qtr. Hrs. - 3

EMS 496 Special Topics
Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

EMS 497 Undergraduate Seminar
Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
ENGLISH

ENG 101 Composition I
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
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
PR: ENG 101 or equivalent. Contemporary prose and poetry selected to invite the interest of students in literature. Writing related to readings.

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

ENG 211 Survey of English Literature to 1625

ENG 212 Survey of English Literature, 1626-1798

ENG 213 Survey of English Literature, 1798-1914

ENG 300 Expository Writing
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 Qtr. Hrs. - 3
For scientific, professional, or business students. The first half of the course lays emphasis upon clear expository writing with particular attention to business letters and memoranda. The second half of the course stresses the production of professional reports or articles in the student's particular discipline.

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 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
ENG 401 Senior Writing Workshop I  Qtr. Hrs. - 3  
PR: Evidence of writing skill satisfactory to the instructor. Analysis of significant nonfiction; market research; intensive writing practice leading to a completed body of nonfiction writing suitable for publication. Should be taken in conjunction with ENG 498. (May be repeated once for credit.)

ENG 402 Senior Writing Workshop II  Qtr. Hrs. - 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. Should be taken in conjunction with ENG 498. (May be repeated once for credit.)

ENG 403 Senior Writing Workshop III  Qtr. Hrs. - 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. Should be taken in conjunction with ENG 498. (May be repeated once for credit.)

ENG 404 English Versification  Qtr. Hrs. - 3  
Intensive study of the structural characteristics of English poetry, metrical systems, rhyme, scansion, and poetic rhetorical devices.

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 Studies in 17th Century English Literature I  Qtr. Hrs. - 3  
Early prose, poetry, and drama (exclusive of Shakespeare).

ENG 422 Studies in 17th Century English Literature II  Qtr. Hrs. - 3  
Literature of the Puritan domination.

ENG 423 Studies in 17th Century English Literature III  Qtr. Hrs. - 3  
Literature of the Restoration period.

ENG 424 Studies in 18th Century English Literature I  Qtr. Hrs. - 3  
Selected works of writers of the first 40 years of the 18th Century.

ENG 425 Studies in 18th Century English Literature II  Qtr. Hrs. - 3  
The rise of the English novel and the "Age of Johnson."

ENG 426 Studies in 18th Century English Literature III  Qtr. Hrs. - 3  
Early romanticism; the Gothic novel and the novel of manners; the drama 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.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ENG 428</td>
<td>Studies in 19th Century English Literature II</td>
<td>Qtr. Hrs. - 3</td>
<td>English literature from 1832 to 1870: the early Victorians.</td>
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<tr>
<td>ENG 429</td>
<td>Studies in 19th Century English Literature III</td>
<td>Qtr. Hrs. - 3</td>
<td>English literature from 1870 to 1914: later Victorians and transitional writers.</td>
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<tr>
<td>ENG 430</td>
<td>Chaucer</td>
<td>Qtr. Hrs. - 3</td>
<td>The Canterbury Tales, Troilus and Criseyde, and other works.</td>
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<td>ENG 431</td>
<td>Shakespeare's Comedies</td>
<td>Qtr. Hrs. - 3</td>
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<td>ENG 432</td>
<td>Shakespeare's Histories</td>
<td>Qtr. Hrs. - 3</td>
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<tr>
<td>ENG 433</td>
<td>Shakespeare's Tragedies</td>
<td>Qtr. Hrs. - 3</td>
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<td>ENG 434</td>
<td>Milton</td>
<td>Qtr. Hrs. - 3</td>
<td>Paradise Lost, Paradise Regained, Samson Agonistes, shorter poems, and selected prose.</td>
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<tr>
<td>ENG 441</td>
<td>English Drama to 1642 (exclusive of Shakespeare)</td>
<td>Qtr. Hrs. - 3</td>
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<td>ENG 442</td>
<td>Restoration and 18th Century English Drama</td>
<td>Qtr. Hrs. - 3</td>
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<td>ENG 444</td>
<td>The British Novel in the 18th Century</td>
<td>Qtr. Hrs. - 3</td>
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<tr>
<td>ENG 445</td>
<td>The British Novel in the 19th Century</td>
<td>Qtr. Hrs. - 3</td>
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<tr>
<td>ENG 446</td>
<td>The American Novel in the 19th Century</td>
<td>Qtr. Hrs. - 3</td>
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<tr>
<td>ENG 451</td>
<td>British and American Fiction Since 1900</td>
<td>Qtr. Hrs. - 3</td>
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<tr>
<td>ENG 452</td>
<td>British and American Poetry Since 1900</td>
<td>Qtr. Hrs. - 3</td>
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<tr>
<td>ENG 453</td>
<td>British and American Drama Since 1900</td>
<td>Qtr. Hrs. - 3</td>
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<tr>
<td>ENG 460</td>
<td>Historical Survey of Literary Criticism</td>
<td>Qtr. Hrs. - 3</td>
<td>Study of the major critics from classical antiquity through the modern era.</td>
</tr>
<tr>
<td>ENG 461</td>
<td>British Literary Criticism to 1900</td>
<td>Qtr. Hrs. - 3</td>
<td>PR: ENG 460. Study of the major critics in England from the Renaissance through the Victorian period.</td>
</tr>
<tr>
<td>ENG 462</td>
<td>British Literary Criticism Since 1900</td>
<td>Qtr. Hrs. - 3</td>
<td>PR: ENG 460. Study of the important critical theories and principles developed in England from the Edwardian era to the present.</td>
</tr>
<tr>
<td>ENG 463</td>
<td>Literary Criticism in the United States</td>
<td>Qtr. Hrs. - 3</td>
<td>PR: ENG 460. Study of American literary critics to the present.</td>
</tr>
</tbody>
</table>
ENG 471 Modern English Grammar  Qtr. Hrs. - 3  

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

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

ENG 498 Independent Study  Qtr. Hrs. - 2-5  
PR: Consent of instructor. May be repeated for credit.

ENG 499 Undergraduate Research  Qtr. Hrs. - 2-5  
PR: Consent of instructor. May be repeated for credit.

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, ECON 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: ECON 203 or consent of instructor. Principles and methods of risk reduction and specialization, with particular emphasis on insurance.

FIN 321 Investments  Qtr. Hrs. - 4
PR: ECON 203 or consent of instructor. Principles of determining investment policy for individual and institutional portfolios.

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  

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 phonetic groupings.

FRE 422 Seventeenth Century French Theater Qtr. Hrs. - 5
PR: FRE 312. Corneille, Racine, and Molière. A study of the life and principal works of the authors.

FRE 431 French Literature of the Eighteenth Century Qtr. Hrs. - 3
PR: FRE 312. The philosophical movement: Montesquieu, 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. - 5
Contemporary French drama and poetry.

FRE 453 Twentieth Century French Literature Qtr. Hrs. - 3

FRE 497 Undergraduate Seminar Qtr. Hrs. - 2.5
PR: Consent of instructor. May be repeated for credit.

FRE 498 Independent Study Qtr. Hrs. - 2.5
PR: Consent of instructor. May be repeated for credit.
GEOL 100 Introductory Geology
A survey of physical and historical geology with an introduction to basic scientific principles and methods. Designed for non-science majors; appropriate for the Environmental Studies Program. Recommended that GEOL 110 be taken concurrently.

GEOL 101 Physical Geology
PR: Any one of the following: GEOL 100, ENGR 151, CHEM 161, or PHYS 208. 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. Recommended that GEOL 110 and/or GEOL 111 be taken concurrently.

GEOL 102 Historical Geology
PR: GEOL 100 or GEOL 101. 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. Recommended that GEOL 112 be taken concurrently.

GEOL 110 Introductory Geology Laboratory
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
CR: GEOL 101 and GEOL 110. 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
PR: GEOL 110. 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
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
PR: GER 101 or equivalent. Continuation of GER 101.

GER 103 Elementary German Language and Civilization
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.

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: 1878-1918  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.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>HIST 420</td>
<td>United States Diplomatic History</td>
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<tr>
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<td>The foreign relations of the United States from the founding of the Republic to the present.</td>
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<tr>
<td>HIST 430</td>
<td>Latin American History: The ABC Countries</td>
<td>5</td>
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<tr>
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<td>A survey of the histories of Argentina, Brazil, and Chile from the colonial period to the present.</td>
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<tr>
<td>HIST 452</td>
<td>The Middle Ages and The Renaissance</td>
<td>5</td>
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<td>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.</td>
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<td>HIST 455</td>
<td>The Age of the Reformation and the Enlightenment</td>
<td>5</td>
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<td>PR: HIST 202. Europe from the 16th Century to the 18th Century.</td>
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<td>HIST 457</td>
<td>Modern Europe: 1789-1918</td>
<td>5</td>
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<td>HIST 459</td>
<td>Modern Europe: 1918 to the Present</td>
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<td>HIST 461</td>
<td>English History to 1485</td>
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<td>HIST 462</td>
<td>English History: 1485-1815</td>
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<td>HIST 463</td>
<td>British History: 1815 to Present</td>
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<tr>
<td>HIST 464</td>
<td>British Empire and Commonwealth</td>
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<tr>
<td></td>
<td>Development of the British Empire and Commonwealth since the American Revolution.</td>
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<tr>
<td>HIST 466</td>
<td>British History: Tudor-Stuart Period</td>
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<td>A study of the Tudor-Stuart period, with particular emphasis on the civil/religious conflicts of the time.</td>
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<td>HIST 470</td>
<td>History of Russia to 1856</td>
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<td>HIST 471</td>
<td>History of Russia: 1856-1917</td>
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<td>HIST 472</td>
<td>History of the Soviet Union: 1917 to the Present</td>
<td>4</td>
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<tr>
<td>HIST 480</td>
<td>History and Historians</td>
<td>4</td>
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<td>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.</td>
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</tr>
<tr>
<td>HIST 497</td>
<td>Undergraduate Seminar</td>
<td>2.5</td>
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<td></td>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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<tr>
<td>HIST 498</td>
<td>Independent Study</td>
<td>2.5</td>
</tr>
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<td></td>
<td>PR: Consent of instructor. May be repeated for credit.</td>
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</tr>
</tbody>
</table>
HUMANITIES

HUM 201 Western Humanities Survey  
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  
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.

HUM 301 The Mind and Art of Greece  
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  
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  
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  
The re-birth of humanistic art and free inquiry, particularly in Italy, from Giotto to Titian, with emphasis on the Neo Plutonic Academy, polyphonic music, and visual realism.

HUM 307 Reformation and Early Baroque Era  
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  
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  
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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUM 310</td>
<td>Mind and Art of the Recent Past</td>
<td>The influence of evolution, science, and utilitarian thought on various literary, artistic, and musical styles from the mid-19th Century to World War I.</td>
</tr>
<tr>
<td>HUM 311</td>
<td>Egypt and the Near East</td>
<td>The life and thought of ancient civilizations as revealed through art and archaeology.</td>
</tr>
<tr>
<td>HUM 315</td>
<td>China and Japan</td>
<td>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.)</td>
</tr>
<tr>
<td>HUM 317</td>
<td>India</td>
<td>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.)</td>
</tr>
<tr>
<td>HUM 318</td>
<td>Islamic Cultures</td>
<td>An inquiry into the foundations and development of Islamic thought and culture in various geographical locations. (Same as REL 318.)</td>
</tr>
<tr>
<td>HUM 319</td>
<td>Russia</td>
<td>Outstanding examples of Russian music, dance, drama, and fiction, with attention to the distinctive mixture of cultural influences they reveal.</td>
</tr>
<tr>
<td>HUM 335</td>
<td>Afro-American Culture</td>
<td>The artistic influence of the Negro in America.</td>
</tr>
<tr>
<td>HUM 351</td>
<td>Latin-American Cultures</td>
<td>The art and archaeological remains of Inca, Mayan, and Aztec civilizations; their influences on Latin-American music, art and literature.</td>
</tr>
<tr>
<td>HUM 355</td>
<td>American Ideas I</td>
<td>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.</td>
</tr>
<tr>
<td>HUM 356</td>
<td>American Ideas II</td>
<td>Continuation of HUM 355 with emphasis on the effect of industrialism, pragmatism, individualism, and the cycles of reform and reaction.</td>
</tr>
<tr>
<td>HUM 371</td>
<td>Contemporary American Culture</td>
<td>An integrated view of the art, music, and literature of our time, revealing the impact of depersonalization, alienation, revolt, and the search for self-awareness.</td>
</tr>
</tbody>
</table>
HUM 413 The Romantic Mood
A comparative study of selected romantic art works in various periods and places, including modern America.

HUM 421 Purposes of Art
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 441 Purposes of Music
Religious and social functions of music and its relationships with other arts.

HUM 451 The Epic
The epic hero as a model of human ideals in various cultural settings.

HUM 455 The Tragic View
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
A definition of the comic and satiric views of life and a study of examples in literature from Aristophanes to Ionesco.

HUM 471 Mythic Literature

HUM 473 Confession Literature
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
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 ravel the common thread of human speculation on human affairs.

HUM 496 Special Topics
PR: Consent of instructor. May be repeated for credit.

HUM 498 Independent Study
PR: Consent of instructor. May be repeated for credit.

HUMANITIES AND FINE ARTS

HFA 490 Senior Seminar: Humanities and Arts in Human Affairs
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 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 331 Work Analysis and Design
   Qtr. Hrs. - 3
   PR: Junior standing or approval of instructor. Analysis, design and operation of work systems; their relationship to job evaluation and wage payment systems. Laboratory assignments.

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 361 Engineering Applications of Computer Methods
   Qtr. Hrs. - 3
   PR: MATH 223, COMP 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. Laboratory assignments.

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 421 Operations Research Models
   Qtr. Hrs. - 3
   PR: ENGR 471. Inventory and replacement models, queueing theory, sequencing, forecasting, dynamic programming.

IEMS 422 Network Analysis
   Qtr. Hrs. - 3
   PR: IEMS 435 and ENGR 442. Analysis of networks including: CPM, PERT, GERT, maximum flow problems.

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 433 Queueing Theory
   Qtr. Hrs. - 3
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Qtr. Hrs.</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEMS 435</td>
<td>Probability for Engineers</td>
<td>3</td>
<td>ENGR 371. Combinatorial analysis, sample space, events, probability, discrete and continuous random variables, probability distributions with applications in engineering. (Same as STAT 435.)</td>
</tr>
<tr>
<td>IEMS 436</td>
<td>Statistics for Engineers</td>
<td>3</td>
<td>ENGR 371. Significance tests and confidence intervals, tests of hypotheses, simple and multiple regression and correlation with applications in engineering. (Same as STAT 436.)</td>
</tr>
<tr>
<td>IEMS 442</td>
<td>Engineering Economic Analysis</td>
<td>3</td>
<td>ENGR 341 and IEMS 435. The engineering economic audit, breakeven point analysis, variable budget control of manufacturing costs, cost analysis, and product pricing.</td>
</tr>
<tr>
<td>IEMS 443</td>
<td>Analysis of Decision Processes</td>
<td>3</td>
<td>ENGR 371 and ENGR 341. Methods of making economic decisions; effects of risk, uncertainty, and strategy on managerial economic decision.</td>
</tr>
<tr>
<td>IEMS 451</td>
<td>Human Engineering</td>
<td>3</td>
<td>Senior standing. Man-machine systems; design and conduct of human engineering studies. Laboratory assignments.</td>
</tr>
<tr>
<td>IEMS 452</td>
<td>Human Factors in Space Travel</td>
<td>3</td>
<td>IEMS 451. Artificial environments and environmental control of upper atmosphere and space.</td>
</tr>
<tr>
<td>IEMS 461</td>
<td>System Simulation with Digital Computers</td>
<td>3</td>
<td>IEMS 361. Methods and procedures for simulating large scale systems with digital computers. FORTRAN and GASP programming languages are used. Laboratory assignments.</td>
</tr>
<tr>
<td>IEMS 462</td>
<td>Information Acquisition</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>IEMS 463</td>
<td>Project Engineering</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>IEMS 464</td>
<td>Design of Industrial Operations</td>
<td>3</td>
<td>IEMS 331. Planning, analyzing, controlling and evaluating production systems. Laboratory assignments.</td>
</tr>
<tr>
<td>IEMS 496</td>
<td>Special Topics</td>
<td>2-5</td>
<td>Consent of instructor. May be repeated for credit.</td>
</tr>
<tr>
<td>IEMS 497</td>
<td>Undergraduate Seminar</td>
<td>2-5</td>
<td>Consent of instructor. May be repeated for credit.</td>
</tr>
</tbody>
</table>
INHALATION THERAPY

INHT 350 Introduction to Respiratory Equipment  Qtr. Hrs. - 3

INHT 351 Respiratory Equipment Laboratory  Qtr. Hrs. - 1
Procedures in cleaning, sterilizing, maintenance, and repair of equipment. Taken concurrently with INHT 350.

INHT 355 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.

INHT 360 Respiratory Equipment Function  Qtr. Hrs. - 3

INHT 361 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 INHT 360.

INHT 370 Pulmonary Physiology  Qtr. Hrs. - 3

INHT 371 Pulmonary Physiology Laboratory  Qtr. Hrs. - 1
Experiments in ventilation mechanics, diffusion, circulation, and gas transport. Taken concurrently with INHT 370.

INHT 380 Respiratory Pathology  Qtr. Hrs. - 3
PR: ZOOL 234. Cellular pathology with emphasis on pathology of respiratory and cardiovascular systems.

INHT 381 Respiratory Pathology Laboratory  Qtr. Hrs. - 1
Macro and microscopic identification of respiratory diseases. Gross pathology. Taken concurrently with INHT 381.
INHT 390 Cardiopulmonary Resuscitation  Qtr. Hrs. - 3

INHT 391 Cardiopulmonary Resuscitation Laboratory  Qtr. Hrs. - 1
Adult intubation and available airways. Defibrillation practice. Taken concurrently with INHT 390.

INHT 450 Pulmonary Function Studies  Qtr. Hrs. - 3
PR: Permission of instructor. Detailed procedures and tests to provide objective information for diagnosis of respiratory diseases.

INHT 451 Pulmonary Function Laboratory  Qtr. Hrs. - 1
Testing procedures and experiments in normal and abnormal respiratory functions. Taken concurrently with INHT 450.

INHT 455, 456 Medical Pharmacology  Qtr. Hrs. - 3,3

INHT 460 Medicine  Qtr. Hrs. - 3
PR: INHT 370. Disease states treated medically in conjunction with one or more modalities of respiratory therapy.

INHT 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 INHT 460.

INHT 470 Respiratory Physical Therapy  Qtr. Hrs. - 3

INHT 471 Respiratory Physical Therapy Laboratory  Qtr. Hrs. - 1
Observation and assistance in respiratory physical therapy procedures performed on hospital patients. Taken concurrently with INHT 470.

INHT 480 Respiratory Pediatrics  Qtr. Hrs. - 3

INHT 481 Respiratory Pediatrics Laboratory  Qtr. Hrs. - 1
Review of pediatric equipment. Treatment of specific diseases. Infant resuscitative procedures and intubation. Taken concurrently with INHT 480.
INHT 490 Cardiopulmonary Therapy  
**Qtr. Hrs. - 3**

INHT 491 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 INHT 490.

**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 130 Elementary Italian Language and Civilization  
**Qtr. Hrs. - 3**
PR: ITA 102 or equivalent. Continuation of ITA 102.

**JOURNALISM**

JRN 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.

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: JRN 319. Fundamentals of copy editing for printed media, including selection, processing and display of news.

JRN 322 Information Processing  
**Qtr. Hrs. - 4**
Planning content and format of newspapers and other periodicals; layout, dummying, departmental editing, copy desk management.

JRN 330 History of Journalism  
**Qtr. Hrs. - 3**
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 421 Editorial and Column Writing
PR: Consent of instructor. Building the editorial page, backgrounding and interpreting the news.

JRN 422 Public Affairs Reporting
PR: JRN 420 or permission of instructor. Study of community news sources, reporting courts, city and county government.

JRN 423 Writing for the Mass Media
PR: Consent of instructor. Students write for a certain segment of the mass media of their own choosing. Will include playwriting, creative writing, article writing, etc. May be repeated for credit.

JRN 424 Critical Writing
PR: Consent of instructor. Practice in writing reviews of plays, concerts, and books.

JRN 425 Feature Writing
PR: Consent of instructor. Writing of feature articles for newspapers and magazines.

JRN 426 Public Relations
Principles and practice of public relations, the means of gaining publicity and influencing people.

JRN 427 Public Relations Campaigns
The planning and execution of a public relations campaign; use of research and coordination of elements of the campaign.

JRN 429 Mass Media and Popular Culture
An impact study of mass media upon American culture; past to present.

JRN 431 International Communication and the Foreign Press
A study of the news communicating systems of the world, the role of foreign correspondents, the foreign press.

JRN 432 The Mass Media in Developing Countries
Role of the media in the developing areas of the world, how the nations and media help shape the direction of one another.

JRN 433 Propaganda and Psychological Warfare
Propaganda and psychological warfare principles with a study of the activities engaged in by nations.

JRN 434 Principles of Advertising
Fundamentals of advertising theory and practice, including social and economic aspects.

JRN 435 Advertising Media
PR: JRN 434 or consent of instructor. Evaluations of advertising media in terms of their ability to serve the advertiser's communication needs and the tools of analysis used in determining media success.
JRN 436 Advertising Copy
PR: Consent of instructor. The writing and preparation of copy for advertisements.

JRN 437 Advertising Campaigns
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 496 Special Topics
PR: Consent of instructor. May be repeated for credit.

JRN 498 Independent Study
PR: Consent of instructor. May be repeated for credit.

MANAGEMENT

MGMT 301 Management
PR: ECON 203. Fundamentals of management underlying the solution of problems relating to the organization and operation of business enterprises.

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

MGMT 344 Organization Theory
PR: MGMT 301. Elements in organizations and the processes by which they develop and influence behavior are considered.

MGMT 347 Human Relations in Management
PR: MGMT 344. The individual, interpersonal and group relations and inter-group and organizational problems in business.

MGMT 364 Personnel Management
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 367 Industrial Relations
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 424 Production Management Problems
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
PR: MGMT 364. Case studies in personnel problems directed toward the application of personnel management theory and concepts to organization problems.

MGMT 499 Undergraduate Research
PR: Consent of instructor. May be repeated for credit.

MGMT 601 Management Process
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
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
PR: Bus. Core and 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
PR: ECON 203. Study of functions, institutions and basic problems in marketing of goods and services in our economy.

MKTG 324 Marketing Environment
PR: MKTG 301. A course emphasizing the relationship of firm to firm, to government, to labor and to other organized groups or institutions as they interact with the marketing function of the firm.

MKTG 326 Consumer Market Behavior
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 326 Consumer Market Behavior
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 Pricing Policies
PR: MKTG 301. The nature of marketing decisions and pricing; marketing organization and the pricing process; price theories and pricing models.
MKTG 344 Marketing Logistics  
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  
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  
PR: MKTG 301. Problems confronting sales manager; training in sales techniques; sales objectives and policies; organization; and administration of sales force.

MKTG 364 Advertising Management  
PR: MKTG 301. Analysis of field of advertising; purposes, techniques, media, organization, and role of research; economic and social aspects of advertising.

MKTG 384 Marketing Research  
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  
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 495 Marketing Policies and Strategies  
PR: MKTG 384 and MKTG 469. Marketing problems and policies are explored with emphasis placed on the decision-making process.

MKTG 499 Undergraduate Research  
PR: Consent of instructor. May be repeated for credit.

MKTG 601 Marketing Policy  
PR: Graduate standing. Marketing policy formulation and decision-making with respect to planning, pricing, promoting, and distributing.

MKTG 602 Current Marketing Problems  
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.
MATH 100 Principles of Mathematics
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 104 Fundamental Algebra
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
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
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 115 Finite Mathematics
PR: MATH 104 or one and one half years of high school algebra and one year of plane geometry or two years of high school algebra. Mathematical logic, set theory, counting and the binomial theorem, probability.

MATH 198 Freshman Seminar
PR: Consent of instructor. This course develops the student’s ability to analyze and solve logical and mathematical problems by careful analysis of selected problems. (Required of all majors in the Mathematical Sciences.)

MATH 211 Analytic Geometry
PR: MATH 110 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
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 314 Boolean Algebra
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, 352 Foundations of Geometry  Qtr. Hrs. - 3,3
PR: Consent of instructor. Euclidean geometry; geometry of transformations; projective and other non-Euclidean geometries.

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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Qtr. Hrs.</th>
<th>PR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 421, 422, 423 Advanced Calculus</td>
<td>3,3,3</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>MATH 424 Lebesgue Theory</td>
<td>3</td>
<td>MATH 423. Inner and outer measure; measurable sets and functions; the Lebesgue integral.</td>
<td></td>
</tr>
<tr>
<td>MATH 425 Techniques of Complex Variables</td>
<td>3</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>MATH 426, 427 Theory of Complex Variables</td>
<td>3,3</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>MATH 428 The Number System</td>
<td>3</td>
<td>MATH 420. An axiomatic development of the natural numbers followed by a constructive development of the real and complex numbers. Intended for prospective teachers of mathematics.</td>
<td></td>
</tr>
<tr>
<td>MATH 429 Foundations of Calculus</td>
<td>3</td>
<td>MATH 420. 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.</td>
<td></td>
</tr>
<tr>
<td>MATH 431 Ordinary Differential Equations</td>
<td>3</td>
<td>MATH 331. Systems of equations; the Wronskian; Abel's identity; integrating factors and adjoint equations.</td>
<td></td>
</tr>
<tr>
<td>MATH 432 Theory of Differential Equations</td>
<td>3</td>
<td>MATH 331. The existence and uniqueness of solutions; oscillation theory; asymptotic solutions; stability.</td>
<td></td>
</tr>
<tr>
<td>MATH 434 Partial Differential Equations</td>
<td>3</td>
<td>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.</td>
<td></td>
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<tr>
<td>MATH 435 Boundary Value Problems</td>
<td>3</td>
<td>MATH 434. Adjoint forms and Green's functions; applications in engineering and the physical sciences.</td>
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</tbody>
</table>
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 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

MATH 491 Contemporary Mathematics  Qtr. Hrs. - 3
PR: Consent of the instructor. Concepts, problems, and advanced topics included in current approaches to secondary mathematics. (Same as EDSE 493).

MATH 496 Special Topics  Qtr. Hrs. - 2-5
PR: Consent of the instructor. May be repeated for credit.

MATH 497 Undergraduate Seminar  Qtr. Hrs. - 2-5
PR: Consent of the instructor. May be repeated for credit.

MATH 498 Independent Study  Qtr. Hrs. - 2-5
PR: Consent of the instructor. May be repeated for credit.

MATH 499 Undergraduate Research  Qtr. Hrs. - 2-5
PR: Consent of the instructor. May be repeated for credit.
MEAS 341 Mechanisms
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
PR: MEAS 341. Experimental mechanics, dynamics, measurements; applications of dynamics in design.

MEAS 351 Measurement Systems
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
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
PR: ENGR 331. Applied thermodynamics; gas mixtures, power cycles, and reactive systems.

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

MEAS 421 Space Mechanics
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

MEAS 424 Flight Vehicle Structures
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 437 Energy Conversion  Qtr. Hrs. - 3
PR: MEAS 372 and PHYS 344. Unconventional methods of energy conversion; particular emphasis on fuel cells, thermoelectrics, thermonics, solar energy, photovoltaics, nuclear, and magnetohydrodynamics.

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 471 Statistical Thermodynamics  Qtr. Hrs. - 3

MEAS 472,473 Heat Transfer  Qtr. Hrs. - 3

MEAS 496 Special Topics  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

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

MEAS 498 Independent Study  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

MEAS 499 Undergraduate Research  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
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
Immunohematology; 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.

MEDICAL RECORDS SCIENCE

MRSC 300,301,302,303 Medical Records Science Qtr. Hrs. - 3,4,4,4
Methods of securing and preserving medical records; establishing medical reference library; research and statistical techniques; types of records.

MRSC 310 Medical Terminology Qtr. Hrs. - 3
Scientific prefixes and suffixes; terminology of disease and operations; drug and anesthesia terms; abbreviations; hospital terminology.

MRSC 320,321 Medical Records Organization and Administration Qtr. Hrs. - 3,3
Principles of management; procedures in medical records department; control and production standards; administration of data processing systems.

MRSC 370,371,372 Directed Practice in Medical Records Qtr. Hrs. - 2,2,2
A rotating supervised practice enabling the student to deal with problems, to accept responsibility, and to appreciate the confidential nature of medical records.

MRSC 375 Problems in Medical Records Administration Qtr. Hrs. - 3
Study of problem areas in medical records administration, discussion of topics involving students' experiences in medical records.
MICROBIOLOGY

MICR 200 General Microbiology  Qtr. Hrs. - 4
PR: 8 hours in biological sciences. Fundamentals of microbiology, morphology, metabolism. Laboratory emphasizes procedures and principles in microbiology.

MICR 210 Culture Media and Reagents  Qtr. Hrs. - 2
PR: MICR 200. Preparation of differential, selective, and enrichment media; reagents used in microbiology.

MICR 220 Sanitary Science and Public Health  Qtr. Hrs. - 3
PR: MICR 200. Theories of diseases; sanitary procedures in water purification; sewage disposal; refuse collection; milk supplies; swimming pools; air contamination; personal and public health. (Not for majors in microbiology).

MICR 300 Advanced General Microbiology  Qtr. Hrs. - 4
PR: MICR 200. Advanced fundamental theory and technique.

MICR 320 Pathogenic Microbiology  Qtr. Hrs. - 4
PR: MICR 300. 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: 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 pathogenic bacteria in 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 496 Special Topics  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.
MICR 497 Undergraduate Seminar
PR: Consent of instructor. May be repeated for credit.

MICR 498 Independent Study
PR: Consent of instructor. May be repeated for credit.

MUSIC

Courses are classified as follows:


MUS 101, 102, 103 Music Theory
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
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
May be repeated for credit.

MUS 112 Voice
One half-hour private instruction per week. May be repeated for credit.

MUS 113 String
One half-hour private instruction per week. May be repeated for credit.

MUS 114 Woodwind
One half-hour private instruction per week. May be repeated for credit.

MUS 115 Brass
One half-hour private instruction per week. May be repeated for credit.

MUS 116 Percussion
One half-hour private instruction per week. May be repeated for credit.
MUS 117 Organ  
One half-hour private instruction per week. May be repeated for credit.

MUS 118 Piano  
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 resonation.

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

MUS 218,219,220 Piano Literature
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
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
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
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
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
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
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
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
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
(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
PR: MUS 303. Formal aspects of the styles of major composers with an
emphasis on orchestral literature.

MUS 411 Piano
PR: Consent of instructor. One hour private instruction per week. May be
repeated for credit.

MUS 412 Voice
PR: Consent of instructor. One hour private instruction per week. May be
repeated for credit.

MUS 413 String
PR: Consent of instructor. One hour private instruction per week. May be
repeated for credit.

MUS 414 Woodwind
PR: Consent of instructor. One hour private instruction per week. May be
repeated for credit.

MUS 415 Brass
PR: Consent of instructor. One hour private instruction per week. May be
repeated for credit.

MUS 416 Percussion
PR: Consent of instructor. One hour private instruction per week. May be
repeated for credit.

MUS 417 Organ
PR: Consent of instructor. One hour private instruction per week. May be
repeated for credit.

MUS 421 Piano
PR: Consent of instructor. Hours of instruction are variable. May be
repeated for credit.

MUS 422 Voice
PR: Consent of instructor. Hours of instruction are variable. May be
repeated for credit.

MUS 423 String
PR: Consent of instructor. Hours of instruction are variable. May be
repeated for credit.

MUS 424 Woodwind
PR: Consent of instructor. Hours of instruction are variable. May be
repeated for credit.
MUS 425 Brass  
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.

MUS 426 Percussion  
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.

MUS 427 Organ  
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.

MUS 450,451,452 Music of the Twentieth Century  
PR: Consent of instructor. Hours of instruction are variable. May be repeated for credit.

MUS 496 Special Topics  
PR: Consent of instructor. May be repeated for credit.

MUS 497 Undergraduate Seminar  
PR: Consent of instructor. May be repeated for credit.

MUS 498 Independent Study  
PR: Consent of instructor. May be repeated for credit.

NATURAL SCIENCE

SCI 490 Senior Seminar: Science in Human Affairs  
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. Not open to students majoring in the College of Natural Sciences.

PHILOSOPHY

PHI 105 Non-Formal Logic  
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  
Basic analysis of patterns of inference; examination of logical form; development of elementary techniques for assessing validity of inferences.

PHI 221 Introduction to Philosophy  
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 Philosophical Analysis  Qtr. Hrs. - 4
The role of philosophy as the clarification of basic concepts used in various kinds of discourse. The impact of logical positivism and linguistic analysis.

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 409 Philosophy of Science  Qtr. Hrs. - 4
An examination of the conceptual foundations and methodology of modern science.

PHI 496 Special Topics  Qtr. Hrs. - 2-5
PR: Consent of instructor. May be repeated for credit.

PHI 498 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
PR: Two years of high school mathematics. An elementary survey of the astronomical universe including pulsars and the application of space technology to observational astronomy. Appropriate for the Environmental Studies Program.
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 221. 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 227,228 Classical Mechanics Qtr. Hrs. - 3,3
PR: PHYS 213 or PHYS 108 or consent of instructor. A study of statics and dynamics of rigid bodies, planetary motion, and special relativity. Intended for prospective teachers of science in secondary schools and others desiring knowledge of mechanics.

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 287,288,289 Physical Measurements Qtr. Hrs. - 3,3,3
PR: PHYS 213 or 108 or consent of instructor. A laboratory oriented course that begins with basic electrical circuits and includes a study of vacuum tubes, semiconductors and other electronic devices such as rectifiers, amplifiers and oscillators. Experiments in Modern Physics are also included. Intended for prospective teachers of science in secondary schools and others desiring knowledge and experience in circuits and electronics related to physical measurements.

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 321,322,323 Mechanics Qtr. Hrs. - 3,3,3
PR: PHYS 213 and MATH 222 or consent of instructor. A study of mechanics including vectors, coordinate transformations, fundamental theorems of Newtonian mechanics, rigid body dynamics, small oscillations, Lagrangian mechanics, and special relativity.
PHYS 331,332,333 Electricity and Magnetism  Qtr. Hrs. - 3,3,3
PR: PHY 213, 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 335,336 Electronics  Qtr. Hrs. - 3,3
PR: PHY 213 or consent of instructor. The study of basic D.C. and A.C. circuit theory, the properties of vacuum tubes, semiconductors, power supplies, vacuum triodes and transistors, amplification, oscillation, modulation, detection, and noise.

PHYS 341,342,343 Modern Physics  Qtr. Hrs. - 3,3,3
PR: PHY 213 and MATH 223 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 Engineering  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 347,348 Concepts in Modern Physics  Qtr. Hrs. - 3,3
PR: PHY 213 or PHY 108 or consent of instructor. A study of modern physics, including atomic and molecular structure, Bohr model of the atom, special relativity, and solid state physics. Intended for prospective teachers of science in secondary schools and others desiring an introductory course in modern physics.

PHYS 351,352 Optics  Qtr. Hrs. - 3,3
PR: PHY 213 or consent of instructor. A study of refraction, interference, diffraction, optical instruments, dipole radiation, Kirchoff integral, scattering, polarization, and stimulated emission.

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 357,358 Wave Motion and Optics  Qtr. Hrs. - 3,3
PR: PHY 213 or PHY 108 or consent of instructor. A lecture and laboratory study of ripple tank water waves, sound waves, microwaves, and optics. Topics in both geometrical and physical optics will be considered. Intended for prospective teachers of science in secondary schools and others desiring knowledge and experience in wave phenomena.

PHYS 381 Physics Laboratory - Electronics  Qtr. Hrs. - 3
PR: PHY 213 or consent of instructor. Lecture and laboratory work stressing electronic principles through the study of test equipment, power supplies, amplifiers, oscillators, and pulse circuits.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Qtr. Hrs.</th>
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<tbody>
<tr>
<td>PHYS 382</td>
<td>Physics Laboratory - Electricity and Magnetism</td>
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<td>PHYS 383</td>
<td>Physics Laboratory - Nuclear Physics</td>
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<td>PHYS 384</td>
<td>Physics Laboratory - Optics and Wave Motion</td>
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<td>PHYS 385</td>
<td>Physics Laboratory - Modern and Solid State Physics</td>
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<tr>
<td>PHYS 461</td>
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<td>PHYS 471,472</td>
<td>Quantum Mechanics</td>
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<td>PHYS 475</td>
<td>Statistical Physics</td>
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<tr>
<td>PHYS 491</td>
<td>Contemporary Physics</td>
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<td>PHYS 496</td>
<td>Special Topics</td>
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<tr>
<td>PHYS 498</td>
<td>Independent Study</td>
<td>2-5</td>
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</table>
PHYS 499 Undergraduate Research  
PR: Consent of instructor. May be repeated for credit.

POLITICAL SCIENCE

PCL 201 American National Government  
A study of the dynamics of American national government, including its structure, organization, powers, and procedures.

PCL 203 Principles of Political Science  
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 301 American State and Local Government  
PR: PCL 201, 203 or consent of instructor. Analysis of the organization and functions of state and local governments and of problems of policy formulation and execution, particularly as they relate to the federal system.

PCL 305 Political Parties and Processes  
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  
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  
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  
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 International Relations  
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 406 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 Administration I Qtr. Hrs. - 3
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. - 3
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 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  
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  
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 461 Political Philosophy  
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  
PR: PCL 201, 203 or consent of instructor. Renaissance to the 19th Century.

PCL 463 Political Philosophy  
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  
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  
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 497 Undergraduate Seminar  
PR: Consent of instructor. May be repeated for credit.

PCL 498 Independent Study  
PR: Consent of instructor. May be repeated for credit.

PCL 499 Undergraduate Research  
PR: Consent of instructor. May be repeated for credit.

PSYCHOLOGY

PSY 201, 202 General Psychology  
The basic principles, theories, and methods of contemporary psychology.

PSY 300 Applied Psychology  
Applications of principles of psychology to problems of human development, personal and social adjustment, career choice and satisfaction.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Ctr. Hrs.</th>
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<tbody>
<tr>
<td>PSY 301</td>
<td>Basic Learning Processes</td>
<td>4</td>
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<tr>
<td></td>
<td>PR: PSY 201, 202. A survey of theories and research findings from basic laboratory investigation of learning phenomena. Lec-lab.</td>
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<tr>
<td>PSY 302</td>
<td>Complex Human Learning</td>
<td>4</td>
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<td>PR: PSY 201, 202. Selected topics from theories and research on complex human learning and problem solving. Lec-lab.</td>
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<tr>
<td>PSY 303</td>
<td>Physiological Psychology</td>
<td>4</td>
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<tr>
<td>PSY 304</td>
<td>Perception</td>
<td>4</td>
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<td>PR: PSY 201, 202. Consideration of physical and psychological variables in perceptual phenomena. Lec-lab.</td>
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<tr>
<td>PSY 305</td>
<td>Psychological Measurement</td>
<td>4</td>
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<td></td>
<td>PR: PSY 201, 202, STAT 201. Theory of test construction and consideration of selected measures of psychological characteristics.</td>
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<tr>
<td>PSY 306</td>
<td>Psychology of Adjustment</td>
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<td>Psychological principles of adjustment, application of psychology to problems in living.</td>
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<tr>
<td>PSY 307</td>
<td>Motivation</td>
<td>4</td>
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<td>PSY 308</td>
<td>Social Psychology</td>
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<td>PR: PSY 201, 202. Effects of social situations and social variables on the behavior of individuals.</td>
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<tr>
<td>PSY 309</td>
<td>Personality Theory</td>
<td>4</td>
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<td>PSY 310</td>
<td>Abnormal Psychology</td>
<td>4</td>
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<td>PR: PSY 201, 202. Classification, causation, and treatment of deviant patterns of behavior.</td>
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<td>PSY 311</td>
<td>Methods of Psychological Research</td>
<td>3</td>
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<td>PR: PSY 201, 202. Critical evaluation of research methods in psychology, considerations of internal and external validity.</td>
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<td>PSY 312</td>
<td>Clinical Psychology</td>
<td>4</td>
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<td>PR: PSY 309, 310. Consideration of psychodiagnostics, behavioral modification techniques and clinical research. Lec-lab.</td>
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<tr>
<td>PSY 313</td>
<td>Developmental Psychology</td>
<td>4</td>
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<tr>
<td></td>
<td>The effects of genetic, psychological, maturational, and social factors on behavior at various stages of development.</td>
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</tbody>
</table>
PSY 314 Industrial Psychology  
PR: PSY 201, 202, STAT 201. Psychological principles of employee selection, training, and morale.

PSY 321 Principles of Behavior Modification  
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 323 Comparative Psychology  

PSY 401 Senior Research Proposal  
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 405 History and Systems of Psychology  
PR: PSY 301, 309. Historical development of psychology with emphasis on classical theoretical positions.

PSY 408 Experimental Social Psychology  
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  

PSY 497 Undergraduate Seminar  
PR: Consent of instructor. May be repeated for credit.

PSY 498 Independent Study  
PR: Consent of instructor. May be repeated for credit.

PSY 499 Undergraduate Research  
PR: Consent of instructor.

RADIO/TELEVISION

RTV 140 Radio-Television I  
Qtr. Hrs. - 4  
Nature of the media, the mechanics of operation, history, economics, programming, and internal and external controls.

RTV 240 Audio Production I  
Qtr. Hrs. - 3  
Sound recording; acoustics; and music and effects, both live and recorded, for radio and television. RTV 260 required for students taking RTV 240.
RTV 241 Television Production I  
Qtr. Hrs. - 3  
Studio operation; available means of presentation: studio, lights, sets, graphics, cameras, audio switching, and video tape recording. RTV 261 required for students taking RTV 241.

RTV 260 Audio Production I Laboratory  
Qtr. Hrs. - 1  
Required of students taking RTV 240. Three hours per week are required in the production of radio programs. Students are assigned specific production responsibilities.

RTV 261 Television Production I Laboratory  
Qtr. Hrs. - 1  
Required of students taking RTV 241. Three hours per week are required in the production of television programs. Students are assigned specific production responsibilities.

RTV 260 Audio Production I Laboratory  
Qtr. Hrs. - 1  
Required of students taking RTV 240. Three hours per week are required in the production of radio programs. Students are assigned specific production responsibilities.

RTV 261 Television Production I Laboratory  
Qtr. Hrs. - 1  
Required of students taking RTV 241. Three hours per week are required in the production of television programs. Students are assigned specific production responsibilities.

RTV 340 Audio Production II  
Qtr. Hrs. - 3  
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 360 required for students taking RTV 340.

RTV 341 Television Production II  
Qtr. Hrs. - 3  
PR: RTV 241 or consent of instructor. Emphasis on the coordination of talent, cameras, visuals, audio and lighting with the dramatic values of the presentation. RTV 361 required for students taking RTV 341.

RTV 342 Broadcast Journalism I  
Qtr. Hrs. - 4  
Examination of the historical, legal, and quasi-legal influences on broadcast news; introduction to news sources, writing, and interviewing techniques for radio-televison 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 346 Radio, Television, and Society  
Qtr. Hrs. - 3  
A study of the impact of electronic media upon the habits, customs, and thinking of our times. Considerations of internal media problems.

RTV 350 Speech for 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.
RTV 351 Radio Production and Directing
PR: RTV 340. Techniques and practice in producing and directing radio programs. RTV 371 required for students taking RTV 351.

RTV 360 Audio Production II Laboratory
Required of students taking RTV 340. Three hours per week are required in the production of radio programs. Students are assigned specific production responsibilities.

RTV 361 Television Production II Laboratory
Required of students taking RTV 341. Three hours per week are required in the production of television programs. Students are assigned specific production responsibilities.

RTV 371 Radio Production and Directing Laboratory
Required of students taking RTV 351. Three hours per week are required in the production of radio programs. Students are assigned specific production responsibilities.

RTV 441 Television Production and Directing
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; integration of the parts to the whole. RTV 461 required for students taking RTV 441.

RTV 444 Broadcast Continuity and Programming II
PR: RTV 344 or consent of instructor. Preparation of documentaries and dramatic writing for radio and television.

RTV 445 Television Film Production
PR: Consent of instructor. Planning and preparation of filmed documentaries, public service and commercial productions. (Laboratory hours to be arranged.)

RTV 448 Broadcast Regulations
PR: RTV 140 or RTV 342. Federal, state, local and self-regulatory agencies and practices which govern electronic media.

RTV 450 Broadcast Journalism II

RTV 451 Radio-Television Advertising
PR: Consent of instructor. Radio and television as advertising media; advertisers' demands and budgets; appropriate programs for the sponsors' needs; writing of commercial continuity.

RTV 452 Broadcast Criticism
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  
PR: Consent of instructor. 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  
PR: Consent of instructor. 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 474 required for students taking RTV 454.

RTV 457 Broadcast Internship  
PR: RTV 240 and RTV 344 and consent of instructor. Practicum at a selected professional broadcast production center 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.

RTV 458 Broadcast Management  
PR: RTV 448. Consideration of broadcast management problems in station operations at the local, regional and national levels.

RTV 461 Television Production and Directing Laboratory  
PR: Students taking RTV 441. Three hours per week are required in the production of television programs. Students are assigned specific production responsibilities.

RTV 470 Broadcast Journalism II Laboratory  
PR: Students taking RTV 450. Three hours per week are required in the production of radio and/or television programs. Students are assigned specific production responsibilities.

RTV 474 Instructional Broadcasting Laboratory  
PR: Students taking RTV 454. Three hours per week are required in the production of radio and/or television programs. Students are assigned specific production responsibilities.

RTV 496 Special Topics  
PR: Consent of instructor. May be repeated for credit.

RTV 498 Independent Study  
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
Same as HUM 317.

REL 318 The Religious Heritage of Islam
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.

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
PR: RUS 101 or equivalent. Continuation of RUS 101.
Qtr. Hrs. - 3

RUS 103 Elementary Russian Language and Civilization
PR: RUS 102 or equivalent. Continuation of RUS 102.
Qtr. Hrs. - 3

RUS 201 Intermediate Russian Language and Civilization
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.
Qtr. Hrs. - 3

RUS 202 Intermediate Russian Language and Civilization
PR: RUS 201 or equivalent. Continuation of RUS 201.
Qtr. Hrs. - 3

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

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.

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. This course, primarily intended for the senior student, is 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.


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


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


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. - 3
PR: SOC 201, 202. 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. - 3
PR: SOC 201, 202, 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. - 3
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. - 3
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. - 3
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 314 Cultural Anthropology  Qtr. Hrs. - 3
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. - 3
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. - 3
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 325 Urban Sociology  Qtr. Hrs. - 3
PR: SOC 201, 202. 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. - 3
PR: SOC 201, 202. Rural American life, its resources, and the problems
of changing patterns of rural social structure.

SOC 331 Social Problems  Qtr. Hrs. - 3
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. - 3
PR: SOC 201, 202. 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. - 3
Social institutions, social differentiation, and social control, with emphasis
on American and other modern societies.
SOC 336 Social Stratification
Qtr. Hrs. - 3
PR: SOC 201, 202. 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. - 5
PR: SOC 201, 202. 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. - 3
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. - 3
PR: SOC 340, 341. 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. - 3
PR: SOC 340, 341. 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 345 Juvenile Delinquency
Qtr. Hrs. - 5
PR: SOC 201, 202. 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. - 5

SOC 348 Sociology of Alcoholism
Qtr. Hrs. - 3
Introduction to the nature of alcoholism and review of its impact on society.

SOC 350 Sociology and the Supreme Court: A Focus for Social Change
Qtr. Hrs. - 3
Sociological, economic and political forces giving rise to and resulting from decisions of the Supreme Court.

SOC 352 Intergroup Conflict and Prejudice
Qtr. Hrs. - 3
PR: SOC 201, 202. 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 354 The Sociology of Adolescence Qtr. Hrs. - 3
PR: SOC 201, 202. 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, 202. Concerned with the context and essential sources of social development and change.

SOC 362 Contemporary Woman and Society Qtr. Hrs. - 3
PR: SOC 201, 202. 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 402 Method and Theory in Anthropology Qtr. Hrs. - 3
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 407 The Family Qtr. Hrs. - 5
PR: SOC 201, 202. The study of the family as a social institution. The family through history, and the family cross-culturally. The modern American family as a distinct 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, 202 and one course in statistics. A study of growth problems in the emerging nations of Africa and Latin America.

SOC 411 Demography Qtr. Hrs. - 3
PR: SOC 201, 202. 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, 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. - 3
Principles governing the spatial distribution of human populations and activities within an area.

SOC 451 Contemporary Social Movements Qtr. Hrs. - 3
PR: SOC 201, 202, 231. Causes and effects of various social movements in American society compared to large-scale upheavals throughout the West. Considers various theories of explanation.
SOC 495 Undergraduate Research Methods
PR: Consent of instructor. May be repeated for credit.

SOC 496 Special Topics
PR: Consent of instructor. May be repeated for credit.

SOC 498 Independent Study
PR: Consent of instructor. For graduating seniors in Sociology. May be repeated for credit.

SOC 499 Undergraduate Research
PR: Consent of instructor. May be repeated for credit.

SPANISH

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
PR: SPA 101 or equivalent. Continuation of SPA 101.
Qtr. Hrs. - 3

SPA 103 Elementary Spanish Language and Civilization
PR: SPA 102 or equivalent. Continuation of SPA 102.
Qtr. Hrs. - 3

SPA 201 Intermediate Spanish Language and Civilization
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.
Qtr. Hrs. - 3

SPA 202 Intermediate Spanish Language and Civilization
PR: SPA 201 or equivalent. Continuation of SPA 201.
Qtr. Hrs. - 3

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

SPA 301 Spanish Composition
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.
Qtr. Hrs. - 4

SPA 303 Spanish Conversation
PR: SPA 203 or equivalent. Development of skills in conversation and comprehension through practice and systematic review of phonology and grammatical structure.
Qtr. Hrs. - 4
SPA 311 Survey of Spanish Literature
PR: SPA 203 or equivalent. Main literary currents and works from the Middle Ages through the Renaissance and Baroque.

Qtr. Hrs. - 3

SPA 312 Survey of Spanish Literature
PR: SPA 203 or equivalent. Main literary currents and works of the eighteenth and nineteenth centuries.

Qtr. Hrs. - 3

SPA 313 Survey of Spanish Literature
PR: SPA 203 or equivalent. Main literary currents and works from the Generation of 1898 to the present.

Qtr. Hrs. - 3

SPA 316 Survey of Latin-American Literature
PR: SPA 203 or equivalent. Main literary currents and works from the Colonial Period through the struggle for independence.

Qtr. Hrs. - 3

SPA 317 Survey of Latin-American Literature
PR: SPA 203 or equivalent. Main literary currents and works from the second half of the nineteenth century to the present.

Qtr. Hrs. - 3

SPA 401 Spanish Phonetics and Diction
PR: SPA 303 or equivalent. Spanish phonology with emphasis on phonetic groupings.

Qtr. Hrs. - 2

SPA 421 Golden Age Drama

Qtr. Hrs. - 3

SPA 423 Cervantes
PR: SPA 311. Don Quixote.

Qtr. Hrs. - 3

SPA 441 Nineteenth Century Spanish Literature

Qtr. Hrs. - 3

SPA 442 Nineteenth Century Spanish Literature
PR: SPA 312. The realistic and naturalistic novel in Spain.

Qtr. Hrs. - 3

SPA 443 The Generation of 1898
PR: SPA 313. A study of the Generation's main authors and their works.

Qtr. Hrs. - 3

SPA 451 Twentieth Century Spanish Literature
PR: SPA 313. The contemporary Spanish novel.

Qtr. Hrs. - 3

SPA 452 Twentieth Century Spanish Literature
PR: SPA 313. Contemporary Spanish drama and poetry.

Qtr. Hrs. - 5

SPA 497 Undergraduate Seminar
PR: Consent of instructor. May be repeated for credit.

Qtr. Hrs. - 2-5
SPA 498 Independent Study  
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. - 3  
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 360 Persuasion: Argumentation  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 363 Group Discussion and Interaction  Qtr. Hrs. - 4  
Nature of discussion and conference, problem analysis, duties of the  
participants, function of leader, and participation in various group  
situations.

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 370 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 371 Speech and Human Relations  
Introduction to semantics; symbols and meaning and the relationship with human behavior.

SPE 460 Group Dynamics  
A study of human behavior in group situations.

SPE 461 Studies in Modern Oral Communication Theory  
Comparative study of the approaches of modern oral communication theorists.

SPE 462 Attitude Formation and Change  
PR: SPE 360 or consent of instructor. Application of the theory of reasoned discourse. Emphasis on evidence, argument, and analysis; factors involving the change of audience attitudes, and their application in the speaking situation. Student speeches, reports and projects.

SPE 463 Studies in Listening  
Analysis of current trends, professional literature, and resource materials bearing upon the teaching of listening in the classroom. Practice in listening; preparing listening experiences; oral and written reports.

SPE 468 Survey of Rhetoric  
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 Language Disorders of Children  
Study of the facts, concepts, and theories applicable to the bases and diagnoses of language disorders in children.

SPE 470 History and Criticism of American Public Address  
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  
Rhetorical criticism of speaking and writing of British statesmen who have had an influence on political, social, and economic milieu of their times.

SPE 495 Undergraduate Research Methods  
PR: Consent of instructor. May be repeated for credit.

SPE 496 Special Topics  
PR: Consent of instructor. May be repeated for credit.

SPE 498 Independent Study  
PR: Consent of instructor. May be repeated for credit.
STATISTICS

STAT 201 Principles of Statistics
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
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
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
CR: STAT 321. Use of computers in problem solving for STAT 321. (Same as ECON 322.)

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

STAT 335 Probability and Statistics for Engineers
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
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
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
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
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
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
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
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 496 Special Topics
PR: Consent of instructor. May be repeated for credit.

STAT 497 Undergraduate Seminar
PR: Consent of instructor. May be repeated for credit.

STAT 498 Independent Study
PR: Consent of instructor. May be repeated for credit.

STAT 499 Undergraduate Research
PR: Consent of instructor. May be repeated for credit.

THEATRE

THA 180 Study of Drama and Theatre
Nature of drama and the theatre, and basic principles of play analysis.

THA 220, 221, 222 Theatre Practice I
Introduction to stagecraft, lighting, properties, costume design. (Laboratory hours to be arranged and practical experience on technical crews as required.)
THA 230 Interpretation I  
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 283, 284, 285 Acting I  
Study and practical experience in the development of vocal and physical skills in acting. An introduction to mime, pantomime, and improvisation. May be repeated to a maximum of 3 hours credit per course.

THA 310 History of the Motion Picture  
Development of the film industry; its social and economic impact. (Same as COM 310.)

THA 320, 321, 322 Theatre Practice II  
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  
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  
Development of theatre art from the earliest times through the sixteenth century.

THA 332 History of the Theatre: XVII and XVIII Centuries  
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  
Development of theatre art from the Romantic Period to the modern theatre.

THA 380 Directing I  
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  
Study and practice of scene design; perspective drawing, fundamentals of design, and techniques of scene painting. (Service on crews as required.)

THA 382 Stage Lighting  
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 283, 284, or 285. 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. - 3
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 and 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.

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THA 487 American Theatre: XX Century
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
An introduction to the aesthetic 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
PR: THA 230. Individual oral reading projects; an intensive study of the literature for interpretation.

THA 496 Special Topics
PR: Consent of instructor. May be repeated for credit.

THA 497 Undergraduate Seminar
PR: Consent of instructor. May be repeated for credit.

THA 498 Independent Study
PR: Consent of instructor. May be repeated for credit.

TRANSPORTATION

TRAN 301 Principles of Transportation
PR: ECON 203. The economic characteristics, organization, and services of the different modes of transportation.

TRAN 401 Transportation Pricing and Policy
PR: ACCY 103 and TRAN 301. An analysis of transportation costs, financing, rate making, and governmental regulation.

TRAN 411 Transportation Planning
PR: TRAN 401. An analysis of the major problems of the American transportation system and an examination of policies for the development of an efficient transportation system.

TRAN 499 Undergraduate Research
PR: Consent of instructor. May be repeated for credit.

ZOOLOGY

ZOOL 100 General Zoology
PR: BIOL 100. Introduction to zoology; structure, function, representative groups; current concepts in zoological sciences. Laboratory illustrates basic principles in zoology.
ZOOL 220, 221 Comparative Vertebrate Anatomy
PR: ZOOL 100. The vertebrate animals; relationship of organs and systems; and their phylogenetic significance.

ZOOL 234 Human Anatomy
PR: ZOOL 100. The structure of the human body. Not open to students with credit in ZOOL 220, 221 or equivalent.

ZOOL 240 Invertebrate Zoology
PR: ZOOL 100. Taxonomy, anatomy, and ecology of the invertebrate animals.

ZOOL 310 Histological Technique
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
PR: ZOOL 220-221. Embryology of the vertebrates: fertilization of egg; stages of cleavage; development of organs and systems.

ZOOL 322 Vertebrate Histology
PR: ZOOL 100. Anatomy, structure and function of major cell types and tissues.

ZOOL 330 Animal Physiology
PR: BIOL 332 or consent of instructor. Function and interrelationships of nervous, endocrine, muscle, reticulo-endothelial, reproductive, excretory, respiratory, and digestive systems.

ZOOL 340 Vertebrate Zoology
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
PR: ZOOL 100. Introduction to insects; their identification, biology and ecology.

ZOOL 355 Game Conservation and Management
PR: ZOOL 100. Principles of conservation and management; habitat improvement; wildlife techniques; public relations.

ZOOL 370 Animal Parasitology
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
PR: ZOOL 100. Classical ethology, modern experimental ethology and behavioral ecology are considered.
ZOOL 440 Principles of Zoological Systematics  
PR: BIOL 460 and 15 hours or 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  
PR: ZOOL 340 or consent of instructor. Introduction to the biology of the fishes, their classification, evolution, and life histories.

ZOOL 446 Herpetology  
PR: ZOOL 340 or consent of instructor. Introduction to the biology of the amphibians and reptiles, their classification, evolution, and life histories.

ZOOL 447 Ornithology  
PR: ZOOL 340 or consent of instructor. Introduction to the biology of birds, their classification, evolution, and life histories.

ZOOL 448 Mammalogy  
PR: ZOOL 340 or consent of instructor. Introduction to the biology of mammals, their classification, evolution, and life histories.

ZOOL 450 Fishery Biology  

ZOOL 452 Lake and Stream Management  
PR: ZOOL 450. The ecology of freshwater fishes; techniques of aquatic research.

ZOOL 453 Zoogeography  
PR: BIOL 350, 351. Principles and concepts concerning regional patterns of distribution of the animals of the world, both past and present.

ZOOL 473 Medical Entomology  
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 496 Special Topics  
PR: Consent of instructor. May be repeated for credit.

ZOOL 497 Undergraduate Seminar  
PR: Consent of instructor. May be repeated for credit.

ZOOL 498 Independent Study  
PR: Consent of instructor. May be repeated for credit.

ZOOL 499 Undergraduate Research  
PR: Consent of instructor. May be repeated for credit.